The Performance of Equity Funds in Thailand, 1992 - 2000

Theeralak Satjawathee

This dissertation submitted in partial fulfilment of the requirements for the degree of

Doctor of Business Administration

Victoria Graduate School of Business

Faculty of Business and Law

Victoria University

Melbourne Australia

2004

DECLARATION

This dissertation entitled ***The Performance of Equity Funds in Thailand, 1992-2000*** is my own work and contains no material that has been published previously for the award of any degree in any university, except where due to reference is made in the text of the dissertation.

[redacted]

Theeralak Satjawathee

ACKNOWLEDGMENTS

I would like to express my deepest appreciation to Professor Geoffrey George, my principal supervisor, for his kind guidance and encouragement throughout my hard times, both coursework and research stages. His supervisory skills, teaching philosophy, mild manner and encouraging demeanor have been a lighthouse in giving the right way to me in completing this dissertation. I am grateful for his invaluable advice and patience in reading, commenting upon and improving the drafts. Such enabled me to learn much along the way.

I am particularly indebted to Dr. John Tippet, my co-supervisor. His kindly encouragement, timely guidance, worthwhile suggestions and endurance in reading, correcting and commenting on the drafts is greatly appreciated. His encouragement, comments and suggestions to improve the dissertation were always given in a very professional manner. Without the generous help of both my supervisors, this dissertation would not have been completed.

I am greatly appreciative to Dr. Kandiah Jegasothy, Lecturer in the School of Applied Economics, for his kind and skilful assistance, valuable comments and detailed suggestions with regard to the statistical work of the thesis. His advice, assistance and co-operation made the research possible.

I wish to thank Dr. Nick Billington for his encouragement and provision of facilities during coursework and research stages, and Dr. Jean Dawson for her caring advice with regard to the research requirements of the University. I am also grateful to the Postgraduate Research Unit (PRU) in providing several useful research training programs.

I wish to express my thanks to asset management companies, the Association of Investment Management Companies (AIMC), the Stock Exchange of Thailand (SET) and the Securities and Exchange Commission (SEC) in Thailand for providing data and information. A special thanks goes to Ms. Proadklao Ruoengnitivith for her kindness and helpfulness for valuable information for the research. I also thank Mr. Wiwat Pattaravarangkul for his assistance with data sourcing in Thailand.

I wish to express my sincere appreciation to many people at Payap University in Thailand. I am very grateful to Ms. Vanlapa Wongchan, Head of the Finance and Banking Department, who was the first to encourage me to pursue a doctoral degree. A special appreciation goes to Mr. Manit Pabut, the Dean of the Faculty of Accountancy, Finance and Banking, for his helpfulness in supporting me to obtain a full scholarship from Payap University. I am specially grateful to Dr. Boonthong Poocharoen, the President, for giving me the opportunity by granting me the university's scholarship. The encouragement and kind support of my colleagues has also been greatly appreciated.

Finally, and most importantly, to my dearest parents, I would like to give my heart-felt thanks for the great start they gave me in life, for teaching me a sense of perspective, for their emotional and spiritual support, not only during my study life but during my entire life. More than any statement, my wholehearted gratitude goes to them.

For all of the knowledge I have received,

I wish to dedicate this dissertation to my teachers,

from kindergarten teachers to doctoral degree teachers.

ABSTRACT

The primary aim of this study is to examine Thai equity fund performance during the period 1992-2000. The achievement of the primary aim will involve investigation of fund performance in sub-periods of expansionary and contractionary market environments, the relationship between investment performance and risk, and the correlation between the risk-adjusted performance measures. The secondary aim of this study is to investigate the persistence of fund performance between a subsequent period and a series of prior periods of varying length. This study of persistence will lead to an exploration of an optimal past performance information set of equity funds in Thailand.

Four risk-adjusted performance measures (Treynor measure, Sharpe ratio, Jensen alpha, and M^2) and a non risk-adjusted measure (rate of return) are utilised to examine the performance of 86 Thai equity funds. To reduce survivorship bias, the sample set includes all equity funds existing during the period January 1992 - December 2000.

Fund performance as measured by the four risk-adjusted performance measures strongly indicates that the majority of funds included in this study under-performed relative to the SET Index during 1992-2000. Results for sub-periods indicate that during the expansionary market environment, January 1992 - January 1996, the performance of Thai equity funds was superior to the market portfolio; however, during the contractionary market environment, February 1996 - December 2000, fund performance was inferior to that of the market.

When fund performance is measured by the non risk-adjusted performance measure, the rate of return for the majority of Thai funds for the period 1992-2000, was superior to the return of the market benchmark.

Theoretically, it is expected that the risk-adjusted performance measures would be independent of the risk measures. Based on the sample evidence, there was a slight positive relationship between the Sharpe investment performance and S.D. (total risk), indicating a bias in the positive direction. However, there is no discernible

relationship between other risk-adjusted performance measures and relevant measures of risk. In addition, it is expected that rate of return and risk measures would be significantly related. Evidence of significant inverse relationships between rate of return and both risk measures, beta and S.D., was found, indicating that during 1992-2000 lower risk funds appeared to get a higher rate of return than higher risk funds.

Furthermore, since there is evidence of a significant positive relationship between the four major risk-adjusted measures, it is concluded that any one measure is sufficient to examine fund risk-adjusted performance in Thailand.

To investigate fund performance persistence, the relationship between subsequent period performance and a series of prior periods of varying length was tested through the use of four methodologies: (1) regression analysis; (2) Spearman rank correlation coefficient; (3) quartile comparison tables; and (4) contingency tables.

The overall results of all methodologies, except contingency table analysis, suggest that using any of two to five year prior period information is a guide to future performance. The optimal past performance period to be used as a guide to future performance is the five-year prior period. Although there is evidence that two-year to five-year prior periods are related to subsequent period performance, there is no evidence that increasing the length of performance history from two to five years will lead to a monotonic increase in the predictive value of past period information. Further, all methodologies indicate that there is no evidence of a relationship between prior and subsequent period performance when using a six-year or seven-year prior period.

TABLE OF CONTENTS

CHAPTER 3: METHODOLOGY

CHAPTER 5: THE PERSISTENCE OF EQUITY FUND PERFORMANCE

CHAPTER 6: CONCLUSIONS, DISCUSSION, IMPLICATIONS, LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

LIST OF TABLES

LIST OF FIGURES

Chapter 1

INTRODUCTION

1.1 BACKGROUND OF EQUITY MARKET AND EQUITY FUND INDUSTRY IN THAILAND

The development of the equity market in Thailand traces its origins back to the early 1960s. In 1961 Thailand implemented its first National Economic and Social Development Plan to support the promotion of economic growth and stability as well as to develop the country's standard of living. Following upon this, as a part of the Second National Economic and Social Development Plan (1967-1971), Thailand's first officially sanctioned and regulated securities market was initially proposed to be established in order to mobilize additional capital for national economic development. Finally, on 30th April 1975, the Stock Exchange of Thailand (SET) officially started trading.

Impressive economic growth[1] and attractive returns[2] are evident. The SET has been one of the most dynamic emerging markets, with growth in total market capitalization averaging 61.1 per cent per annum during 1988-1995 (Association of Investment Management Companies 1996). However, Thailand was subjected to a severe

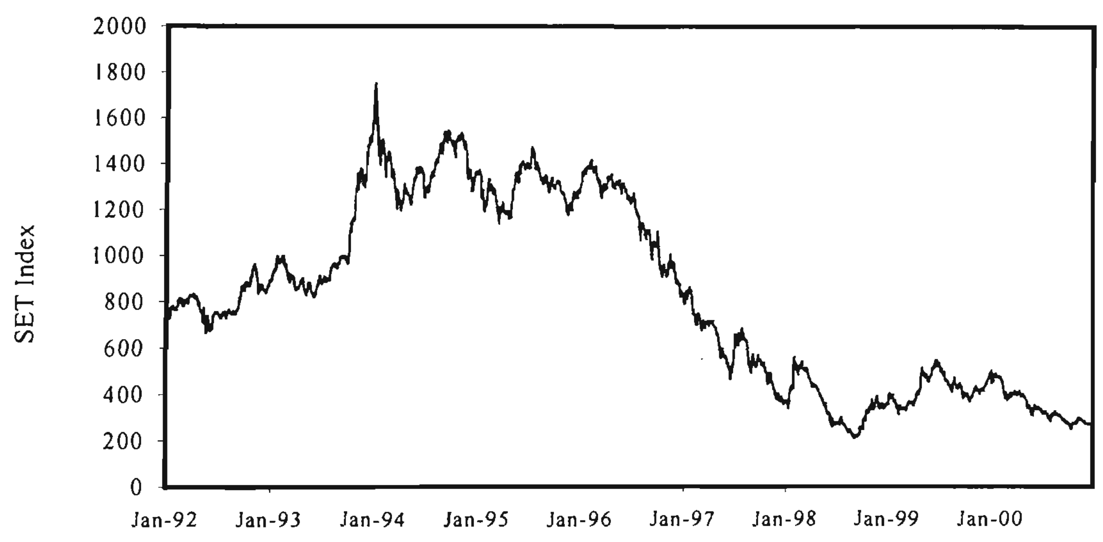
---

[1] The growth of Thai economy accelerated sharply between 1987-1995. Toward the end of this period, Thailand was a country, which had one of the fastest growth rates in the world (Leightner 1999).

[2] Prior to 1997, relatively low yields in industrial countries together with attractive returns in developing economies, including Thailand, motivated western investors to relocate their funds to money and capital markets. However, these inflows have rapidly gone out after the severe financial crisis in 1997(Siamwalla, Vajragupta and Vichyanond 1999).

financial crisis during which the economy collapsed in 1997. The collapse was considered to be the worst recession in modern Thai economic history (Hataiseree 1998). The total market capitalization of SET declined 55.7 per cent during 1996-1997 reflecting the financial crisis. By the end of 1997, the capitalization of the Thai equity market was 1,133 billion bath, having fallen from 2,559 billion baht in 1996. By the end of 2000, the capitalization of the Thai equity market was 1,279 billion bath, having fallen from 2,193 billion baht in 1999, or equivalent to a 41.7 percent decline. In addition, the SET index in December 2000 closed at 269.19 points, down 44.1 per cent from 481.92 points at the end of 1999 (Securities and Exchange Commission 1997, 1999 and 2000). To demonstrate movement of the SET index, Figure 1.1 presents the index covering the period of pre and post financial crisis as follows.

Figure 1.1 Set Index January 1992 - December 2000



Source: The Stock Exchange of Thailand

The SET index reached the highest level on 4 January 1994 at 1,753.73 points. The sharp decline of the index commenced in January 1996, which hit the lowest level at 207.31 points on 4 September 1998, equivalent to 88.18 percent decline from the highest point. Decreasing market capitalization of the Thai equity market and the sharp decline of the SET index during the financial market crisis indicated that the crisis has had a significant impact on the behaviour of equity return and therefore, on the performance of Thai equity funds. Before describing the impact of the crisis to Thai equity fund industry, background of the industry is recalled as follows.

Background of the equity fund industry in Thailand

In the period prior to 1992, the mutual fund industry in Thailand was monopolised by The MFC Asset Management Public Company Limited, which launched the first closed-end equity fund in 1977. During the period 1977 to 1991, The MFC Asset Management Public Company Limited established a further eleven local mutual funds, of which seven were still operating at the conclusion of 1991, all being equity funds (Association of Investment Management Companies 1999).

The monopolistic nature of the mutual fund industry in Thailand ceased in 1992 when the Thai parliament passed new securities law entitled 'The Securities and Exchange Act B.E. 2535', which led to the creation of seven new mutual fund licenses. Prior to 1997, the mutual fund industry had grown rapidly as channels for domestic savings mobilization. Presence is becoming an important part in the development of the Thai's capital market (Association of Investment Management Companies 1996).

The growth of the mutual fund industry during 1992-1998 was heavily oriented towards equity investments (see Figure 1.2 for details). In 1992 the net asset value of all equity funds was 71,547 million bahts, and accounted for 96.78 per cent of the total net asset value of all types of mutual funds. Table 1.1 shows that by 1995, the net asset value of equity funds had increased to 220,066 million bahts, indicating a 207.58 per cent growth within three years.

Table 1.1 Net asset value of equity funds, 1992-2000

Year	Net asset value of equity funds (million bahts)
1992	71,547
1993	202,184
1994	217,522
1995	220,066
1996	153,849
1997	61,524
1998	46,856
1999	46,656
2000	36,282

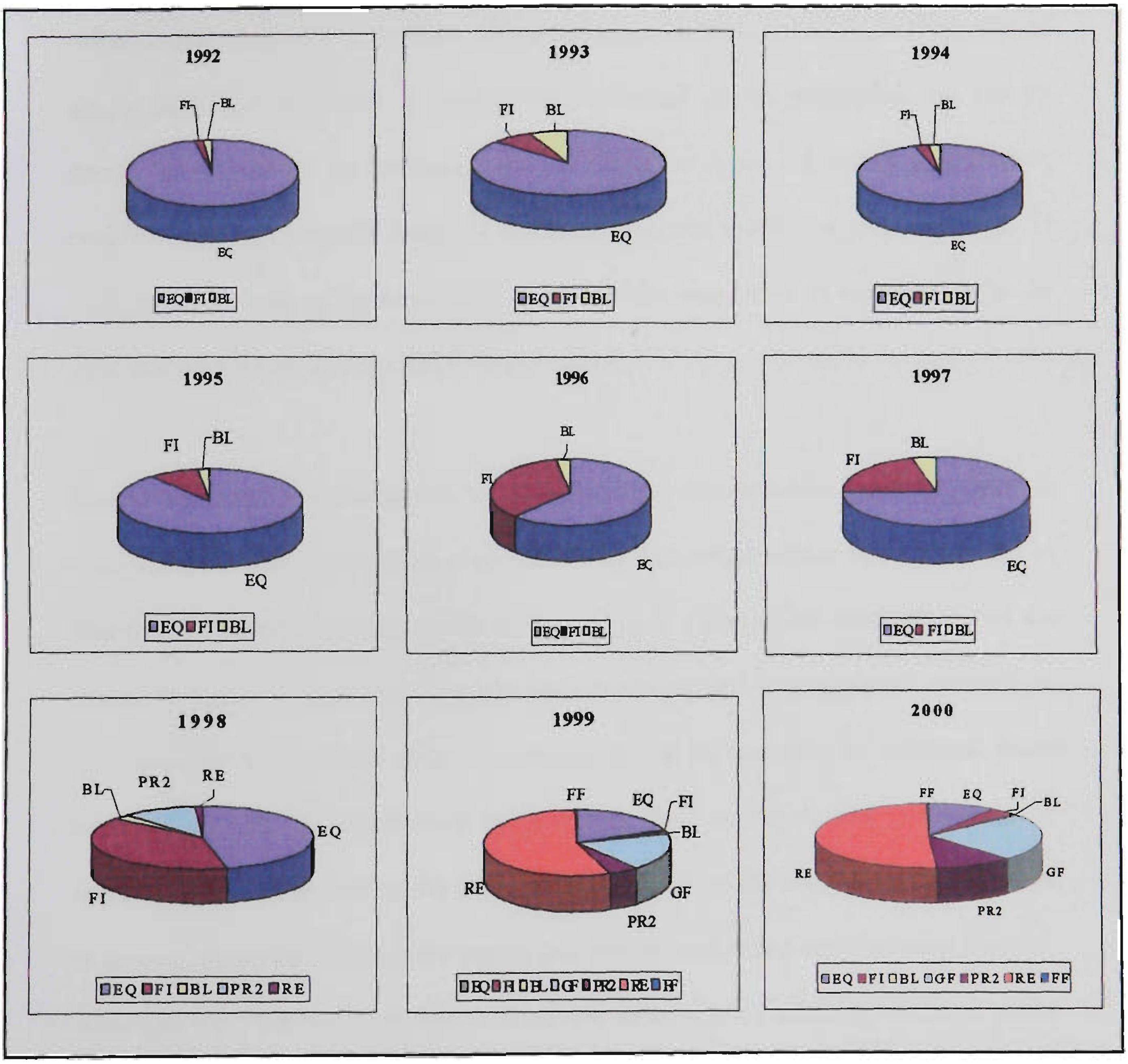
Sources: AIMC Fact Book Year 1999, and
Mutual Fund Annual Report Year 2000

Similar to the decline of the SET index and its market capitalization, equity fund assets began to fall in 1996 and net asset value decreased to 153, 849 million bahts by the end of 1996 and continued dropping during 1997. Within two years (1996-7), the net asset value of equity mutual funds fell by 72.04 per cent. By the conclusion of 2000, the net asset value had reduced to 36,282 million bahts.

Mutual funds in Thailand include equity funds, fixed income funds, balanced funds flexible funds, property funds for rehabilitation and mutual funds for rehabilitation.

The proportions of equity funds (considered by size of net asset values) in the Thai mutual fund industry are presented in Figure 1.2.

Figure 1.2 **Proportion of mutual funds: equity funds (EQ), fixed income funds (FI), balanced funds (BL), general fixed income funds (GF), flexible funds (FF), property funds for rehabilitation (PR2), and mutual fund for rehabilitation (RE) in Thai mutual fund industry, 1992-2000**



Source: Securities and Exchange Commission

Thailand is an emerging market, and might have equity market characteristics that are different from developed markets. Traditionally, equity funds in Thailand act as a bridge linking investors with the equity market. Unlike the US mutual fund industry where assets are heavily concentrated in short term money market funds, much of the growth in Thailand has been on the equity side (Association of Investment Management Companies 1996). This statement can be confirmed by Figure 1.2. It shows that the growth of the mutual fund industry in the early and mid 1990s was oriented towards equity investment. However, after the financial crisis in 1997, size of equity funds had decreased. In 1999-2000, the strong growth proportion was mainly driven by two newly set up funds, mutual funds for resolving financial institution problem (RE) and property funds for resolving financial institution problem (PR2). If these two newly set up funds are not considered, the proportion of equity funds in the Thai mutual fund industry is still considered high.

The background of equity fund industry in Thailand demonstrates that the industry is significant because equity funds have grown so dramatically (due to its size) and as channels for domestic saving mobilization, which is a part of the development of the country's capital market. However, the industry is subject to substantial volatility as evidenced by the financial crisis. Consequently the performance of managed funds has been an issue of significance for investors, fund managers and government in recent years. In other words, the performance of Thai equity fund is of interest to be examined, particularly during the period that covers both rising and declining markets. Although the Thai fund industry is relatively new, it is of great significance to the progress and development of the Thai economy.

1.2 BACKGROUND TO THE RESEARCH PROBLEM

A time period of study

Analysis of mutual funds is important because investors trend to use mutual fund vehicles as their approach to enter the stock market (Krueger and Callaway 1995). Although in the U.S. fund performance has been one of the most widely studied topics in all of finance (Reilly and Brown 2000), research in Thai fund performance is sparse and to date consists of unpublished working papers. Conclusions from prior Thai studies are variable and all prior studies have the limitation of being for relatively short time periods. This indicates that the issue of fund performance is far from resolved and that further research is required.

Studies of fund performance require a review period that extends over several years and covers at least a full market cycle which allows examination of fund performance during rising and declining markets (Kritzman 1986; Reilly and Norton 1995). No prior study of the performance of Thai equity funds has met this requirement. This study provides a longitudinal study of the performance of equity funds not previously researched in Thailand. The time period of this study is a nine-year period (1992 - 2000), namely from the time of the cessation of monopolisation within the Thai mutual funds industry in 1992 to 2000. This period covers a period of rising economic activity (January 1992 to January 1996) and a period of declining economic activity (February 1996 to December 2000) (see section 3.2.1 and Figure 3.1 for detail).

Return and risk performance information

Before the 1960s, the investment community evaluated portfolio performance almost entirely by reference to the rate of return. Researchers were aware of the concept of risk but there was no measurable specification for the term (Reilly and Brown 2000). Developments in modern portfolio theory by Markowitz (1952, 1959) demonstrated how investors could measure risk. However, because no measurement technique that combined risk and return performance into a single value had been developed, risk and return factors had to be considered separately during the early 1960s (Reilly and Brown 2000). Developments in fund performance measurement that combined return and risk into a single value, called a risk-adjusted performance measure, have been developed since 1965 including the major studies by Treynor (1965), Sharpe (1966), and Jensen (1968).

Although risk-adjusted performance measures that combine risk and return performance into a single value have been developed for many decades, some fund management companies in Thailand still provide return information separately from risk information. This means that investors have to consider return and risk separately. Moreover, some fund management companies provide fund performance information by reporting only the rate of return. To obtain the alternative fund performance information that combines risk and return performance into a single value, this research will examine fund performance by applying the techniques constructed and tested in developed capital markets by Treynor (1965), Sharpe (1966), Jensen (1968) and more recently Modigliani and Modigliani (1997), hereafter described as M^2. These four measures (Treynor measure, Sharpe ratio, Jensen alpha and M^2) will be discussed in the next chapter. In addition, to compare results, a non risk-adjusted performance measure will also be investigated.

Fund performance persistence

The Thai fund industry is relatively new and has therefore received little academic interest in testing for persistence in fund performance, which is testing for predictability of future performance. Although a number of U.S. studies have been examined for persistence in fund performance (for example, Grinblatt and Titman 1992; Malkiel 1995; Krueger and Callaway 1995; Elton, Gruber, and Blake 1996b; Carhart 1997; Phelps and Detzel 1997; Bers and Madura 2000), the conflicting results from these studies indicate that the issue is far from resolved and that further research is required. Therefore, this research study will test for the performance persistence of equity funds and explore the optimal past performance information set for Thailand.

1.3 AIMS OF THE RESEARCH

The primary aim of this study is to examine the performance of Thai equity funds during the period 1992-2000 and the secondary aim is to examine the persistence of fund performance during the same period.

It is expected that the achievement of the primary aim would involve an investigation of the following matters:

(i) fund performance during 1992-2000 both average fund performance and the proportion of outperforming funds, including annual performance ;

(ii) fund performance in an expansionary market period (January 1992-January 1996) both average fund performance and the proportion of outperforming funds;

(iii) fund performance in a contractionary market period (February 1996-December 2000) both average fund performance and the proportion of outperforming funds;

(iv) relationship between fund risk and investment performance; and

(v) relationship between the risk-adjusted performance measures.

In addition, it is expected that the achievement of the secondary aim would involve an investigation of the following matters:

(i) relationship between past and future performance which is the examination of the predictability of future performance; and

(ii) if the study of persistence in (i) is verified, this would lead to an exploration of the appropriate length of past performance information to be used as a guide for future performance, which is an exploration of the optimal past performance information set for equity funds in Thailand.

1.4 RESEARCH QUESTIONS

Seven research questions associated with the two main aims above are described in this section. Research questions relevant to the primary aim are described in 1.4.1. Research questions associated with the secondary aim are described in 1.4.2.

1.4.1 The performance of equity funds

The primary aim of this study is to examine the performance of Thai equity funds. This will be achieved by a comparison of the Thai equity fund performance with the market benchmark[3]. This aim leads to Research question 1.

Research question 1: Is the performance of Thai equity funds existing during the period 1992 - 2000 different from the performance of the Thai market portfolio during the same period?

In addition, the study period 1992-2000 covers the two different market environments, an expansionary market environment and a contractionary market environment. The two different market periods in this study are defined by movement in the SET Index (see 3.2.1 and Figure 3.1 for detail). The expansionary market period is from January 1992 to January 1996 and the contractionary market period is from February 1996 to December 2000. It is expected that the achievement of the primary aim would involve investigation of fund performance in these two market environments. To address these issues, Research questions 2 and 3 are listed below:

Research question 2: Is the performance of Thai equity funds existing during the expansionary market period, January 1992 - January 1996, different from the performance of the Thai market portfolio during the same period?

---

[3] To answer research questions 1, 2 and 3, two-stage hypothesis tests will be employed to test, firstly, for any significant difference between fund performance and market portfolio performance, and, secondly, the direction of any difference (see 3.1.1 for detail).

Research question 3: Is the performance of Thai equity funds existing during the contractionary market period, February 1996 - December 2000, different from the performance of the Thai market portfolio during the same period?

Furthermore, Friend and Blume (1970) pointed out that, theoretically, the risk-adjusted measures should be independent of the relevant risk measures because they are risk-adjusted measures. Friend and Blume found a significant inverse relationship between the performance measure and the risk measure, indicating a bias in a negative direction. Employing risk-adjusted performance measures to use with Thai data, it is interesting to consider this issue and test whether the risk-adjusted measures are independent of the relevant risk measures. In addition, relationships between the rate of return, which is a non risk-adjusted measure, and the corresponding risk measures are to be examined. To address these issues, Research question 4 is:

Research question 4: Is the investment performance of Thai equity funds related to fund risk?

Moreover, since the four risk-adjusted performance measures (Treynor, Sharpe, Jensen and M^2) estimate fund performance using different procedures, it is important to consider whether fund performance results are dependent upon which of the Treynor, Sharpe, Jensen or M^2 measures is used. This issue generates Research question 5.

Research question 5: Is the risk-adjusted performance of funds dependent upon which of the Treynor, Sharpe, Jensen or M^2 measures is used to measure performance?

1.4.2 The persistence of equity fund performance

As stated in 1.3, the secondary aim of this study is to examine the persistence of fund performance, which is the examination of the predictability of future performance. Therefore, the relationship between past and future performance will be examined. This aim generates Research question 6.

Research question 6: Is subsequent period performance related to prior period performance?

If persistence in fund performance is verified, this would lead to an exploration of the optimal past performance information set for equity funds in Thailand. Research question 7 following, is the corresponding question to Research question 6 above.

Research question 7: Does the information content of prior period performance vary with the length of the period of prior performance?

This research question is proposed to examine whether longer term past performance data contains more information related to future performance than does shorter term past performance data. Even though this issue has been examined in the literature (see Hallahan 1999), none exists for Thailand.

1.5 SIGNIFICANCE OF THE RESEARCH

This study is expected to make significant contribution with practical implications for the following market participants in Thailand:

(i) ***Regulators:*** This study is expected to provide a framework for regulators of financial markets, which will enable regulatory bodies including the Securities and Exchange Commission (SEC) of Thailand to review policies and practices of financial management in Thailand, including fund management and performance reporting. For example, at present, the SEC has policy to warn investors that past performance should not be used to consider future performance. However, the finding of fund performance persistence in this study suggests that past performance information can be used a guide for future performance.

(ii) ***Fund managers:*** This research can be expected to provide a benchmark study of mutual fund performance in Thailand, which will enable Thai fund managers to evaluate the performance of funds under management included reporting of risk and returns, and, as a consequence, contribute to the efficient development of Thai financial markets.

(iii) ***Investors:*** Investors will require information which will enable the performance of the fund and the fund managers to be evaluated. Investors require information upon both the return achieved by funds and the risks that fund managers incur. At present, investors do not have access to risk information of several funds because some fund management companies do not report risk information. This study will provide both risk-adjusted and non risk-adjusted information to investors.

(iv) ***New market participants:*** The research is expected to provide information to future financial market entrants. It will provide data which benchmarks fund performance during a period of volatile economic activity.

(v) ***Analysts and researchers:*** Participants in capital markets utilise information provided by market analysts and researchers. This benchmark research is expected to provide new information to enable the evaluation of fund performance.

This research study not only will be significant to all of the above mentioned market participants in Thailand, but also to market participants including regulators in financial markets of other developing countries.

1.6 METHODOLOGY

This research will proceed in three stages as follows.

Stage 1: Literature Review

Since fund performance has been one of the most widely studied topics in finance, particularly in mature capital markets (Reilly and Brown, 2000), a large number of books and articles have explained fund performance regarding fund performance measures, overall performance of mutual funds, factors that influence fund performance, persistence of fund performance, as well as potential bias in performance measures.

Stage 2: Data Collection

Data will be collected in Thailand from: eleven asset management companies which manage 86 equity funds in a sample set; The Securities and Exchange Commission (SEC); The Association of Investment Management Companies (AIMC); The Stock Exchange of Thailand (SET); and The Bank of Thailand (BOT). The data set in this study will focus on equity mutual funds that existed during any given month between January 1992 and December 2000, 86 in total.

The data to be collected is: (i) monthly Net Asset Value (NAV) per unit of equity funds; (ii) dividend yields of equity funds; (iii) Thai deposit interest rates; and (iv) the Stock Exchange of Thailand Index (SET Index).

Stage 3: Data Analysis

The Treynor measure (Treynor 1965), Sharpe ratio (Sharpe 1966), Jensen alpha (Jensen 1968), M^2 (Modigliani and Modigliani 1997) and rate of return (see 3.3 for detail) will be utilised to estimate the performance of Thai equity funds. The first four measures are risk-adjusted performance measures while the rate of return is a non risk-adjusted measure. The relationship between investment performance and fund risk as well as relationship between the four risk-adjusted performance measures will be tested. The analysis will be processed using SPSS and Excel programs leading to appropriate inferential statistical analysis, including the pair (dependent) *t*-test, binomial test, Pearson correlation coefficient and linear regression analyses.

To investigate for persistence of fund performance, namely, to investigate any relationship between past and future performance, the time frame will be split into a series of prior periods of varying lengths and a subsequent period of two years (1999-

00). The prior periods will be set to six different lengths: two years (1997-98), three years (1996-98), four years (1995-98), five years (1994-98), six years (1993-98) and seven years (1992-98). The persistence of fund performance will be tested through the use of four methodologies: (i) regression analysis; (ii) Spearman rank correlation coefficient; (iii) quartile comparison tables (including top and bottom quartile rankings); and (iv) contingency tables. To explore the optimal past performance information set (if any), explanatory power (R^2) of regression analysis will be investigated. Again, the analysis will be processed using SPSS and Excel programs.

1.7 OVERVIEW OF THE DISSERTATION

Following this chapter, Chapter two reviews the literature related to mutual fund performance. The review includes developments in portfolio theory, risk-adjusted performance measures and potential bias in risk-adjusted measures. Empirical results from previous studies of mutual fund performance and persistence in fund performance are also reviewed. Unpublished working papers on fund performance in Thailand are reviewed.

Chapter three presents the research methodology. Seven null hypotheses associated with the seven research questions are set. This chapter also details the methods of investigating the hypothesis tests. Data collection method, sample selection, methods for evaluating fund performance both risk-adjusted performance and non risk-adjusted performance measures, methods for examining persistence of fund performance, and statistical tests of hypotheses are discussed.

Chapter four reports the empirical results of the hypothesis tests conducted on Thai equity fund performance during the nine-year period 1992-2000, the expansionary market period, and the contractionary market period. This chapter also discusses the relationship between risk and investment performance. In addition, the relationship between risk-adjusted performance measures is reported.

Chapter five reports the empirical results of the hypothesis tests of the persistence of fund performance. Results from the four methodologies (i) regression analysis; (ii) Spearman rank correlation coefficient analysis; (iii) quartile comparison table analysis; (iv) contingency table analysis are reported. Results of optimal past performance are also revealed.

Chapter six presents a summary of this research study. This chapter includes conclusions and discussion, along with the implications of the research. This chapter also discusses the limitations and possible future directions for fund performance studies in Thailand.

1.8 SUMMARY

This chapter provides a brief introduction to the background of the equity fund industry in Thailand. It also introduces the background to research problem and the aims of this research study, as well as the issues that will be examined. This chapter also explains the significance of this study concerning equity fund performance in Thailand and the research methods. The structure of this dissertation is also outlined. The next chapter will provide a review of the literature on the development of fund evaluation measures, fund performance studies, including persistence of fund performance studies.

Chapter 2

LITERATURE REVIEW

The purpose of this chapter is to review the literature relating to fund performance. This chapter consists of eight main sections. First, portfolio and asset pricing; second, Thai fund performance; third, the three major risk-adjusted performance measures; fourth, potential bias; fifth, alternative evaluation measures; sixth, overall performance of mutual funds; seventh, persistence of mutual fund performance; and eighth, a summary of the chapter.

2.1 PORTFOLIO AND ASSET PRICING

In every field of study, it is possible to identify a person or event that caused a major change in the development or direction of the field. In investment, the work by Harry Markowitz on portfolio theory in 1952 changed the field more than any other single event (Reilly 1982). As a consequence of this work, Markowitz is referred to as the father of modern portfolio theory, and much subsequent research has been derived from this development (Elton and Gruber 1997). Portfolio theory and the Capital Asset Pricing Model are briefly reviewed in the following sections.

2.1.1 Portfolio Theory

Before the early 1960s, the investment community evaluated portfolio performance almost entirely by reference to the rate of return. Concerns were apparent regarding risk, however no systematic and reliable risk measure had yet emerged (Reilly and Brown 2000). Markowitz (1952, 1959) derived the expected rate of return for an asset portfolio and a measure of expected risk. He demonstrated that the standard deviation of the expected rate of return of a portfolio was an appropriate measure of the risk of a portfolio. As explained by Reilly and Brown (2000), the Markowitz 's expected rate of return of a portfolio is the weighted average of the expected return for the individual assets in the portfolio. The weights are the percentage of value of the portfolio. The standard deviation of a portfolio is a function of the weighted average of the individual variances and the weighted covariance between the rates of return for all the pairs of assets in the portfolio. Markowitz derived the computation of the expected return for a portfolio and the formula for the standard deviation of a portfolio as follows:

$$E(R_{portfolio}) = \sum_{i=1}^{n} W_i \, E(R_i) \qquad (2\text{-}1)$$

where,
$E(R_{portfolio})$ = the expected return for a portfolio,
W_i = the percent of the portfolio in asset i, and
$E(R_i)$ = the expected rate of return for asset i.

The general formula for the standard deviation of a portfolio is as follows:

$$\sigma_{portfolio} = \sqrt{\sum_{i=1}^{n} w_i^2 \sigma_i^2 + \sum_{\substack{j=1 \\ i \neq j}}^{n} \sum_{i=1}^{n} w_i w_j Cov_{ij}} \qquad (2\text{-}2)$$

where,
$\sigma_{portfolio}$ = the standard deviation of the portfolio,
w_i = the weights of the individual assets in the portfolio, where weights are determined by the proportion of value in the portfolio,
σ_i^2 = the variance of rates of return for asset i,
Cov_{ij} = the covariance between the rates of return for assets i and j, where $Cov_{ij} = r_{ij}\,\sigma_i\,\sigma_j$, and
R_{ij} = the correlation coefficient.

Markowitz (1952, 1959) stated that the fundamental theorem of his model was (i) holding variance constant, maximize expected return, and (ii) holding constant the expected return, minimize variance. These two principles led to the formulation of an efficient frontier[1]. From these principles, Makowitz was able to demonstrate that investors, in selecting securities in a portfolio, should consider how the returns for each security in a portfolio co-varied with all other securities. As a consequence investors should diversify their investment into different securities, which have low correlation coefficients between each other, so that total risk in a portfolio is reduced and the portfolio becomes efficient. Elton and Gruber (1997, p.444) stated that Markowitz portfolio theory 'leads to a mutual fund theorem, namely, that all investors can obtain their desired portfolio by mixing two mutual funds; one made up of the riskless asset and one representing the tangency portfolio'.

After mean-variance portfolio theory was developed by Markowitz, several works on estimating inputs took place. It was the first time in the literature of financial economics that estimation of correlation coefficients, or alternatively covariances, was required (Elton and Gruber 1997). Elton and Gruber also noted that one of the alternative approaches to estimating variance and co-variance individually is the market model introduced by Sharpe (1963). The market model, sometimes called the single index model, explains the return on an asset in terms of a constant component which is based on some basic underlying factor (frequently this factor is the market index), a beta and a random residual. The beta is the sensitivity of an asset to market

[1] The efficient frontier is the curve that includes all of the best combining stocks with different returns and risk. It defines the set of portfolios that has the maximum expected return for each given level of risk, or the minimum risk for each given level of return (Reilly and Brown 2000, p.280)

movement. The residuals are presumed uncorrelated over time, uncorrelated with the index return and uncorrelated with each other. The model is expressed as

$$R_{it} \quad = \quad \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \qquad (2\text{-}3)$$

where,

R_{it} = the return on asset i at time t,
α_i = constant component of asset i return,
β_i = the sensitivity of asset i to market movement,
R_{mt} = return on the market in period t, and
ε_{it} = residual term.

When considering the portfolio inputs, the advantages of the use of the market model are that the number of estimates required was significantly decreased, the accuracy of portfolio optimisation was increased, and the type of inputs needed was easier for analysts to understand (Elton and Gruber 1997).

Elton and Gruber also noted that shortly after the market model was developed, a number of researchers (for example, Kim 1978; Lehmann and Modest 1987; Fama and French 1992; Elton, Gruber and Blake 1996b; Carhart 1997) started to investigate whether multi-index models 'better explain reality'. The prototype multi-index is as follows:

$$R_{it} \quad = \quad \alpha_i + \sum_{j=1}^{J} \beta_{ij} I_{jt} + \varepsilon_{it} \qquad i = 1, \ldots, N \qquad (2\text{-}4)$$

where,

β_{ij} = sensitivity of asset i to index j, I_j the j^{th} index,
J = the total number of indexes employed, and other terms as above.

Multiple-index models required calculation of N times J betas and the variances of the J indexes. Multiple-index models, like single-index models, are extensively used in other contexts: the models are (i) the building blocks for arbitrage pricing theory, (ii) used to understand a sensitivity of the portfolio to various economic influences,

(iii) the basic method for evaluating fund managers, and (iv) are able to be used to reformulate mean-variance portfolio theory in a way that may be more meaningful to managers to make active on asset allocation (Elton and Gruber 1997).

2.1.2 Capital Asset Pricing Model

Sharpe (1964), Lintner (1965), and Mossin (1966) initially developed the Capital Asset Pricing model (CAPM) by expanding Markowitz's portfolio theory to include consideration of the risk-free rate of return. The CAPM is a model that explains the relationship between expected return and risk. Fabozzi (1999) in a review of the CAPM notes that the model is based on a specific set of assumptions as follows: (i) investors depend on two factors in decision-making: expected return and variance; (ii) investors are rational and risk-averse and are Markowitz efficient investors (who have a tangent on the efficient frontier); (iii) investors all invest in the same time period; (iv) investors share homogeneous expectations; (v) there is a risk- free investment, and investors can borrow or lend any amount at the risk-free rate; (vi) capital markets are competitive; and (vii) there are no transaction costs or obstacles that interfere with the supply of and demand for an asset. The CAPM is expressed as:

$$E(R_i) = R_f + \beta_i \, [E(R_m) - R_f] \qquad (2\text{-}5)$$

where,
$E(R_i)$ = the expected return of a portfolio,
R_f = average risk-free rate,
$E(R_m)$ = the expected market return,
β_i = COV_{im} / σ_m^2, a measure of the risk of portfolio i relative to the market,
COV_{im} = the covariance between the portfolio i return and the market portfolio return, and
σ_m^2 = the variance of the market return.

Based on the above assumptions, all investors will desire to hold the same efficient portfolio of risky assets. The only difference is the amount of risk-free borrowing or lending that investors undertake. The risky portfolio held by all investors is referred to as the market portfolio. The market portfolio is the portfolio held by the representative investor. The linear efficient set of the CAPM is referred to as the Capital Market Line (CML). The CML is the equilibrium relationship between the expected return and standard deviation of efficient portfolios. Under the CAPM, the risk measure for an individual risky asset is its covariance with the market portfolio. The linear relationship between expected return and market covariance is referred to as the Security Market Line (SML). The beta of a security is an alternative measure of risk. Beta is a measure of covariance relative to the market portfolio's variance; namely, it is a relative measure of the sensitivity of an asset's return to change in returns on the market portfolio. The beta used in testing the CAPM is estimated using the market model. The market model is a return generating process, not an equilibrium model (Sharpe, Alexander, and Bailey 1995).

Several empirical studies of the CAPM have failed to fully support the model (Fabozzi 1999). Perhaps the most controversial paper was written by Roll (1977). He argued that the CAPM is not testable until the exact composition of the true market portfolio is known. This means that the theory is not testable unless all individual assets are included in the sample. All investment assets are not only stocks but also bonds, real estate, art objects, and so on. In addition, the only valid test of the CAPM is to observe whether or not the ex-ante true market portfolio[2] is mean-variance

---

[2] Ex-ante market portfolio refers to future expected returns of market portfolio that includes all investment assets.

efficient. This is a consequence of the non-observability of the true market portfolio since a researcher is unable to clearly distinguish whether a test supported the CAPM because the true market portfolio was ex-ante efficient or because the market proxy was efficient. Fabozzi (1999) in a review of Roll noted that 'As a result of his finding, Roll states that he does not believe there ever will be an unambiguous test of the CAPM... Roll says that there is likely to be no unambiguous way to test the CAPM and its implications due to the non-observability of the true market portfolio and its characteristics' (Fabozzi 1999, p.80).

Several researchers have attempted to overcome the criticism of the CAPM, including Ross (1976), who introduced the Arbitrage Pricing Theory (APT). However, criticism of the APT is also in evidence (Shanken 1982 and 1985; Dhrymes, Friend and Gultekin 1984; Dhrymes, Friend and Gultekin and Gultekin 1985; Jarrow 1988).

Nevertheless, Miller (1999) stated that the CAPM offered new and powerful theoretical insights into the nature of risk, and lends itself admirably to the kind of empirical investigation so necessary in the development of finance. 'Shortly after Sharpe's work (Sharpe 1964) appeared, the market created mutual funds that sought to hold all the shares in the market in their outstanding proportions' (Miller 1999, p.97)

To gain insight into fund performance studies, the development of the three major risk-adjusted performance measures, alternative evaluation measures, fund performance studies as well as persistence of fund performance studies in mature capital markets will be reviewed in the following sections.

2.2 THE THREE MAJOR RISK-ADJUSTED PERFORMANCE MEASURES

Based upon the CAPM, several techniques have been derived to evaluate fund or portfolio performance. The three major evaluation techniques referred to as risk-adjusted performance measures are the Treynor measure (Treynor 1965), the Sharpe ratio (Sharpe 1966), and Jensen alpha (Jensen 1968). These measures combine risk and return into a single value. Each of these measures is reviewed below.

2.2.1 The Treynor Measure

The Treynor measure (Treynor 1965) interprets a portfolio's abnormal performance as the difference between the fund's actual return and the Security Market line (SML). As discussed in Reilly and Norton (1995), and Brailsford and Heaney (1998), Treynor recognised that unsystematic risk, which is unique to a particular stock, should be excluded as it can be eliminated in a completely diversified portfolio. Hence, the Treynor measure focuses on the portfolio's systematic risk. The variance of a portfolio's return comes from overall market movements and is measured by beta (β). The Treynor measure is:

$$\textit{Treynor measure} = \frac{\bar{R}_p - \bar{R}_f}{\beta_p} \qquad (2\text{-}6)$$

where,

$\bar{R}_p$ = the average rate of return for the portfolio during a time period,

$\bar{R}_f$ = the average risk-free rate during the same time period, and

β_p = the beta coefficient of the portfolio (the slope of the fund's characteristic line).

The larger the Treynor value, the more preferable the fund is for risk-averse investors. For example, if the Treynor value of fund A is higher than fund B, the risk-adjusted performance of fund A is better than fund B. However, comparing a Treynor value of a fund with the market portfolio to indicate whether the fund is superior to the market, the Treynor value for the aggregate market ($Treynor_{market}$) is given by:

$$Treynor_{market} = \frac{\bar{R}_m - \bar{R}_f}{\beta_m} = \bar{R}_m - \bar{R}_f \qquad (2\text{-}7)$$

where,

$\bar{R}_m$ = the average rate of return for the market portfolio during a given time period,

$\bar{R}_f$ = the average risk-free rate during the same time period, and

β_m = beta of market portfolio, always equal to 1.00.

Since the beta of the market portfolio always equals 1.00, the $Treynor_{market}$ reduces to (R_m - R_f) which is the market risk premium. It equals the slope of the security market line (SML). Hence, a Treynor value higher than the market risk premium would plot above the SML and show a superior portfolio performance compared with the market. In contrast, a portfolio with a lower Treynor value than the market risk premium would plot below the SML and indicate an inferior risk-adjusted portfolio performance (Reilly and Norton 1995).

2.2.2 The Sharpe Ratio

The Sharpe Ratio[3] (Sharpe 1966) evaluates excess returns adjusted for total risk of the portfolio by using the standard deviation of the portfolio's return. Sharpe (1966) aimed to develop Treynor's work (1965) by focusing on Treynor's measure and testing it empirically 'in order to evaluate its predictive ability and to make explicit

---

[3] Sharpe (1994) stated that he proposed the term 'reward-to-variability ratio' to describe the original version of his work in the year 1966. Other authors have referred to the measure as the *Sharpe Index*, the *Sharpe Measure*, or the *Sharpe Ratio*. Finally, Sharpe (1994) decided to use the term 'Sharpe Ratio' to refer to his measure.

the relationships between recent developments in capital theory and alternative models of mutual fund performance and to subject these alternative models to empirical test' (Sharpe 1966, p.119). The Sharpe ratio is given by

$$Sharpe\ ratio = \frac{\bar{R}_p - \bar{R}_f}{\sigma_p} \tag{2-8}$$

where,

$\bar{R}_p$ = the average rate of return for portfolio during a time period,

$\bar{R}_f$ = the average risk-free rate during the same time period, and

σ_p = the standard deviation of the return for portfolio during the same time period.

The benchmark for the Sharpe ratio is the slope of the CML which is given by the excess return on market portfolio returns divided by the standard deviation of market portfolio returns, $[(R_m - R_f) / \sigma_m]$. If the Sharpe ratio value is higher than this value, the portfolio lies above the CML indicating superior performance. In contrast, if the Sharpe ratio value is lower than this value, the portfolio lies below the CML indicating inferior performance (Sharpe, Alexander, and Bailey 1995)

Strong (2000) indicates similarity and differences between the Sharpe ratio and Treynor measure. Strong states that the Sharpe ratio is very similar to the Treynor measure in terms of mathematical similarity, except that Sharpe uses standard deviation of return as a measure of risk while Treynor uses portfolio beta. However, the concepts of the two measures are different. The Sharpe ratio evaluates excess return adjusted for total risk, whereas Treynor measures return relative to beta, which is a measure of systematic risk. In other words, the Sharpe ratio is based on the capital market line (CML), but the Treynor measure is based on the ex-post security market line (SML).

The empirical evidence on the correlation between the Treynor and Sharpe measures was found by several researchers including Shawsky (1982) and Reilly (1989). Reilly used return data of 20 mutual funds during 1978-1987 to test the relationship between results of the two measures. A very high correlation value (0.992) was found, indicating a strong relationship between the Treynor and Sharpe measures.

Reilly (1989) also points out the differences between the two measures, that if a portfolio is incompletely diversified, it can have a low ranking based on the Sharpe ratio but a high ranking for the Treynor Index. If a portfolio is completely diversified which means that it does not contain any unsystematic risk, both measures would give the same rankings. Hence, 'the two performance measures provide *complementary* but different information, and *both measures should be calculated*' (Reilly 1989, p.804).

2.2.3 The Jensen Alpha

Jensen (1968) introduced the Jensen Alpha to evaluate risk-adjusted abnormal returns by relating actual returns to expected returns based on the systematic risk of a fund. Jensen alpha is similar to the Treynor and Sharpe measures that are based upon the CAPM. The Jensen Alpha for portfolio performance is as follows:

$$R_{pt} - R_{ft} \quad = \quad \alpha_p + \beta_p \, [\, R_{mt} - R_{ft}] + \varepsilon_{pt} \, , \; t = 1, \ldots T \qquad (2\text{-}9)$$

where,

R_{pt} = the rate of return for portfolio j in period t,
R_{ft} = the risk-free rate in period t,
R_{mt} = the expected return on the market portfolio in period t,
α_p = the intercept term (Jensen Alpha),
β_p = the systematic risk (beta) for portfolio j, and
ε_{pt} = the residual term where $E(\varepsilon_{pt}) = 0$ and $Var(\varepsilon_{pt}) = \sigma_p^2$.

The intercept term (α_p) that measures the deviation of portfolio return is the portfolio alpha. A significant positive alpha indicates that a portfolio is superior to the market portfolio. In contrast, a negative alpha indicates that a portfolio is inferior to the market portfolio.

Although the Jensen alpha has been the subject of various criticisms, such as the model is based on an upwardly-biased estimate of systematic risk for a market-timing investment strategy (Grinblatt and Titman 1989b), it is the most widely used measure in academic empirical studies (Grinblatt and Titman 1989b; Block and French 2002).

The extensive use of Jensen's model may be that the structure of the model is a simple linear regression model which is easier than employing either the Treynor or Sharpe models to add new tested factor(s). However, one shortcoming of Jensen's model is the use of only the market portfolio as the overall return-generating factor in the market. Several researchers have successfully developed and tested models with additional or alternative common factors, including Fama and French (1992) and Carhart (1997). In Fama and French (1992), the authors found two empirical variables (size and book-to-market equity) explain the cross-sectional returns' of observed returns for stocks. Carhart (1997) added one more variable, a momentum in common stock return and demonstrated that size, book-to-market equity, and momentum factors explain the apparent performance persistence for mutual funds. The issue of the wide use of the Jensen model will be discussed further in 2.4.1.

In summary, the Treynor and Sharpe measures are similar in that they all compute the amount of excess return received per unit of risk borne. They differ because of the risk surrogate used. Two kinds of risk can be estimated. Systematic risk is estimated by beta and the portfolio's total risk is estimated by its standard deviation. The Treynor measure involves analysis of a portfolio's excess return and total risk, while, the Sharpe ratio and the Jensen alpha involve analysis of a portfolio's excess return and systematic risk. Risk-adjusted performance measures is generally based on one of two viewpoints, taking either systematic or total risk into consideration.

2.3 POTENTIAL BIAS

Three issues of potential bias in examining fund performance are reviewed in this section. Potential bias in the three major risk-adjusted measures is presented in 2.4.1. Benchmark error is presented in 2.4.2 and survivorship bias is reviewed in 2.4.3.

2.3.1 Potential bias in the three major risk-adjusted measures

Friend and Blume (1970), Klemkosay (1973), Chen and Lee (1981 and 1986), and Leland (1999) point out that there is potential bias in utilising the Treynor, Sharpe and Jensen measures to measure fund performance. Friend and Blume (1970) indicate that the Treynor, Sharpe and Jensen risk-adjusted performance measures should be independent of alternative measures of risk since they are risk-adjusted measures. The authors suggest that a major assumption in the market-line theory is invalid, "i.e., are not realistic approximation of the real world, even for the ex-ante magnitudes to which the theory applies" (Friend and Blume 1970, p. 564). This does systematically bias the risk-adjusted performance measures, while inconsistencies between ex-post and ex-ante distributions of return and values of risk affect these measures of performance in several ways.

Friend and Blume (1970) selected 200 random portfolios from 788 common stocks listed on the NYSE from January 1960 to June 1968 to analyse the relationship between the risk-adjusted performance measures and two risk measures (beta and standard deviation). Results indicated an inverse relationship between the risk-adjusted performance measures and the risk measures; namely, the risk-adjusted performance of portfolio with low risk was better than the comparable performance for portfolio with high risk. Results also revealed a bias against high-risk portfolios.

The authors conclude that their analysis raised questions about the usefulness of the Treynor, Sharpe and Jensen risk-adjusted performance measures. With the magnitude of the bias related to risk of portfolio, the measures appear to yield seriously biased estimates of performance. 'Thus, the numerous studies of mutual fund performance based on the one-parameter measures are suspect especially when they attempt to appraise individual portfolios, or when the average risk of this portfolio differs from that of the market as a whole' (Friend and Blume 1970, p.574).

Klemkosky (1973) also examined the relationship between risk-adjusted performance measures and risk using 40 actual mutual funds quarterly data, 1966-1971. The author stated that this period (1966-1971) was more representative due to covering the inclusion of the 1969-1970 bear market and subsequent recovery.

Klemkosky derived five measures to examine fund performance. They are the three major risk-adjusted performance measures and two statistics that estimate the excess return above the risk-free rate relative to the semi-standard deviation[4] and relative to the mean absolute deviation[5]. These two statistics were included because the author believes that they are alternative risk measures. To test for bias, the risk-adjusted performance measures were regressed against the related measures of risk.

Results demonstrated that the risk-adjusted performance measures, especially the Treynor and Jensen measures, were biased in a positive direction. The average rates of return were positively correlated with risk. The mean absolute deviation and the semi-standard deviation performance measures were less biased than the three risk-adjusted measures. Since the time period of the study included the bear market and subsequent recovery, it is unlikely that in this period ex post returns for high-risk funds were higher than ex ante values or that ex post risks were lower than ex ante expectations. It seems that the bias might not be an inverse relationship between the composite performance measures and risk, but a positive relationship. The author concluded that although a bias might exist, one could not be certain of its direction.

The possible sources of the bias associated with relationship between the risk-adjusted performance measures and their risk proxies were investigated by Chen and Lee (1981 and 1986). In the former study, Chen and Lee (1981) examined the sources of bias relevant to the relationship between the Sharpe ratio and its risk proxy. The authors state that the sample size and the investment horizon are two significant

---

[4] The semi-standard deviation was first suggested to use by Markowitz (1959) ' as a measure of risk in portfolio selection but recognized the computational difficulties involved in generating a set of efficient portfolio. However, used in ex-post analysis, semi-variation is as easy to compute as variance' (Klemkosky 1973, p.508)

[5] As explained by Klemkosky (1973, p.508), 'the Bank Administration Institute (BAI) felt that the mean absolute deviation was the best measure of risk because it is more stationary over time and entails less sampling error'.

factors in determining the degree of the relationship. The investment horizon in the study refers to either one day, one week, one month, one quarter or one year. In addition, this relationship was shown to be dependent on market conditions associated with the sample period selection. In the later study, Chen and Lee (1986) tested further for the sources of bias associated with the relationship between the Treynor as well as Jensen performance measures and their risk proxies. The finding in this later study is consistent with the former study, that the relationships are generally affected by the sample size, the investment horizon and the market condition.

Since the CAPM assumes that all asset returns are normally distributed (and thus symmetrical) and that investors have mean-variance preferences (and thus ignore skewness), Leland (1999) challenged both assumptions as suspect. He stated that in a world in which the market portfolio has identically and independently distributed returns, the market portfolio will be mean-variance inefficient, the CAPM beta will not properly measure risk, and the CAPM alpha will mis-measure the value added by investment managers (Leland 1999, p.33). Leland challenged all estimation techniques that utilize risk measures such as beta (Jensen Alpha and Treynor measure) and the standard deviation (Sharpe Ratio). The author presented a new risk measure that requires no more information to implement than the CAPM but correctly captures all elements of risk, including skewness, kurtosis, and other characteristics that describe the shape of the return distribution. He showed that the new risk measure has the property that any portfolio strategy has zero measured excess return after adjustment for risk when that strategy can be implemented without superior information (neither the CAPM nor the Sharpe ratio possesses this property). He has shown that alpha can be biased downward for those portfolios designed to limit downside risk.

In summary, theoretically, the risk-adjusted performance measures should be independent of alternative measures of risk. Evidence on relationship between the risk-adjusted performance measures were found in both negative direction (Friend and Blume 1970) and positive direction (Klemkosky 1973). In addition, sources of bias relevant to the relationship between the risk-adjusted performance measures and their risk proxy are sample size, the investment horizon and the market condition (Chen and Lee 1981 and 1986).

2.3.2 Benchmark error

To evaluate portfolio performance, several measures including the Treynor, Sharpe and Jensen measures utilise the market portfolio as the benchmark. Derived from the CAPM, all the equity portfolio performance measures assume the existence of a market portfolio at the point of tangency on the Markowitz efficient frontier. Since the market portfolio is on the efficient frontier, it is a completely diversified portfolio, which must contain not only common stocks but also all risky assets in the economy. However, the CAPM theory does have one major drawback. It is difficult to discover realistic proxies for this theoretical market portfolio (Reilly and Brown 2000). This concern was highlighted in studies undertaken by Roll (1977, 1978, 1980, and 1981).

The Security Market Line (SML) is also derived from the CAPM model. Roll's investigations (1977, 1978, 1980, and 1981) suggest that the CAPM theory, which utilises the SML criterion, provides ambiguous performance indications for portfolio evaluations. Roll referred to it as a benchmark error. He pointed out that if the market proxy used to compute betas is mean-variance efficient, all securities would plot on the SML. However, if the proxy used for the market portfolio does not present the true composition of a mean-variance efficient portfolio, then the SML may not be the true SML. Different inefficient indices will provide different SML's, and different rankings. Moreover, the beta computed for alternative portfolios would be incorrect due to an inappropriate market portfolio.

However, Mayers and Rice (1979) challenged Roll's criticisms. The authors examined portfolio performance tests when using the Security Market Line as a benchmark. They stated that 'superior portfolio managers are reasonably detectable in a properly performed security market line analysis. Favourable and unfavourable information events will be similarly, on average, identified with positive and negative residuals. Thus, Roll's rhetorical question on the use of an index that is not 'truly' efficient is answered' (Mayers and Rice 1979). The authors concluded that CAPM tests provide information that the value-weighted market portfolio is efficient due to market beliefs. Therefore, the criticism by Roll does not invalidate the standard Capital Asset Pricing Model and the SML criterion is a valid method for evaluating portfolio performance.

Roll (1979) replied to Mayers and Rice that they had missed the point, as they assumed that everyone has the same opinion upon which market index is to be utilised. An inefficient index is required to gain rankings of portfolios, but this can not ensure that the ranking reflects actual preference orderings of investors. Roll concluded that the SML criterion should be abandoned due to the issue of ambiguity. Roll offered an alternative criterion that measures portfolio performance against the efficient frontier in mean-variance space. Due to the fact that an index does not have to be chosen for this measurement, the issue of ambiguity is removed. Roll proposed that if the SML criterion is to be kept, it needs to be empirically demonstrated that routinely implemented indices do not rank portfolios differently.

Peterson and Rice (1980) investigated Roll's argument through an empirical study that examined the SML ambiguity issue. They tested the evaluative robustness of the Treynor measure and Sharpe ratio. To examine whether different indices ranked portfolios ambiguously, the authors used quarterly total returns of fifteen mutual funds over two five-year periods, 1967-1971 and 1972-1976. The fifteen funds were a random selection from all funds for which data was available for ten-year periods. The authors employed four different indices to be tested. These were the Dow Jones Industrial Average Index, the Standard and Poor's 500 Stock Index, an equally-weighted index, and a value-weighted index where the latter closely approximates the New York Stock Exchange Composite Index. The authors compared these indices to examine whether different indices provided different rankings.

The results revealed that little change in ranking occurred when employing the four different indices. Both Treynor and Sharpe measures ranked the fifteen funds similarly. Over two five-year periods, for the Treynor and the Sharpe measures, and for the SML criterion, the results show high correlations in all rankings. The authors concluded that 'little serious injustice is committed in the process. Of course, until more evidence is available, evaluation techniques that rely on market indices, such as the SML criterion and Treynor performance measure, should be used with caution and awareness of the ambiguity potential' (Peterson and Rice 1980, p.1255)

Dybvig and Ross (1985) also analysed possible problems in using SML analysis for the evaluation of portfolio performance in the situation where fund managers have different information. The authors proved their theoretical model and stated that a manager with superior information who makes optimal use of information may plot inside, on, or outside the efficient frontier and may plot above, on, or below the SML. It is possible that every combination of these cases may occur. The authors stated that SML analysis performs poorly in a situation where fund managers have different information.

Lehmann and Modest (1987) aimed to examine whether traditional measures of abnormal mutual funds performance, Jensen alpha and Appraisal ratio (Treynor and Black 1972), were sensitive to the benchmark chosen to measure normal performance. The Appraisal ratio is also known as the information ratio (see 2.4.1 for more detail). To solve this question, the authors employed a variety of APT benchmarks and the standard CAPM benchmarks to investigate. The Jensen Alpha and the Appraisal ratio were also employed to examine the performance of mutual funds. The data sets in this study were the monthly returns of 130 mutual funds during 1968 - 1982. Three conclusions emerged from this study. First, both the Jensen Alpha and Appraisal ratios were sensitive to the method used to build the APT benchmark. Second, 'the rankings of the funds are less sensitive to the exact number of common sources of systematic risk that are assumed to impinge on security return' (Lehmann and Modest 1987, p.263). Third, there were considerable differences between the performance measures yielded by the standard CAPM benchmarks and those produced with the APT benchmarks, which suggested the significance of knowing the appropriate model for expected return and risk in this context. The authors noted that 'if the choice of a benchmark were an unimportant one, different benchmarks should have yielded similar results; the overwhelming fact is that they did not' (Lehmann and Modest 1987, p.263).

Grinblatt and Titman (1994) also examined the sensitivity of fund performance to benchmark choice. Three performance measures: the Quadratic Regression Measure[6] (Treynor and Mazuy 1966), the Jensen Alpha (Jensen 1968) and the Positive Period Weighting Measure[7] (Grinblatt and Titman 1989b), were utilised in this study. The authors examined a sample of 109 portfolios and employed four different types of benchmark to test for any effect of benchmark choice. These were: (i) the Value-

---

[6] Treynor and Marzuy (1966) introduced the quadratic regression equation to estimate the ability of an investment manager to successfully time the market. The authors conducted a non-linear version of CAPM to test for market timing. The model is:

$$R_p - R_f = \alpha_p + \beta_p [R_m - R_f] + \psi_p [R_m - R_f]^2 + \varepsilon$$

where,
R_p = the average rate of return for portfolio during a time period,
R_f = the average rate of return on a risk-free rate during the same time period,
R_m = the average rate of return on market portfolio during the same time period, and
ε = the residual term.

If value for ψ_p is positive, it indicates a superior market timing ability. If value for ψ_p is negative, it indicates an inferior market timing ability. The intercept (α_p) performs the timing adjusted stock selectivity measure.

[7] The Grinblatt and Titman's positive period weighting measure is obtained in two steps. First, selecting a vector of weights, $W_1, \ldots, W_t$. Each element of the vector corresponds to one time series observation. Second, taking the dot product of the weight vector and the excess return vector of the portfolio to demonstrate the performance of a fund; that is:

$$\textit{Positive weighting measure (PW)} = \sum W_t R_{pt}$$

where,
W_t = a vector of weights of one time series observation, and
R_{pt} = excess return of portfolio in period t.

The weight vector is selected to have non-negative weights that create the weighted sum of the excess returns of the benchmark portfolio sum to zero. If R_{It} represents period t excess return of the index portfolio used as a benchmark, that is $\sum W_t R_{It} = 0$, $W_t > 0$. The authors provided conditions under which positive values for these measures imply that the mutual fund manager has special information.

Weighted Index, (ii) the Equally-Weighted Index, (iii) a 10-factor portfolio benchmark constructed from factor portfolio weights used in Lehmann and Modest (1988), and (iv) eight Characteristic-Base Portfolios (P8) which were used in Grinblatt and Titman (1989a). The results revealed that 'the measures generally yield similar inferences when using the same benchmark and that inferences can vary, even from the same measure, when using different benchmarks' (Grinblatt and Titman 1994, p. 419). The authors suggested that when evaluating mutual fund performance, appropriate proxies for the market portfolio should be chosen carefully.

Reilly and Brown (2000) commented that the important point is that an inappropriate market proxy will affect portfolio performance measures which are based on SML analysis, because the position and slope of the SML may deviate from the true SML. As summarised by Reilly and Brown (2000, p.329), Roll's criticisms in relation to benchmarking concerns, do not negate the value of the CAPM as a normative model of asset pricing. The CAPM theory is still valid.

2.3.3 Survivorship bias

Survivorship bias refers to the problems incurred in mutual fund studies due to the fact that poor performance funds are usually terminated while the skilled ones stay around (Sharpe, Alexander, Baily 1995). Examining fund performance of only survivor funds may lead to an overstated performance measurement (Elton, Gruber and Blake 1996a).

The issue of survivorship bias on the performance of mutual funds has received attention in the academic literature in recent years. Early mutual fund performance studies were focused on testing new models or methods for measuring performance and were less concerned with bias in the data. One of the reasons for this is that the most commonly used databases do not allow the user to both study it and correct for it (Elton, Gruber and Blake 1996a).

Grinblatt and Titman (1989a) utilised quarterly return data of equity funds in an attempt to investigate the effect of survivorship bias. The authors simulated quarterly returns for each fund by computing the return as if the fund held the common stocks shown at the beginning of each quarter to the end of that quarter. Annual return was calculated from the quarterly returns. The authors computed the return on both equally-weighted portfolios with survivorship bias and equally-weighted portfolios without bias. The difference in alpha (α) between these two portfolios provided the results of estimates of survivorship bias which ranged between 10 and 30 basis points. However, Elton, Gruber and Blake (1996a) commented that the sample in this study was affected by an inability to track funds due to changing names of some funds. Name changes were highly correlated with mergers and policy changes; therefore, it was unclear that the sample was free of survivorship bias.

Brown, Goetzmann, Ibbotson and Ross (1992) examined the relationship between survivorship-induced persistence in performance and total risk differentials on a sample of growth equity mutual funds during 1976-1987. The authors attempted to prove that this relationship gave rise to the appearance of predictability. Results indicate that a very small survivorship bias is adequate to create a strong and significant appearance of dependence in serial returns. Truncation by survivorship increased an apparent persistence in performance where there was dispersion of risk among money managers. The authors noted that it is difficult to devise a simple adjustment to standard performance measures that will correct for survivorship bias and that this issue calls for further study.

Brown and Goetzmann (1994, cited in Elton, Gruber and Blake 1996a) estimated the effect of survivorship bias on two samples that consisted of annual returns during 1967 to 1988. The first sample included all funds that existed at the end of 1988 and that did not merge or disappear during 1976 to 1988. The second sample consisted of all funds existing in the Wiesenberger database any year for the period 1976 to 1988. The authors did not track funds that disappeared from Weisenberger where this database source does not record what occurred to them; hence, unlike earlier researchers, Brown and Goetzmann did not use the double objective of survival and a minimum history. Elton, Gruber and Blake (1996a) therefore commented that it was difficult to use the results to understand the size of any bias. Brown and Goetzmann reported that the bias involved by not including merged funds varies between 20 and 80 basis points per annum, depending on the weighting method utilized.

Malkiel (1995) investigated the performance of all equity mutual funds that existed for any time within the year over the period 1971 to 1991, and estimated the effect of survivorship bias by comparing the average annual returns from 1982-1991 of all mutual funds in existence each year with the returns for all funds that survived for 10 years. He found that the bias increased the return on the surviving equity funds by 150 basis points. The author concluded that analyses that systematically exclude non-surviving funds would significantly overstate the returns received by mutual fund investors. He also noted that 'this finding suggests that previous researchers, such as

Grinblatt and Titman (1989a), have underestimated the magnitude of survivorship bias by claiming that the bias is relatively small' (p.554).

Elton, Gruber and Blake (1996a) noted that mutual fund attrition is a problem because the funds that disappear tend to be poor performance funds. Thus, studying only funds that survive leads to an overstated performance measurement. However, in many cases, a fund that disappears is not terminated but is merged into another fund. The effect and perhaps intent of this is that the merging fund continues to earn fees from investors whereas the record of the fund's poor performance is deleted from the data or incorporated with other data in a sample. The authors also pointed out that most of the classic studies on performance of mutual funds ignored attrition and, therefore, were subject to survivorship bias. The authors state that:

> 'Correction for attrition is important for several reasons. First, samples that do not correct for attrition will overstate the return that mutual funds earn for their investors. Second, ignoring attrition may differentially impact the return reported for mutual funds with different objectives, because funds with different objectives may have different rates of attrition. Finally, some of the other variables studied may also be correlated with attrition and, thus, studying a sample with survivorship bias may introduce spurious correlation between these variables and performance' (Elton, Gruber and Blake 1996a, pp. 209-210).

Elton, Gruber and Blake investigated the impact of survivorship bias by examining both the frequency of mutual fund disappearance and the impact of this on investors' returns during 1977-1993. The authors started with the 361 funds categorized as having a common stock investment policy in 1977. Each fund was tracked to the end of 1993, recording all name changes, policy changes and mergers. A *three-index model,* developed by Blake, Elton and Gruber (1993; see 2.4.1 for more detail), and the Jensen alpha measure were utilised to measure fund performance. The authors also presented raw returns (non risk-adjusted returns) in addition to the risk-adjusted returns. To test survivorship bias, the difference between the value of surviving funds and all funds was examined.

Results showed that risk-adjusted performance for survivor funds was -0.13 per cent and for those that merge was -2.88 per cent per annum. The performance for the combined sample was -1.03 per cent. The estimate of bias is equal to the performance in the surviving sample minus the performance on the full sample: 0.90 per cent per annum. The authors concluded that failure to eliminate survivorship bias could lead to incorrect conclusions about the effect of fund characteristics on return.

In summary, funds that disappear, both terminated and merged funds, tend to be poor performance funds. Examining fund performance of only surviving funds will lead to an overstatement of performance. Several researchers as noted above have demonstrated this issue and also found that both fund types and the sample period of study are involved in the size of survivorship bias. In other words, funds with different objectives might have different rates of attrition; and the longer the sample period, the greater the survivorship bias.

2.4 ALTERNATIVE EVALUATION MEASURES

Subsequent to the work by Treynor, Sharpe and Jensen, researchers have developed alternative portfolio evaluation measures. This section is divided into three parts. The first part (2.5.1) presents a review of risk-adjusted performance measures that have been developed based on Jensen's work (1968). The second part (2.5.2) presents a review of risk-adjusted performance measures that have been developed based on

Sharpe's work (1966); and the third part (2.5.3) presents a review of other alternative evaluation measure studies.

2.4.1 Evaluation measures based on the Jensen alpha

While a number of methods exist to evaluate the risk-adjusted performance of a portfolio, probably the most widely used in academic empirical studies are based on the Jensen (1968) alpha (Grinblatt and Titman 1989b; Block and French 2002).

Block and French (2002) stated that one criticism of the Jensen alpha is the use of only one benchmark index which is the market portfolio. This benchmark is used as the overall return-generating factor in the market. Several researchers have proposed alternative models based on the Jensen alpha by adding alternative common factors. The examples of alternative models based on the Jensen alpha are as follows.

As explained by Block and French (2002), Fama and French (1992) discovered two empirical factors (size and book-to-market equity) that can be used to explain the cross-section of observed returns for stocks. In a subsequent study, Fama and French (1993) included these variables in a *three-factor model* of portfolio performance measure. The three-factor model is given by:

$$R_{pt} = \alpha_{pT} + b_{pt}\, RMRF_t + s_{pt}\, SMB_t + h_{pt}\, HML_t + \varepsilon_{pt} \tag{2-10}$$

where,
R_{pt} = the return on portfolio i in excess of the risk free rate,
$RMRF_t$ = the excess return on a value-weighted aggregate market proxy,
SMB_t = factor-mimicking portfolio for size,
HML_t = factor-mimicking portfolio for book-to-market equity,
ε_{pt} = the residual term.

Thereafter, Carhart (1997) constructed the *four-factor model* by combining Fama and French's (1993) three-factor model and Jegadeesh and Titman's (1993) one-year momentum anomaly to evaluate fund performance. The four-factor model is:

$$R_{pt} = \alpha_{pT} + b_{pt}\,RMRF_t + s_{pt}\,SMB_t + h_{pt}\,HML_t + p_{pT}\,PR1YR_t + \varepsilon_{pt} \qquad (2\text{-}11)$$

where,
R_{pt} = the return on portfolio i in excess of the one month T-bill return,
$PR1YR_t$ = factor-mimicking portfolio for one-year return momentum,
and other terms as above.

After testing mutual funds performance, Carhart found that the three-factor model (equation 2-10) yielded average pricing error less than the Jensen alpha model (equation 2-9), and the four-factor model (equation 2-11) improved on the three-factor model.

Block and French (2002) have also adapted the Jensen alpha (1968) by employing two market indexes that are considerably correlated. These two indexes are a value and an equally weighted index composed of the same securities. The authors propose a *two-index model* as follows:

$$R_p - R_f = \alpha_p + \beta_p\,[\,Rvw_i - R_{ft}\,] + \gamma_p\,(\overline{Rew_p}) + \varepsilon_{pt} \qquad (2\text{-}12)$$

where,
R_p = the rate of return for portfolio,
R_f = the rate of return on a risk free rate,
Rvw_i = the return on the value-weighted index,
$\overline{Rew_i}$ = the return on the equally weighted market index with the influence of the value-weighted index removed.

However, Block and French (2000, p.18) state that "our approach should not be a substitute for other multi-factor models; it should augment them...it would likely be desirable to extend our two-index model to incorporate factors from Fama and French, Carhart, other researchers, or as yet undiscovered factors important in the return-generating process."

Elton, Gruber and Blake (1996b) have also extended the Jensen alpha (1968) as a single-index model by adding more factors into their model called a *'four-index model'*. This model is similar to Carhart's four-factor model in selecting high-performing funds but different in definition. The four-index model involves the S&P 500 Index, a size-related index, a bond index, and a growth-value index for explaining the return on local non-specialized mutual funds. The four-index model was extended from a three-index model (Blake, Elton and Gruber 1993), which was utilised to examine investment performance of bond funds. The authors added one more index to explain the performance of growth versus value stocks. A fund's risk-adjusted performance based on the intercept (α_i) from a four-index model is expressed as:

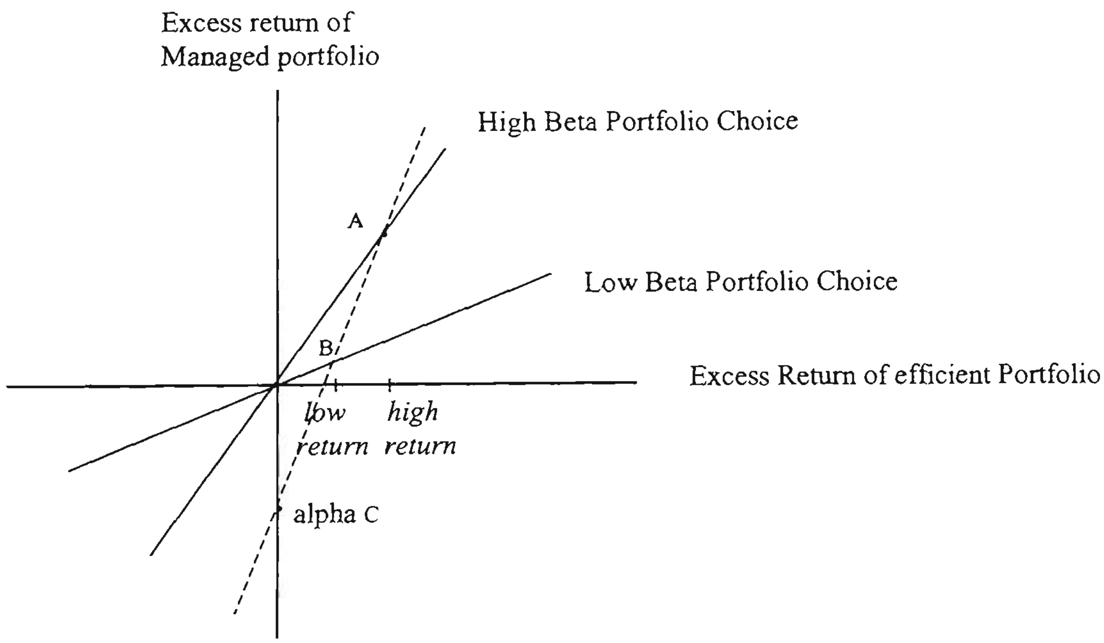
$$R_{it} = \alpha_i + \beta_{iSP} R_{SPt} + \beta_{iSL} R_{SLt} + \beta_{iGV} R_{GVt} + \beta_{iB} R_{Bt} + \varepsilon_{it} \quad (2\text{-}13)$$

where,

R_{it} = the return on portfolio i in excess of the one month T-bill return in month t,
R_{SPt} = the excess return on the S&P Index in month t,
R_{SLt} = the difference in return between a small-cap and large-cap stock portfolio,
R_{GVt} = the difference in return between a growth and value stock portfolio,
β_{ik} = the sensitivity of excess return on portfolio i to excess return on index k (k= SP, SL, GV, B),
R_{Bt} = the excess return on a bond index in month t, and
ε_{it} = the residual term.

One criticism of the Jensen measure (1968) is that the model is based on an upwardly biased estimate of systematic risk for a market-timing investment strategy. Hence, the Jensen alpha is able to assign negative performance to a market timer. For this reason, Grinblatt and Titman (1989b) developed an alternative performance measure called the *'positive period weighting measure'*, which utilises the same data as the Jensen measure but which accurately identifies informed investors as positive performers. Examples on upward bias in Jensen is provided by several researchers including Jensen (1972), Dybvig and Ross (1985) and Grinblatt and Titman (1989b) demonstrating that, because of an upwardly biased estimate, the Jensen measure can assign negative performance to the market timer. An example of the bias, a negative Jensen measure for a market timers, explained by Grinblatt and Titman (1989b, pp.394-5) is as follows.

Figure 2.1 An example of a negative Jensen measure for a market timer



Source: Grinblatt and Titman (1989b, p. 395)

'The two solid lines plot the excess return of a managed portfolio consisting of a risk-free investment and an investment in the risky efficient portfolio against the latter's excess return for two different choices of beta. A market timer will select a high beta portfolio and be at point *A* upon receipt of the high return information and at point *B* if he receives a low return information. An uninformed observer would estimate the risk of this investment strategy as the slope of the dotted line connecting points *A* and *B*, which exceeds the risk of the portfolio in either information state. Moreover, it is even possible, as in the example, that Jensen measure, which is the intercept of the dotted line at *C*, may be negative, erroneously indicating that the informed investor is an inferior performer' (Grinblatt and Titman 1989b, pp.394-5).

2.4.2 Evaluation measures based on the Sharpe ratio

Sharpe (1994) and Modigliani and Modigliani (1997) are examples of risk-adjusted performance measure studies that were developed based on the Sharpe ratio (1966). While both Treynor and Jensen risk-adjusted performance measures use beta as the measure of risk (systematic risk), the Sharpe ratio uses standard deviation as a measure of risk (total risk). Sharpe (1994) and Modigliani and Modigliani (1997) are reviewed as follows.

Sharpe (1994) suggested a measure that relates performance to any benchmark portfolio. The author suggested a more generalised version of the Sharpe ratio as a practical alternative for performance measurements in a multi-index world. In the original Sharpe ratio, Sharpe measured the ratio of the difference between average return on a portfolio and the riskless rate to the standard deviation of the portfolio. The new Sharpe ratio utilises the ratio of the difference between the average return on the portfolio and the benchmark portfolio, which can be a combination of several portfolios, to the standard deviation of difference.

Sharpe (1994, p.57) stated that 'the (new) Sharpe Ratio is designed to measure the expected return per unit of risk for a zero-investment strategy. (This feature relates the Sharpe ratio to derivatives and swaps). The difference between the returns on two investment assets represents the results of such a strategy. The Sharpe Ratio does not cover cases in which only one investment return is involved.' The historic (ex-post) Sharpe Ratio can be expressed as follows.

$$\textit{Ex-post Sharpe Ratio} = \sqrt{\frac{\bar{D}}{\sigma_d}} \qquad (2\text{-}14)$$

where, $\bar{D}$ = the average value of D_t over the period being examined,

$$\bar{D} = \sum_{t=1}^{T} D_t / T$$

D_t = the differential return in period t, $= R_{pt} - R_{Bt}$

R_{pt} = the return on a portfolio in period t,

R_{Bt} = the return on the benchmark portfolio in period t, and

σ_d = the standard deviation of the differential return during the period.

$$\sigma_d = \sqrt{\frac{\sum_{t=1}^{T} (D_t - \bar{D})^2}{T-1}}$$

The historic Sharpe ratio points out the historic average differential return (compared to a specified benchmark) per unit of historic variability of the differential return. Sharpe (1994) noted that this ratio is closely related to the *t-statistic* for computing the statistical significance of the mean differential return.

Modigliani and Modigliani (1997) propose an alternative technique of risk-adjusted performance measurement called M-squared (M^2), which considers standard deviation as a measure of risk. As pointed out by Reilly and Brown (2000), the M^2 is a variation of both the Sharpe ratio (1966) and Fama's $R_s\,[\sigma(R_a)]$[8] measure (Fama 1972, see 2.4.3). Modigliani and Modigliani assert that this technique is applicable to any portfolio and is also intuitively clear and easily calculated from readily available

---

[8] As defined in 2.4.3, $R_s\,[\sigma(R_a)]$ refers to the return on the combination of the riskless asset and the market portfolio that has return dispersion equivalent to that of the actual portfolio chosen.

information. As stated above, M^2 utilises standard deviation as the relevant measure of risk and takes a portfolio's average return and determines what it would have been if the portfolio had the similar level of total risk as the market benchmark (Sharpe, Alexander and Bailey 1999).

The basic idea of M^2 is that it utilises 'the market opportunity cost of risk, or trade-off between risk and return, to adjust all portfolios to the level of risk in the unmanaged market benchmark...thereby *matching* a portfolio's risk to that of the market, and then measuring the returns of this risk-matched portfolio' (Modigliani and Modigliani 1997, p.46). M^2 is expressed as follows:

$$M^2 = \frac{\sigma_M}{\sigma_p}(\bar{R}_p - \bar{R}_f) + \bar{R}_f \tag{2-15}$$

where,

$\bar{R}_p$ = average return of fund p during a given time period,

$\bar{R}_f$ = risk-free rate for the same time period,

σ_p = standard deviation of R_p , and

σ_M = standard deviation of R_M (average return of the market portfolio for the same time period).

M^2 can be compared directly with the average return on the market portfolio over the same time period in order to see whether the portfolio concerned is superior or inferior to the market benchmark on a risk-adjusted basis. If the difference is positive, the portfolio exhibits superior performance. If the difference is negative, the portfolio demonstrates inferior performance to the market benchmark. The authors noted that ranking a set of portfolios by the M^2 and the Sharpe ratio would yield the same results.

2.4.3 Other evaluation measures

The following sections give a brief review of these other portfolio evaluation measures.

(i) Information Ratio

The development of the information ratio, also known as the *appraisal ratio,* is credited to Treynor and Black (1973). Although this measure seeks to summarise risk and return performance of an active portfolio into a single number like the three major risk-adjusted performance measures (Treynor, Sharpe and Jensen measures), the information ratio is ***not*** a risk-adjusted performance measure (Modigliani and Modigliani 1997).

The information ratio builds on the Markowitz mean-variance theory which asserts that the mean and standard deviation of returns are adequate statistics for identifying an investment portfolio (Goodwin 1998). The information ratio is based on an average excess return of the portfolio above the market portfolio divided by the standard deviation of the difference between the portfolio return and the market return. The information ratio is given by:

$$\textit{Information Ratio} = \frac{\bar{R}_p - \bar{R}_b}{\sigma_{ER}} = \frac{ER_p}{\sigma_{ER}} \qquad (2\text{-}16)$$

where.

$\bar{R}_p$ = the average return for portfolio p during a time period,

$\bar{R}_b$ = the average return for the benchmark portfolio during the same time period,

ER_p = the excess return on portfolio p, and

σ_{ER} = the standard deviation of the rate of excess return during the period.

However, Goodwin (1998) warned that the information ratio is not useful for managers to make decisions on asset allocations. 'The ratio does not contain any information on correlation between asset classes' (Goodwin 1998, p.41). As with previous measures, the information ratio does not take into account the risk tolerance of the investor. He concluded that the information ratio can be used as only a guide to select an active manager within a group of similar managers, but it is not helpful for making decisions about how much to allocate to a particular asset class or style.

(ii) Components of investment performance measures

A portfolio evaluation measure focusing on components of investment performance was first introduced by Fama (1972). Following the studies by Treynor (1965), Sharpe (1966) and Jensen (1968), Fama suggested that the return on a portfolio could be subdivided into two components: the return from security selection called '*selectivity*' and the return from risk-taking called '*risk*'. A variety of subdivisions of both *selectivity* and *risk* are expressed as follows.

Overall Performance = *Selectivity* + *Risk*

(Net selectivity + Diversification) + *(Management's Risk + Investor's Risk)*

The chart above can be expressed in equation terms as follows:

$$[R_a - R_f] = [R_a - R_x(\beta_a)] + [R_x(\beta_a) - R_f] \qquad (2\text{-}17)$$

$$[R_a - R_x(\sigma(R_a)] + [R_x(\sigma(R_a)) - R_x(\beta_a)] + [R_x(\beta_a) - R_x(\beta_T)] + [R_x(\beta_T) - R_f]$$

where,

R_f	=	risk-free rate,
R_a	=	the actual return on the chosen portfolio a,
$R_x(\beta_a)$	=	the return on the combination of the riskless asset and the market portfolio that has risk β_x equal to β_a, the risk of the chosen portfolio a,
$R_x(\sigma(R_a))$	=	the return on the combination of the riskless asset and the market portfolio that has return dispersion equivalent to that of the actual portfolio chosen,
$R_x(\beta_T)$	=	the return on the naively selected portfolio with the target level of market risk (β_T), and
β_T	=	investor's target level of risk for the portfolio.

Overall performance of the portfolio is the total return over the risk-free return including the return that should have been received for accepting the portfolio risk. A result of selectivity is any excess above this expected return. Reilly and Brown (2000, p.1151) commented that 'this evaluation is possible only if the client has specified a desired level of market risk, which is typical of pension funds and profit sharing plans. Generally, it is not possible to compute this measure for *ex post* evaluation because the desired risk level is typically not available.'

Although further development of fund performance evaluation measures has been proposed in the finance literature, most of the newer performance evaluation measures are not possible of application in this study because of the non availability of data in Thailand. For example, monthly data on fund size and book-to-market in the early 1990s is not available, as well as data on a small-cap or a large-cap stock portfolio and other required data for each measure does not exist.

2.5 OVERALL PERFORMANCE OF MUTUAL FUNDS

In this section the review of research into overall performance of mutual funds is presented. Although some studies on overall performance have also examined the persistence of fund performance which is the predictive value of past performance in forecasting future performance, the persistence of fund performance is separated and reviewed in the next section (2.6).

One of the early interesting studies on performance evaluation was conducted by Cowles (1993). In this study the author compared the average performance of a set of managed portfolios to a passive portfolio and concluded that the managed portfolios underperformed the passive benchmark. Although Cowles examined return, he ignored any consideration of risk.

Sharpe (1966) utilised the Sharpe ratio to examine fund performance using 34 mutual funds over 1954-1963 as portfolio data and the Dow-Jones Industrial Average (DJIA) as a benchmark. He discovered that only 11 funds had outperformed the benchmark, indicating the majority of the funds underperformed the market. However, when adding expenses back to the return, an analysis to gross performance indicated that 19 of the 34 funds had superior performance compared with the DJIA.

Jensen (1968) examined mutual fund performances during the 1945-1964 period using annual data. In this data set, 56 funds had the entire period data (1945-1964) and 115 funds had 10-year period data (1955-1964). Using the S&P 500 as a benchmark, results based on the 1945-1964 period revealed the mean Jensen alpha value was -0.011 and two-thirds of the funds showed inferior performance to the market benchmark. The mutual funds over the period 1955-1964 also did worse than the market benchmark. This finding is consistent with the finding by Sharpe (1966) who examined fund performance during a similar period (1954-1963).

Mains (1977) replicated Jensen's 1968 study. The author utilised 70 funds from Jensen's sample. Mains also utilised monthly returns over the ten-year period (1955-1964) whereas Jensen used annual data. Mains highlighted biases in Jensen's data. He commented that Jensen presumed all dividend yields and capital gains were made at the end of the year; and when Jensen added back expenses to calculate gross returns, Jensen also presumed this was done at the end of the year. Mains commented that this would cause an understatement of the mutual fund rates of return (and therefore, understated the measures of excess return). In addition, Jensen calculated the beta (systematic risk) for the funds by using a 20-year period, 1945-1964, and utilised this estimated beta to the last ten years (1955-1964), although in fact risk was lower during the later period. Mains commented that this would be an overstatement of levels of systematic risk. Results from Mains study indicate that his sub-sample demonstrates slightly higher return and lower risk than Jensen's results. Mains concluded that after adjusting for several biases, results with net returns indicated neutral performance, whereas the performance using gross returns pointed out that most funds outperformed the market portfolio.

Carlson (1970) investigated the performance of mutual fund portfolios during the period 1948-1967. Carlson's study concentrated on the effect of the market series used for comparisons and the time period. Carlson utilised a modified Tobin-Sharpe-Lintner capital asset pricing model as a measurement technique. Three types of mutual funds were examined: Diversified common stock funds, Balanced funds, and Income funds. Each of the funds was compared to the three market indices: The S&P 500, New York Stock Exchange Composite (NYSE) and Dow Jones Industrial Average (DJIA). Results depended on which market benchmark was used. During the period 1948-1967, the majority of funds performed better than the DJIA, whilst only a small number had gross returns greater than the NYSE composite or the S&P 500. The Balanced and Income funds were consistently inferior to the full common stock funds. This indicates that funds with different investment objectives showed different results. In addition, an analysis of various ten-year sub-periods indicates that results were dependent upon thc time interval examined.

McDonald (1974) examined the performance of 123 mutual funds during the ten-year period 1960-1969, and also studied the relationship between fund performance and objectives of the funds. There are five-stated objectives of the funds: (1) maximum capital gain funds, (2) growth funds, (3) income growth funds, (4) balanced funds, and (5) income funds. The author discovered a positive relationship between the measure of risk and the stated objective. The results also reveal that during 1960-1969 the more aggressive funds outperformed the more conservative funds (particularly when performance is measured in terms of risk-adjusted performance).

Kim (1978) examined mutual fund performances during the seven-year period 1969-1975. The sample for this study was 138 mutual funds, with quarterly data. The author utilised the return performance of a three-index benchmark portfolio, a form of weighted index benchmark portfolio approach, as the market portfolio standard. Determined by using the weighted index benchmark portfolio approach, the mutual funds, on average, failed to perform better than the market benchmark over the period 1969-1975. The author stated that poor investment performance was noticeable among funds with high ex-post risk. Funds in the highest risk classes had lower returns per unit of risk than both the benchmark portfolio and other funds in lower risk classes.

Shawky (1982) examined 225 mutual funds using monthly Net Asset Value (NAV) data over a five-year period (1973-1977). The author employed Treynor , Sharpe, and Jensen performance measures to evaluate fund performances and utilised an equally-weighted NYSE composite index as the market benchmark. The sample of 255 funds was divided into four sub-samples according to the funds objectives (Maximum Capital Gain, Growth, Balanced, and Income funds). Results indicate that the returns on the mutual fund industry as a whole conform almost exactly to the equally-weighted NYSE returns. Shawky contended that the fund performance in the 1970s seemed to be better than in the earlier period. The author also discovered that risk was consistent with fund objectives and fund diversification seems to have improved in the 1970s. The strong correlation among the alternative risk adjusted performance measures lead to the conclusion that 'for all practical purpose, there does not seem to be any difference between the performance measures of Sharpe, Treynor, and Jensen' (Shawky 1982, p.34).

Grinblatt and Titman (1989a) evaluated mutual funds using 1975-1984 data on quarterly portfolio holdings for a sample of mutual funds. Data was divided into two sets: cash-distribution adjusted monthly returns for the 157 surviving funds; and 274 equity mutual funds which reported quarterly to the Securities and Exchange Commission (SEC). The authors assert that the second data set is more complete and is not subject to survivorship bias. The authors state that a comparison of their two sample sets is able to gauge the bias in studies with samples consisting only of surviving funds.

Grinblatt and Titman utilised their model, the positive period weighting measure (*PPW*), and the Jensen alpha (1968) to evaluate fund performance. Results indicate that survivorship bias was relatively small (0.5 per cent per year). The Jensen alpha values of the growth funds and aggressive-growth funds were significantly positive which indicates superior performance. However, actual returns did not demonstrate abnormal performance for any type of fund. The authors concluded that investors cannot take benefit from the superior abilities of these portfolio managers by buying shares in their funds.

Malkiel (1995) studied the performance of all equity funds in existence in each year during 1971-1991. This data set permitted the author to evaluate fund performance more precisely and enable measurement of survivorship bias. The data utilised quarterly returns. Malkiel utilised the CAPM model and employed the S&P 500 and Wilshire 5000 Stock Index as the market benchmark. Results indicate that equity mutual funds tend to be inferior to the market benchmark.

Block and French (2002) developed a new model, a *two-index model* (see 2.5.1), to examine performance of funds that comprised only of common stocks and monthly returns were available from 1989 to 1998, 506 funds in total. Monthly returns on the Wilshire 5000 value-weighted and equal-weighted indexes from 1989 to 1998 were used as the market benchmark. The single-index model (Jensen alpha) was also used to evaluate fund performance for the purpose of comparing results. The authors state that the two-index model does a better job of evaluating fund performance because the two-index model exhibited higher explanatory power (R^2) than a single-index model. Results of the two-index model revealed that there were only six funds that outperformed the market benchmark.

In Australia, a number of studies have examined Australian fund performance, such as Praetz (1976), Bird, Chin and McCrae (1983), Robson (1986). These three studies are reviewed below. Praetz (1976) examined the performance of 4 Australian mutual funds and 12 unit trusts from 1967 to 1971 using Sharpe (1966) and Treynor (1965) as measuring techniques. Returns were based on fund buying prices and returns for the market were estimated by using the Sydney Ordinary Shares Index No. 15 plus the average dividend yield series for comparability with the Share Index. Results indicate that funds underperformed relative to the market benchmark and there was little consistency of fund performance over time. Praetz revealed weaknesses of the study: the existence of non-equity investment, an imperfect rate of return and market index, the small sample set, and the short period of the study; which limited its usefulness.

Bird, Chin and McCrae (1983) examined the investment performance of 380 Australian superannuation funds and their managers (15 managers) over the period January 1973 - June 1981 using the three major risk-adjusted measures, Treynor (1965), Sharpe (1966) and Jensen (1968). Correlation between the three measures was tested. The Statex Actuaries Accumulation index, the Adjusted Campbell and Cook index (ACC index) and the "20/30" index[9] were used as alternative market benchmarks. Results indicated poor performance of the funds over the first two and a

[9] The 20/30 Index was computed by the authors (Bird, Chin and McCrae). The index represented an attempt to recognize the required proportional investment for superannuation funds.

half years (January 1973 - early 1975), while over the subsequent period of study (late 1975-1981) the majority of funds outperformed the benchmark. However, for the entire period of the study (1973-1981) the performance of superannuation funds underperformed relative to the benchmark. In addition, there was no significant difference between the performance of the funds when estimated by the three risk-adjusted measures (all correlation values were above 0.95).

Robson (1986) examined the investment performance of 67 Australian unit trusts and 9 mutual funds for the period 1969 to 1978. Since no publicly-available market index that included dividend distributions is available for 1969-1978, the author employed the Walter Index[10] as the market portfolio in the first five years (1969-1973) and the Statex Actuaries Accumulation Index for the second five years (1974-1978). The third index utilised was an equally-weighted index, which consisted of all the funds in the sample excepting income trusts. The Melbourne All Ordinaries index was used to test the stationarity of beta of each fund. The three major risk-adjusted performance measures, Sharpe (1966), Treynor (1965) and Jensen (1968), were employed to evaluate fund performance. Rates of return on the 13-week Treasury, 26-Week Treasury Notes, 2-year Government Bonds and 10-year Government Bonds represented risk-free estimates. Robson found that the average performance of funds underperformed the market indexes for the period 1969-1978. Results for the sub-periods indicated that the performance of the funds outperformed the market for the first five-year period (1969-1973) but the performance of the funds underperformed the market for the second five-year period (1974-1978). Both the beta and the

[10] Robson (1986) noted that this index was developed by Terry Walter and is reported in Brown and Walter (1976, cited in Robson 1986, p.59)

standard deviation values of the fund were static over time and there was a negative relationship between fund performance and fund risk level for the period 1969-1978. However, for 1974-1979, there was no relationship between risk and rate of return.

Furthermore, European mutual funds have been examined by several researchers. For instance, McDonald (1973), and Dermine and Röller (1992) studied mutual fund performance in France. Ward and Saunders (1976), Guy (1978), Shukla and Von Imwegen (1995), Bal and Leger (1996), and Blake and Timmerman (1998) studied UK funds. Ter Horst, Nigman and De Roon (1998) examined mutual fund in Netherlands. Dahlquist, Engström and Söderlind (2000) studied Swedish mutual funds. Finally, Otten and Bams (2002) focus their studies on fund performance in several European countries. To provide an overview for European mutual funds, the recently published European study by Otten and Bams (2002) is reviewed.

Otten and Bams (2002) investigated five important mutual fund countries - France, Italy, Germany, Netherlands and the UK - which together account for 85 per cent of total assets in European funds. The authors restricted their samples to pure domestic equity funds with at least 24 months of data and they claimed that their samples were controlled for survivorship bias. The monthly logarithmic returns of 506 equity funds were computed from January 1991 to December 1998 and the Carhart (1997) *four-factor model* was utilised to examine fund performance. Overall results indicate that European mutual funds, and particularly "small-cap" funds, are able to add value, as indicated by their positive after-cost alphas. French, Italian, Dutch and UK funds exhibited significant outperformance at an aggregate level when management fees were added back, while German funds underperformed the relevant market benchmark.

Table 2.1 Summary of overall performance of mutual fund studies

Authors	Year	Period covered	No. of funds	Type of Funds	Model	Market Index	Survivor bias	Performance
Sharpe	1966	1954 - 1963	34	All	Sharpe Ratio	The Dow-Jones Industrial Average (DJIA)	Yes	underperformed
Jensen	1968	1945 - 1964	115	All	Jensen Alpha	The S&P 500	Yes	1946 -1964: underperformed 1955 - 1964: underperformed
Carlson	1970	1948 - 1967	82	Common stock funds, Balance funds, and Income funds	Tobin - Sharpe - Lintner CAPM	The S&P500, NYSE, and DJIA	Yes	Most of funds outperformed the DJIA. A small number of funds outperformed the NYSE or the S&P500
McDonald	1974	1960 - 1969	123	All	Treynor , Sharpe , and Jensen measures	The equally weighted-NYSE composite index	Yes	Two-third of fund underperformed the market portfolio. The more aggressive funds outperformed the more conservative funds
Mains	1977	1955 - 1964	70	All	Jensen alpha	S&P500	Yes	neutral performance
Kim	1978	1969 - 1975	138	All	Weighted Index Benchmark Portfolio approach	A three-index benchmark portfolio (Salomon Brothers' High Grade Corporate Bond Index, the NYSE, and Treasury bills)	Yes	underperformed
Shawky	1982	1973 - 1977	255	All	Treynor , Sharpe , and Jensen measures	The equally weighted-NYSE composite index	Yes	neutral performance
Grinblatt and Titman	1989	1975 - 1984	274	Equity funds	Jensen measure and PPW model (Grinblatt and Titman 's model)	The value weighted - CRSP (New York and American Stock Exchange) , Equally weighted-NYSE , F10 (Lehmann and Modest 1988) , and P8 (Grinblatt and Titman 1988)	No	Aggressive-growth funds outperformed the market portfolio. Actual returned of all funds undeperformed the market portfolio.
Malkiel	1995	1971 - 1991	724	Equity funds	CAPM	The S&P 500 and Wilshire 5000 stock index	No	underperformed
Block and French	2002	1989 - 1998	506	Common stock funds	Jensen Alpha and a two-index model (Block and French's model)	Wilshire 5000 stock index and equal-weighted indexes	Yes	underperformed
Praetz	1976	1967-1971	16	4 Aus. mutual funds 12 Aus. unit trusts	Treynor and Sharpe measures	The Sydney Ordinary Shares Index No.15 plus the average dividend yield series for comparability with the Share Index	Yes	underperformed
Bird, Chin and McCrae	1983	1973 - 1981	380	Australian Supperannuation funds	Treynor, Sharpe, and Jensen measures	The Statex Actuaries Accumulation index, the Adjusted Campell and Cook index, and the 20/30 index	Yes	Underperformed during 34 quarters (1973-1981). When funds were tested for 2 sub-periods, the fund performance of first 17 quarters was inferior, but superior to the market over the second 17 quarters.
Robson	1986	1969-1978	76	9 Aus. mutual funds 67 Aus. unit trusts	Treynor, Sharpe, and Jensen measures	The Walter index and the Statex Actuaries Accumulation index	Yes	Underperformed during 1969-1978. When funds were tested for two sub-periods, the fund performance of 1969-1973 was superior, but was inferior to the market in 1974-1973.
Otten and Bams	2002	1991-1998	506	Equity funds from 5 countries (the UK , France, Germany, Italy, and Netherlands)	Four-factor model (Carhart 's model)	The researchers computed benchmark from all stocks that are in Worldscope universe for each country.	No	French, Italian, Dutch and UK funds outperformed but German Funds underperformed.

2.6 PERSISTENCE AND NON-PERSISTENCE OF MUTUAL FUND PERFORMANCE STUDIES

As stated in 2.5, several fund performance studies have not only examined fund performance but also documented persistency of fund performance. The previous section has presented a review of the research into mutual fund performance. This section will review the research into the persistence of fund performance.

To test the persistence of mutual fund performance, the four widely used methodologies are: regression analysis, Spearman rank correlation analysis, quartile ranking comparison analysis, and contingency table analysis (see 3.4 for detail). Some studies have utilised only one of these methodologies whist many studies have employed more than one methodology.

It should be noted that most of the studies in this section revealed that their samples suffered from survivorship bias. Only three studies by Brown and Goetzman (1995), Carhart (1997) and Daniel, Grinblatt, Titman and Wermers (1997) asserted that their samples controlled for survivorship bias.

Although a number of mutual fund performance studies have found evidence of fund performance persistence, several studies have argued and revealed evidence of non-persistence. These inconsistent results are reviewed in this section. The findings of fund performance persistence are presented in 2.6.1 and the findings of non-persistence in fund performance are presented in 2.6.2.

2.6.1 Persistence of mutual fund performance

In persistence of fund performance studies, the performance in a prior period is typically compared to the performance in a subsequent period.

2.6.1.1 Studies in the early period

One of the earliest analyses of the persistence of mutual fund performance was conducted by Sharpe (1966). The author estimated 34 fund performances over a ten-year period, 1944-1953, and compared these performances with the ranking of the same funds in the subsequent ten-year period, 1954-63. Using the Spearman rank correlation coefficient as a statistical test, results indicated a general upward trend suggesting that a fund with a low ranking in the previous period tended to get a low ranking in the later period, while those ranking high in the previous period tended to rank high in the later period.

Klemkosky (1977), covering the period 1968 through 1975, found performance persistence in long-run performance, but not in short-run performance. The study period was subdivided into four non-overlapping two-year periods and two non-overlapping four-year periods; 1968-69 vs. 1970-71; 1970-71 vs. 1972-73; 1972-73 vs. 1974-75; and 1968-71 vs. 1972-75. The Spearman rank correlation coefficient was utilised to test performance ranking and the chi-square contingency test was used to measure the degree of relationship between the proportion of positive and negative Jensen alphas in successive time periods. Results indicate some consistency if measured over a four-year period but not in all the two-year periods. The author concluded that investors should not use past performance to predict short-run future performance.

2.6.1.2 Studies in the 1990s

Several studies completed in the 1990s also found evidence for fund performance persistence, including Grinblatt and Titman (1992), Hendricks, Patel and Zeckhauser (1993), Goetzmann and Ibbotson (1994), Bauman and Miller (1994), Kahn and Rudd (1995), Malkiel (1995), Brown and Goetzmann (1995), Volkman and Wohar (1995), Elton, Gruber and Blake (1996b), Gruber (1996), Carhart (1997), Daniel, Grinblatt, Titman and Wermers (1997) and Detzel and Weigand (1998). These studies and more recently, the study by Ber and Madura (2000) are reviewed below.

Grinblatt and Titman (1992) utilised a sample of 279 mutual funds that existed from December 1974 to December 1984 to examine the persistence of abnormal performance by using a three-step procedure: (1) split the ten-year sample of fund returns into two five-year sub-periods, (2) calculate the abnormal returns of each five-year sub-period, (3) estimate the slope coefficient in a cross-sectional regression of abnormal returns. The authors found evidence of positive persistence in mutual fund performance.

Short- term and longer-term performance persistence

Hendricks, Patel and Zeckhauser (1993) re-examined the extent to which the past superior performance of mutual funds can be reliably used as an indicator of future superior performance, which is a testing for a 'hot hand phenomenon'[11]. They analysed quarterly return data, 1974 to 1988, by comparing returns with several benchmark market indices. Based on a cross-sectional regression suggested by Fama

---

[11] As described by Hendricks et al (1993) and a parallel study by Goetzmann and Ibbotson (1994), "hot hand phenomenon" refers to the performance of mutual funds that achieved above average returns in a prior period and which continue to get superior performance in a later period.

and MacBeth (1973), the ability to predict the rank of funds is robust across all the short-run evaluation periods (from one to eight quarters). Persistence of superior fund performance proved to be significant, although it is mainly a short-run phenomenon, approximately four quarters. The authors concluded that persistence in the short run in terms of relative performance was found, with the strongest evidence for a one-year evaluation horizon.

This finding on the persistence for a short-run phenomenon (one-year evaluation horizon) was confirmed by Elton, Gruber and Blake (1996b) and Carhart (1997). In the study of Elton, Gruber and Blake (1996b), a new model, a four-index model, was introduced to evaluate and rank fund performance in both the short term (one year) and in the longer term (three years). Rank correlation was employed to test the relationship between prior and subsequent periods. The authors found that past performance is predictive of future performance in both the short term and longer term. Selection of funds based on the prior year's data provided much more information about performance than selection based on data from the prior 3 years. In the study of Carhart (1997), a further new model, a four-factor model, was introduced to measure fund performance and the study also examined persistence of performance in both the short-term (one-year) and longer-term (two- to five-year return and three-year four-factor alpha). Cross-sectional regression, Spearman rank correlation coefficient, and contingency table were used to test the persistence of fund performance. The sample consisted of all known 1,892 equity funds over January 1962 to December 1993. Results indicate strong evidence of short-run persistence of mutual fund returns. The persistence was explained by common-factor sensitivities, expenses, and transaction costs. The author found only very slight evidence of the existence of skilled or informed mutual fund managers. Further, using a longer period of past performance did not provide more information content on future performance.

A number of studies have tested further for a 'hot hand phenomenon', including Goetzmann and Ibbotson (1994), Malkiel (1995) and Daniel, Grinblatt, Titman and Wermers (1997). Goetzmann and Ibbotson (1994) focused on one main question: Do winners repeat? The repeat-winner pattern over successive one and two-year intervals from 1976 to 1988 was examined. This study employed several procedures to test for persistence of fund performance. These included: regression of the last two-year cross-sectional alphas on the next two-year cross-sectional alphas; regression of monthly relative performance on preceding monthly relative performance; boot-strapped quartiles of regression statistics from monthly relative performance tests; two-way tables for two-year and one-year periods; and quartile ranking analysis. Results indicate that all of the two-year, one-year, and monthly results are consistent, with the best performers in the past likely to be the best performers in the future.

Malkiel (1995) reported a 'hot hand phenomenon' result that over the study period (1971-1991) winners tended to repeat almost 66 per cent of the time. Although the persistence phenomenon were found, the findings were likely to be influenced by survivorship bias and the relationships may not be robust since the strong persistence that evidenced in the 1970s failed to exist during the 1980s.

Daniel et al (1997) introduced a new model, a characteristic-based benchmark, to measure fund performance and a 'hot hand phenomenon' was tested using a unique database of 2,500 equity funds from 1975 to 1994. All funds existing during the entire period were ranked on their average monthly return of the prior year. Quintile portfolios were formed and the gross return of funds in each quintile was measured over the following year. All funds existing during a given month were included in the following year (all quintile portfolios were rebalanced monthly). The entire sort process was repeated for the following year and the time-series average return for each portfolio was computed to test for the performance persistence. Results show evidence of the hot hand phenomenon, which is consistent with the findings in previous studies.

Further tests on consistency of winners and losers

Several studies, which were reviewed above, used a contingency table to test for the consistency of winners and losers (Klemkosky 1977; Goetzman and Ibbotson 1994; Carhart 1997). This issue was also tested by Brown and Goetzmann (1995) and Kahn and Rudd (1995).

In Brown and Goetzmann (1995), funds were classified as winners or losers depending upon whether the return was above or below the median of all fund returns reported each year (1976-1988). Contingency tables and the cross product ratio were used to report the number of repeat performers to the number of non-repeat performers. Results provide evidence of significant persistence in fund performance for seven out of twelve years (1976-1988). It is important to highlight that the reversal also happens. For example, one of the years that demonstrated a significant and reversal pattern was 1987, namely winning funds in 1987 tended to be losing funds in 1988. Although there was evidence of relative performance persistence, a year-by-year decomposition of the persistence effect indicates that the relative performance pattern depends upon the time period of study.

In Kahn and Rudd (1995), the authors not only tested for consistency of winners and losers (contingency table analysis), but also used regression analysis to test persistence of performance for 300 equity and 195 fixed-income mutual funds during the period 1983 - 1993. Results indicate the persistence of performance for only fixed-income funds, after controlling for fund style and management fees.

Forecasting fund performance by risk-adjusted performance and raw returns

Gruber (1996) found that risk-adjusted performance was superior in forecasting fund performance when compared with raw returns. The author evaluated the predictability of 227 common stock funds using data from January 1985 to December 1994. To test persistence of performance, the Spearman rank coefficient was used to test rank correlation. The mean and standard deviation of the time series of differences in the excess returns were also calculated.

Performance persistence over a stock market cycle

Persistence in the performance ranking over a complete stock market cycle was found by Bauman and Miller (1994). The data utilised in this study was quarterly rates of return for portfolios of investment management organizations, December 1972 to September 1991. Stock market cycles were defined by the quarterly closing prices of the Standard & Poor's 500 Stock Index. The authors selected market peaks to separate market cycles, five market cycles in total. The Spearman rank correlation coefficients and Chi-square test were used to test persistence of fund performance from one market cycle to the next market cycle. Results indicate that ranking the returns of portfolios over a stock market cycle is very useful in predicting ranking and returns over the next market cycle. However, the authors noted that 'this is not to imply that predictions of portfolio returns and rankings should be made solely on the basis of the variables used in this study. These variables should be used in conjunction with other factors that are known to influence portfolio performance (such as consistency of investment style and continuity of management personnel). The variables we use may serve as the initial filters in predicting portfolio performance' (Bauman and Miller 1994, p.39).

Determinants that influence performance persistence

Determinants that may influence the persistence of fund performance were investigated by several researchers, including Carhart (1997), Volkman and Wohar (1995) and Detzel and Weigand (1998). Carhart (1997) reported that the persistence of fund performance was explained by common-factor sensitivities, expenses, and transaction costs. The common-factor sensitivities refer to size, book-to-market and momentum factors. The author found only very slight evidence on the existence of skilled or informed mutual fund managers.

Volkman and Wohar (1995) investigated systematic factors of persistence in relative performance of 332 mutual funds from September 1980 to December 1989. The relationship between persistent fund performance and four determinants (size of the fund, stated goal of the fund, existence of a sales charge, and management fee) were tested. Results indicate that there was no evidence of a consistent relationship between fund size and persistent fund performance. The existence of a sales charge and goal of a fund did not affect the persistence of fund performance. The authors concluded that persistence in abnormal fund performance is driven by funds with low management fees and with a goal of maximum capital gains. The persistence of fund performance with low management fees appeared only in funds with superior past performance.

Detzel and Weigand (1998) found that the size of the stocks held by funds and fund manager styles (described by ratios including, earnings-to-market, book-to-market, and cash flow-to-market) explained the persistence in mutual fund performance during 1975-1986. The authors also found that market risk and fund expense ratios accounted for only a small amount of the momentum in mutual fund returns.

Performance persistence of closed-end funds

All the above studies have examined the performance persistence of mutual (open-end) funds. Bers and Madura (2000) focused their study on the performance persistence of closed-end funds. The authors investigated persistence for two categories of performance measures: (i) the market price return, which is the performance of the funds as perceived by the market, and (ii) the NAV return, which determines the actual performance of the underlying assets and is thus a surrogate for management skill. The samples consisted of 384 closed-end funds over a period of 1976 to 1996. The samples were divided by type of fund (taxable bond, equity, municipal bond) and were examined over three different holding periods (12, 24, and 36-month periods). To test persistence, the samples were split into two sub-periods. Abnormal returns computed from the second period were then regressed on abnormal returns calculated from the first period in a cross-sectional regression. Results provided strong evidence of NAV performance persistence and market price performance persistence for each type of closed-end fund over the 12, 24, and 36-month holding periods. The results differed only slightly between fund groups and over different holding periods.

2.6.2 Non-persistence of mutual fund performance

Several studies have found evidence of non-persistence in the performance of mutual funds. This evidence is found not only in American studies, but also in Australian and New Zealand studies. The findings are reviewed below.

2.6.2.1 American studies in the early period

Jensen (1968) utilised regression analysis to examine the persistence of fund performance by estimating alpha values for funds in two periods, 1945 to 1954 and 1955 to 1964, and regressing the alpha values from the second period on the values for the first period. Regression results indicate that on average these mutual funds were not able to forecast security prices. Jensen concluded that not only average fund performance, but also individual fund performance were not significantly different from that predicted by chance.

Carlson (1970) examined the degree of performance persistence of 57 common stock funds during 1948 -1967 using the Sharpe ratio as a ranking measure. The 20-year period was divided into 11 overlapping decades and then each decade was divided into two 5-year periods. Rank correlation coefficient results indicate that the degree of persistence in five-year periods was higher than for ten-year intervals. However, degrees of persistence declined over time. Carlson concluded that past performance results exhibited no consistent predictive value.

An early study that used quartile comparison tables to investigate performance persistence was conducted by Dunn and Theisen (1983). The authors used quartile comparison table analysis (with the Chi-square statistic) to test whether funds tend to retain their performance in the same quartile over time. Spearman rank correlation coefficient was used to investigate consistency of performance from one period to the next. The samples consisted of 201 actively managed portfolios during 1973-1982. The authors found that historical results appeared to be of little help in predicting future results and concluded that past performance should be given a minor role in manager selection decisions.

2.6.2.2 American studies in the 1990s

A number of American studies completed in the 1990s found evidence of non-persistence for mutual funds, including Krueger and Callaway (1995) and Phelps and Detzel (1997).

Krueger and Callaway (1995) focused their study on the persistence of three-year mutual fund performance. The sample consisted of 125 funds, which had at least six years of return data, May 1988 - April 1994. Persistence of fund performance was tested through the use of three methodologies: regression analysis, contingency table analysis and percentage of funds that repeat performance in the same place in each third (top third, middle, bottom third). Krueger and Callaway found that fund performances in the first three-year period were of little use in predicting the performances in the second three-year period.

Phelps and Detzel (1997) believed that the positive persistence found in several early 1990s papers was the result of persistence in broad equity classes (macropersistence) rather than sustainable managerial ability (micropersistence). To prove this argument, the authors examined the issue of persistence of mutual fund performance and the extent to which there is macropersistence in the 1980s and 1990s. Monthly return data of 87 mutual funds and 14 different market indices from 1983 to 1994 represented portfolio returns and the market benchmark, respectively. The regression analysis provided evidence in favour of the argument that positive persistence found in the early years in this, and in previous studies, was due to insufficient risk controls. Results from contingency analysis indicate that 'investing in yesterday's winning mutual funds is not a reliable strategy for being in tomorrow's winning mutual funds' (Phelps and Detzel 1997, p.55).

2.6.2.3 Australian and New Zealand studies

Many Australian and New Zealand studies found consistent results of non-persistence in fund performance, including Bird, Chin and McCrae (1983), Robson (1986), Vos, Brown and Christie (1995) and Halahan (1999). These studies are reviewed as follows.

Bird, Chin and McCrae (1983) examined performance persistence of 15 Australian superannuation fund managers during January 1973 - June 1981. The Spearman rank correlation and Kendall coefficient of concordance were used to test persistence of manager performance. Results indicate that there was no evidence that the managers performed consistently over time.

Robson (1986) not only examined the performance persistence of 67 Australian unit trusts and 9 mutual funds during 1969-1978, but also tested for financial characteristics such as size, age, and initial service fee of the funds to consider whether they are useful in predicting future performance. The three major risk-adjusted performance measures, Treynor, Sharpe and Jensen measures, were employed to evaluate and rank fund performance. The Spearman rank order and Pearson product moment correlation coefficients of successive rate of return were tested for the persistence of fund performance from year to year. Results indicate that there was no evidence of persistence in performance and financial characteristics of the funds would not be useful in predicting future fund performance.

Vos, Brown, and Christie (1995) examined the persistence performance of 14 New Zealand equity funds and 12 Australian equity trusts from January 1988 to June 1994. The authors utilised the Sharpe measure (1966) to evaluate the performance of funds. The authors revealed that the time frame utilised in this study was limited by the short observation periods and the differing holding horizons. To test for persistence performance, quartile comparison table analysis, Spearman rank correlation coefficient analysis, and ordinary least square regression analysis were used. Results provided evidence that past performance was of no predictive value in either Australia or New Zealand.

Hallahan (1999) examined the persistence of fund performance and explored the optimal past performance information set of 224 Australian rollover funds[12]. The author tested four fund types: fixed interest, multi-sector yield, multi-sector balanced and multi-sector growth. Performances of mutual funds were computed using the Jensen alpha, Sharpe ratio, information ratio and raw returns. Hallahan employed three methodologies to examine the relation between past and future performance: regression analysis, non- parametric contingency tables, and top and bottom quartile ranking. The author provides a unique study on persistence of fund performance. Namely, fund performances were split into a subsequent period (1994-95), and into prior periods of two (1992-93), three (1991-93), four (1990-93) and five years (1989-93). This enables the examination of the relation between current performance and a past performance series of varying length. Although the author found persistence in Jensen alpha performance for Australian fixed interest funds when testing by regression analysis, there was no evidence of persistence in the other fund types. Hallahan concluded that fund performance in the past is unable to be used to predict future performance. Longer periods of prior performance do not have incremental information content beyond that provided by shorter periods. The author also concluded that the information of fund performance in the past differs inconsistently across different fund styles, and is affected both by the methodology used and the performance measurement employed.

---

[12] 'Rollover fund is a genetic term used to describe several different types of investment fund whose common characteristic is that they only accept particular types of payment having specified, employment-related origin. Rollover funds were introduced by the Australian Government in July 1983 to encourage long-term saving for retirement' (Hallahan 1999,p.258)

Summary of methodologies used in persistence studies

The following table presents results of fund performance persistence studies employing the four widely-used methodologies: regression analysis, Spearman rank correlation coefficient analysis, quartile ranking comparison analysis and contingency table analysis. Some studies have employed only one of these methodologies whist many studies have used more than one methodology.

Table 2.2 Performance persistence studies, methodologies and results

Methodology	Study (authors)
Studies finding performance persistence	
1. Regression analysis	Grinblatt and Titman (1992), Hendricks, Patel and Zeckhauser (1993), Goetzmann and Ibbotson (1994), Kahn and Rudd (1995), Volkman and Wohar (1995), Carhart (1997), Bers and Madura (2000)
2. Spearman rank coefficient	Sharpe (1966), Klemkosky (1977), Shukla and Trzcinka (1994), Bauman and Miller (1994), Elton, Gruber and Blake (1996b), Gruber (1996), Carhart (1997)
3. Quartile ranking comparison	Goetzmann and Ibbotson (1994), Bauman and Miller (1994)
4. Contingency table	Klemkosky (1977), Goetzmann and Ibbotson (1994), Brown and Goetzmann (1995), Malkiel (1995), Kahn and Rudd (1995), Carhart (1997)
Studies finding non-persistence of performance	
1. Regression analysis	Jensen (1968), Vos, Brown and Christie (1995), Krueger and Callaway (1995), Phelps and Detzel (1997), Hallahan (1999)
2. Spearman rank coefficient	Carlson (1970), Bird, Chin and McCrae (1983), Robson (1986), Vos, Brown and Christie (1995)
3. Quartile ranking comparison	Dunn and Theisen (1983), Vos, Brown and Christie (1995), Hallahan (1999)
4. Contingency table	Krueger and Callaway (1995), Phelps and Detzel (1997), Hallahan (1999)

Summary of the length of the prior period and the length of the prediction period

In persistence of fund performance studies, the relation between the performance in a prior period is typically compared to the performance in a subsequent period. The selection of the lengths of both periods has important implications on the study results. The following table presents the summary of fund performance persistence studies on the length of the prior period and the length of the prediction period.

Table 2.3 **Summary of the performance persistence studies on the length of the prior period and the length of the prediction period**

Authors	Year	Period covered	Length of prior period	Length of prediction period
Studies finding performance persistence				
Sharpe	1966	1954 - 1963	10 years	10 years
Klemkosky	1977	1968 - 1975	2 years	2 years
			4 years	4 years
Grinblatt and Titman	1992	1974 - 1984	10 years	10 years
Hendricks, Patel and Zeckhauser	1993	1974 - 1988	1-8 quarters	1-8 quarters
Goetzmann and Ibbotson	1994	1976 1988	1 year	1 year
			2 years	2 years
Bauman and Miller	1994	Dec 1972 - Sep 1991	1st market cycle : 16 quarters	2nd market cycle : 17 quarters
			2nd market cycle : 17 quarters	3rd market cycle : 9 quarters
			3rd market cycle : 9 quarters	4th market cycle : 17 quarters
			4th market cycle : 17 quarters	5th market cycle : 16 quarters
Kahn and Rudd	1995	1988 - 1993	2.5 years	2.5 years
			3 years	3 years
Malkiel	1995	1971 - 1991	1 year	1 year
			10 years	10 years
Brown and Goetzmann	1995	1976 - 1989	1 year	1 year
Volkman and Wohar	1995	Sep 1980 - Dec 1989	4 years	1, 2, 3, and 4 years
Elton, Gruber and Blake	1996	1977 - 1993	1 year	1 year
			1 year	3 years
			3 years	1 years
			3 years	3 years
Gruber	1996	1985 - 1994	1 year	1 year
			3 years	3 years
Carhart	1997	1962 1993	1 year	1year
			1, 2, 3, 4, and 5 years	1 year
Daniel, Grinblatt, Titman and Wermers	1997	Dec 1974 - Dec1994	1 year	1 year
Detzel and Weigand	1998	1976 - 1995	1 year	1year
Ber and Madura	2000	1976 - 1996	12 month	12 months
			24 months	24 months
			36 months	36 months
Studies finding non-persistence of performance (American studies)				
Jensen	1968	1945 - 1964	10 years	10 years
Dunn and Theisen	1983	1973 - 1982	1 year	1 year
			3 years	1, 3, and 5 years
			5 years	1,3, and 5 years
Krueger and Callaway	1995	May 1998 - Apr 1994	3 years	3 years
Phelps and Detzel	1997	1983 - 1994	2 years	2 years
Studies finding non persistence of performance (Australian studies)				
Bird, Chin and McCrae	1983	Jan 1973 - June 1981	17 quarters	17 quarters
Robson	1986	1969 - 1978	1 year	1 year
Vos, Brown and Christie	1995	Jan 1988 - June 1994	1, 2, and 4 quarters	1, 2, and 4 quarters
Hallahan	1999	1989 - 1995	2, 3, 4, and 5 years	2 years

2.7 THAI FUND PERFORMANCE STUDIES

After reviewing the development of fund performance studies in mature capital markets, this section focuses on fund performance studies in Thailand and the limitations of these studies.

According to Brailsford and Heaney (1998), managed funds exist in nearly every country in some style. The basic idea involves pooling investors' funds and handing over management of those funds to a professional manager. However, there are several particular types of managed funds. Differentiation of managed funds often arises due to domestic regulations. Styles of establishment of mutual funds (such as corporate style or contractual style) also differ between countries. As explained by Cai, Chen, and Yamada (1997), for example, Japanese mutual funds are of the contractual type[13], not of the corporate type[14] that exist in the United States. This is similar to mutual funds in Thailand as the fund style is the contractual type of establishment.

[13] A contract that is made between an investment management company, a trustee (a trust bank), and a beneficiary (an investor). The cash collected from investors by management companies through subscription or sales of beneficiary certificates is transferred to the custody of a trustee company. The manager gives investment instructions to the trustee that administers and safe-keeps the assets. This means that management of mutual fund is handled by a fund manager hired by the investment management company. Any of investment management company may have more than one fund manager and have several funds to handle. Thai mutual funds are of the contractual type, not of the corporate type which prevails in the United States.

[14] Each mutual fund in the United States is established in corporate style called an investment company. This company typically is a corporation that has as its major assets the portfolio of marketable securities referred to as a fund. 'The management of the portfolio of securities and most of the other administrative duties are handled by a separate investment management company hired by the board of directors of the investment company' (Reilly and Brown 2000, p.1099).

In Thailand, few studies of the financial performance of funds, including mutual funds, have been conducted. These studies are of limited reliability because of the shortness of the time period of each study, and all remain unpublished working papers.

The first Thai fund performance study was conducted by Kongcharoen (1992). The performance of five equity funds operated during August 1988-December 1990 were examined. Since the time period of the study was very short (2 years and 5 months), weekly data was used. Market prices and Net asset value (NAV) of those funds represented fund returns. The weekly Stock Exchange of Thailand Index (SET Index) was used as a proxy for the market portfolio. The author utilised the twelve-month deposit rate of commercial banks as the risk-free rate. The Treynor measure (1965) and Sharpe ratio (1966) were employed to evaluate fund performance (discussion of the Treynor and Sharpe measures will be referred in section 2.3). The Treynor and Sharpe measures exhibited consistent results: that four out of five funds achieved performance superior to the market benchmark. The rates of return of the four outperforming funds were higher than the average commercial bank deposit rate.

Bhovichitra (1996) examined return rates and risk levels of equity funds during 1992-1995. The sample consisted of 15 Thai equity funds for which monthly data was available for the period 1992-1995. Net Asset Value (NAV) and market prices of those funds represented fund returns. The SET Index was utilised as the market portfolio. The twelve-month deposit rate of commercial banks represented the risk-free rate. The author employed the Capital Asset Pricing Model (CAPM) to examine rate of return and risk levels of each fund. The Treynor (1965) and Sharpe (1996) measures were employed to evaluate fund performance.

Based on the market price data, Bhovichitra's results indicate that Thai funds exhibited an average rate of return higher than the market portfolio, 14 out of 15 funds gained higher return rates than the market. An average standard deviation (total risk) was also higher than the market portfolio and a high rate of unsystematic risk was found. The author interpreted that, on average, those funds in the sample set presented incomplete diversification.

Based on the NAV data, Bhovichitra found that Thai funds showed an average rate of return higher than the market, 13 out of 15 funds achieved higher performances than the market portfolio. The average standard deviation (total risk) value was also higher than that for the market. The high rate of unsystematic risk led the author to interpret that the funds were incompletely diversified.

To test market price and NAV data, Bhovichitra (1996) employed the correlation coefficient method. Results indicated that the appropriate data set to be used to examine fund performance was the NAV data. The Treynor and Sharpe measures confirmed the findings of the CAPM results that the funds outperformed the market portfolio during 1992 - 1995.

Mainkamnurd (1996) examined fund performance during 1992-1995 and tested for persistence of fund performance. The sample consisted of 51 Thai equity funds existing during the study period. Weekly data on net asset value (NAV) represented fund returns. In accordance with prior studies, the SET Index and the term deposit rates of commercial banks were represented as the market portfolio and risk free rates respectively.

Mainkamnurd employed five evaluation techniques to examine fund performance: NAV returns, NAV excess returns, the Treynor measure (1965), the Sharpe ratio (1966), and the Jensen alpha (1968). To test sensitivity values of performance in using different measures, the Pearson correlation was utilised. To examine for persistence in performance of mutual funds, cross-sectional regression and time-series regression developed by Grinblatt and Titman (1992) were tested.

Investigation of overall performance revealed that equity mutual funds underperformed the market benchmark. This result does not support the findings of Bhovichitra (1996) who found that during the similar period (1992-1995) Thai funds achieved superior performance when compared to the market. The Pearson correlation revealed high cross-sectional correlations except for the Treynor measure. This means that the four measures; NAV returns, NAV excess returns, the Sharpe ratio, and the Jensen measure generally provided similar inferences. The time-series regression provided evidence of performance persistence. However, the author was unable to test persistence of fund performance when funds were measured in terms of the Jensen alpha due to the relatively short time series of the data set.

The most recent study on the issue of mutual fund performance was conducted by Pornchaiya (2000). This study examined investment performance of Thai equity funds during January 1996 - June 1999. Mutual funds in the sample set were funds that existed on 25 June 1999 and had been in operation for at least 15 months. Under this condition, there were 77 mutual funds in the sample set, of which 22 were closed-end funds and 55 open-end funds. Monthly NAV and monthly SET Index data were utilized as portfolio returns and market return respectively. The weighted average of saving interest rates and term deposit rates of commercial banks was used as the risk-free rate. The author explained that for studies in other countries such as the U.S. it was normal use the Bond Index or T-bill rates to represent the risk-free rate. However, there was no yield curve on the Bond Index available in Thailand during that period. The author employed the Capital Asset Pricing Model (CAPM) to investigate abnormal returns of mutual funds and also utilised simple regression analysis or ordinary least square (OLS) equations to search for a the relationship between the risk premium of funds and the risk premium of the market portfolio. Since data in this study was time series data, the author used the Durbin-Watson (D.W.) statistic to test for serial correlation.

Results indicated that during January 1996 - June 1999 (part of the economic recession period in Thailand) the majority of mutual funds did not offer superior performance in comparison with the market portfolio. Only one of 77 mutual funds showed a positive abnormal return. The systematic risk of mutual funds was lower than one ($\beta < 1$) indicating that the return on mutual funds had less sensitivity to change in its value than the return on the market portfolio. The author noted that the limitations of this study were the proxy for market benchmark, the proxy for risk-free rate, and a short time series of data. The author suggested that the appropriate data should cover both economic expansion and economic recession periods.

The following table presents results of the Thai fund performance studies. Authors, period covers, number of funds in sample sets, model employing, market portfolio, appearance of survivorship bias, and concluding results are presented.

Table 2.4 Summary previous Thai fund performance studies

Study	Year	Period covered	No. of funds	Model	Market Index	Survi-vourship bias	Perfor--mance	Persistence or non-persistence
Kongcharoen	1992	6/1998 - 12/1990	5	CAPM, Treynor, Sharpe	SET Index	yes	outperform	na.
Bhovichitra	1996	1992 - 1995	15	CAPM, Treynor, Sharpe	SET Index	yes	outperform	na.
Mainkamnurd	1996	1992 - 1995	51	Treynor, Sharpe, Jensen, Return, Excess return	SET Index	yes	under-perform	persistence
Pornchaiya	2000	1/1996 - 6/1999	77	CAPM	SET Index	yes	under-perform	na.

In summary, empirical results of Thai fund performance studies during the 1990s have shown that although studying a similar period (Bhovichitra 1996; Mainkamnurd 1996), conflicting results have emerged. In addition, all four studies are of limited reliability due to the shortness of the time period in each study.

2.8 SUMMARY

This chapter has reviewed the literature that relates to mutual fund performance and prediction of performance. It has discussed the development of the evaluation measures, potential bias, empirical evidence of previous studies on fund performance and persistence of fund performance in developed capital markets such as those in the U.S. and Australia, and studies in a developing capital market, Thailand.

The fund performance evaluation measures have been developed for many decades. The three well-known performance measures that have been used are the Treynor measure (Treynor 1965), the Sharpe ratio (Sharpe 1966) and the Jensen alpha (Jensen 1968). Subsequent to these works, several researchers have developed alternative performance evaluation measures. Some studies attempt to eliminate the limitations of these three measures. Some studies add new testing factors that influence fund performance and some researchers focus their study on testing components of investment performance.

Several studies have pointed out potential bias in fund performance measures. These potential biases are benchmark error, survivorship bias and the bias in relationship between the three major risk-adjusted measures and the risk involved.

Empirical results of mutual fund performance in developed capital markets have been found to be mixed depending upon the time period of study, type of fund, choice of market benchmark, survivability and methodology of measurement.

Empirical studies of persistence in fund performance in developed capital markets have also revealed inconsistent results. A number of studies found evidence of performance persistence while many studies found no evidence of persistence in fund performance.

Empirical results of Thai studies during the early 1990s have shown that, although using the same time period of study, results were inconsistent. One found that Thai equity funds outperformed the market but another found that the funds underperformed the market. The persistence of fund performance was also investigated during the early 1990s and evidence of performance persistence was found. As a developing capital market, some limitations in Thai studies were noted, such as a very short time period of study, the proxy for the risk-free rate and limited choice of benchmark.

The next chapter will provide the research methodology employed in this study. The three well-known risk-adjusted performance measures; Treynor, Sharpe, and Jensen, are traditionally used to measure fund performance for many decades. In particular, the more currently risk-adjusted performance measure, M^2, is included due to its advantages (as referred in 2.4.2). These four measures will be employed to examine equity fund performance in Thailand. Although a number of alternative measures of fund performance have been developed, those alternative measures are not yet possible to be applied to fund performance study in Thailand due to the incomplete nature of Thai fund data.

Since several researchers claimed that survivorship bias leads to an overstated performance measurement, for testing Thai equity fund performance, it should include all equity funds existing during the study period. However, investment managers in Thailand provided information only voluntarily, fund data banks in this study are, unavoidably, subject to survivorship bias (detail of this issue will be discussed in the next chapter (3.2.1)). In addition, bias in risk-adjusted performance measures associated with risk has been found in developed capital market, particularly in the US studies. It is interesting to consider this issue and examine whether the bias exists when employing these measures with Thai data.

The literature reviewed confirms that studies of the performance of funds, and fund performance persistence are inconclusive. In particular, all previous Thai studies are of limited value, essentially a consequence of the relatively short period of the studies conducted. This study will eliminate this limitation by covering a longer and volatile period in the history of Thai funds that covers both rising and declining market periods. In addition, in testing for fund performance persistence, the four widely used methodologies will be employed in this study.

Chapter 3

METHODOLOGY

This chapter discusses the research methodology employed in this study. The chapter consists of six main sections. The first section is research questions and hypotheses; the second section describes the data; the third section is the empirical method employed to examine fund performance; the fourth section is the empirical method for the investigation of the persistence of fund performance; the fifth section is concerned with the statistical testing of hypotheses, while the sixth section is a summary of the chapter.

3.1 RESEARCH QUESTIONS AND HYPOTHESES

The primary aim of this study is to examine the performance of Thai equity funds existing during the period 1992 - 2000. An important aspect of fund performance is persistence, and the related aim of this study is to examine the persistence of fund performance. This study of persistence will lead to an exploration of data in order to investigate if the optimal past performance information set for equity funds exists in Thailand.

The seven research questions are:

Research question 1: Is the performance of Thai equity funds existing during the period 1992 - 2000 different from the performance of the Thai market portfolio during the same period?

Research question 2: Is the performance of Thai equity funds existing during the expansionary market period, January 1992 - January 1996, different from the performance of the Thai market portfolio during the same period?

Research question 3: Is the performance of Thai equity funds existing during the contractionary market period, February 1996 - December 2000, different from the performance of the Thai market portfolio during the same period?

Research question 4: Is the investment performance of Thai equity funds related to fund risk?

Research question 5: Is the risk-adjusted performance of funds dependent upon which of the Treynor, Sharpe, Jensen or M^2 measures is used to measure performance?

Research question 6: Is subsequent period performance related to prior period performance?

Research question 7: Does the information content of prior period performance vary with the length of the period of prior performance?

The null hypotheses (H_0) associated with each of these seven research questions are:

H_{01}: The performance of Thai equity funds during the period 1992-2000 is not different from that of the market.

H_{02}: The performance of Thai equity funds during the expansionary market period is not different from that of the market during the same period.

H_{03}: The performance of Thai equity funds during the contractionary market period is not different from that of the market during the same period.

H_{04}: The investment performance of Thai equity funds is not related to fund risk.

H_{05}: The Treynor, Sharpe, Jensen and M^2 measures of performance of Thai equity funds are not correlated.

H_{06}: Subsequent period performance is independent of prior period performance.

H_{07}: The information content of prior period performance varies with the length of the period of prior performance[1].

Fund performance in the first, second and third null hypotheses will be examined in two ways: average fund performance and the proportion of outperforming funds. These three hypotheses will be tested through the use of two-stage hypothesis testing.

In testing for average fund performance, the first-stage hypothesis test will be to test for any significant difference between fund performance and market performance (two-tail test). If the null hypothesis is rejected, a second-stage hypothesis will be tested to determine whether funds significantly outperformed / underperformed the market benchmark (one-tail test). In testing for the proportion of outperforming funds, the first-stage hypothesis test will be to determine whether the proportion of outperforming funds was different from 50 per cent of the total number of funds (two-

[1] The information content is determined by explanatory power (R^2). Therefore, the appropriate test hypothesis, stated in null form, is: *H_{07}: There is no pattern of persistency in R^2 values* (see 3.5.7 for detail).

tail test). If the proportion is different from 50 per cent, the second-stage hypothesis will be tested to determine the direction of that difference (one-tail test).

Corresponding to the two aims (the performance of equity funds and persistence of performance), section 3.1.1 following, will detail the hypotheses associated with research questions one to five and section 3.1.2 following will describe hypotheses associated with research questions six and seven. The statistical testing of these hypotheses will be described in 3.5.

3.1.1 The performance of Thai equity funds

To answer research question 1, as stated above, fund performance will be examined in two ways, the average performance of Thai equity funds and the proportion of funds that outperformed the market. The appropriate null hypotheses, in accordance with the two-stage testing, for average performance are in *(1)* and for the proportion of outperforming funds are in *(2)*, as follows:

(1) Average fund performance

stage 1 $H_{01.1}$: The average performance of Thai equity funds during the period 1992-2000 was not different from that of the market.

stage 2 $H_{01.1(a)}$: The stage-two null hypothesis will depend on the finding of the stage-one test. If $H_{01.1}$ is rejected, it will be either:

"The average performance of Thai equity funds during the period 1992-2000 was not below that of the market."

or

"The average performance of Thai equity funds during the period 1992-2000 was not above that of the market."

(2) Proportion of outperforming funds

stage 1 $H_{01.2}$: During the period 1992-2000, the proportion of Thai equity funds that outperformed the market benchmark was not different from 50 per cent.

stage 2 $H_{01.2(a)}$: The stage-two null hypothesis will depend on the finding of the stage-one test. If $H_{01.2}$ is rejected, it will be either:

"During the period 1992-2000, 50 per cent (or more) of Thai equity funds outperformed the market benchmark."

or

"During the period 1992-2000, 50 per cent (or fewer) of Thai equity funds outperformed the market benchmark."

The second research question is related to whether the performance of Thai equity funds existing during the expansionary market period, January 1992 - January 1996, is different from the performance of the Thai market portfolio. To answer this question, fund performance will be examined, in particular, the average performance of funds and the proportion of outperforming funds. The two-stage hypotheses (stated in null form) for average performance are in *(1)* and for the proportion of outperforming funds are in *(2)*, following:

(1) Average fund performance

stage 1 $H_{02.1}$: The average performance of Thai equity funds during the expansionary market environment was not different from that of the market.

stage2 $H_{02.1(a)}$: The stage-two null hypothesis will depend on the finding of the stage-one test. If $H_{02.1}$ is rejected, it will be either:

"The average performance of Thai equity funds during the expansionary market environment was not below that of the market."

or

"The average performance of Thai equity funds during the expansionary market environment was not above that of the market."

(2) Proportion of outperforming funds

stage 1 $H_{02.2}$: During the expansionary market environment, the proportion of Thai equity funds that outperformed the market benchmark was not different from 50 per cent.

stage 2 $H_{02.2(a)}$: The stage-two null hypothesis will depend on the finding of the stage-one test. If $H_{02.2}$ is rejected, it will be either:

"During the expansionary market environment, 50 per cent (or more) of Thai equity funds outperformed the market benchmark."

or

"During the expansionary market environment, 50 per cent (or fewer) of Thai equity funds outperformed the market benchmark."

The third research question is to consider whether the performance of Thai equity funds existing during the contractionary market period, February 1996 - December 2000, was different from the performance of the Thai market portfolio. Again, to answer this question, the average performance of funds and the proportion of outperforming funds will be examined, with two-stage hypotheses:

(1) Average fund performance

stage 1 $H_{03.1}$: The average performance of Thai equity funds during the contractionary market environment was not different from that of the market.

stage2 $H_{03.1(a)}$: The stage-two null hypothesis will depend on the finding of the stage-one test. If $H_{03.1}$ is rejected, it will be either:

"The average performance of Thai equity funds during the contractionary market environment was not below that of the market."

or

"The average performance of Thai equity funds during the contractionary market environment was not above that of the market."

(2) Proportion of outperforming funds

stage 1 $H_{03.2}$: During the contractionary market environment, the proportion of Thai equity funds that outperformed the market benchmark was not different from 50 per cent.

stage 2 $H_{03.2(a)}$: The stage-two null hypothesis will depend on the finding of the stage-one test. If $H_{03.2}$ is rejected, it will be either:

"During the contractionary market environment, 50 per cent (or more) of Thai equity funds outperformed the market benchmark."

or

"During the contractionary market environment, 50 per cent (or fewer) of Thai equity funds outperformed the market benchmark."

The fourth research question is whether the investment performance of Thai equity funds is related to fund risk. To answer this research question, the linear relationship between fund performance and risk will be tested (see 3.5.4 for detail). The null hypothesis is:

H_{04}: The investment performance of Thai equity funds is not related to fund risk.

The fifth research question is whether the risk-adjusted performance of funds is dependent upon which of the Treynor, Sharpe, Jensen or M^2 measures is used to measure performance. To answer this research question, the correlation of results from the four risk-adjusted performance measures will be examined. The null hypothesis is:

H_{05}: The Treynor, Sharpe Jensen and M^2 measures of performance of Thai equity funds are not correlated.

3.1.2 Persistence of Thai equity fund performance

The second aim of this study is to examine the persistence of fund performance. If the study of persistence is verified, this will lead to an exploration for an optimal past performance information set for equity funds in Thailand. There are two research questions (numbers six and seven) related to this aim.

Research question six is whether subsequent period performance is related to prior period performance. To answer this research question, four methodologies will be applied: Regression analysis, Spearman rank correlation coefficient, quartile comparison tables and contingency tables. The null hypothesis is as follows.

H_{06}: Subsequent period performance is independent of prior period performance.

Research question seven is whether the information content of prior period performance varies with the length of period of prior performance. The information content is determined by explanatory power (R^2). R^2 values will be checked for any pattern of values to consider whether length of past performance is important (see 3.5.7 for detail). The null hypothesis is:

H_{07}: The information content of prior period performance varies with the length of the period of prior performance[2].

3.2 DATA

Three aspects of the data are considered. First, the sample of funds (3.2.1); second, the benchmark portfolio (3.2.2); and third, the risk-free estimates (3.2.3).

3.2.1 Sample of funds

The sample of funds for this study consists of all local Thai equity funds as classified by the AIMC (The Association of Investment Management Companies) with the exception of specialist equity funds, equity support funds and equity funds that

---

[2] As noted earlier, the information content is determined by explanatory power (R^2). The appropriate test hypothesis, stated in null form, is: H_{07}: *There is no pattern of persistency in* R^2 *values.*

changed their classification before December 2000; e.g. from an equity fund to flexible fund[3]. As stated earlier, the monopolistic nature of the mutual fund industry in Thailand ceased in 1992 when the Thai parliament passed new securities law. Hence, the time period of the study is January 1992 to December 2000; i.e. from the time of the formal cessation of monopolisation within the equity funds industry to December 2000.

To reduce survivorship bias, this study utilises a sample set including NAV monthly data from all equity funds existing each year, 1992-2000. Hence, funds that were in existence during the study period but which terminated prior to December 2000 are included. For example, a fund that existed, say, for the 3-year period January 1995 to December 1997, would be included in the sample (for those years in which it existed). However, it should be noted that fund management companies provided information only voluntarily and the NAV data of several terminated funds are not available (data for only six of 16 terminated funds are available). From this cause, fund data banks are unavoidably subject to survivorship bias. In sum, the sample consists of 80 operating funds and six terminated funds, 86 in total.

Although most fund performance studies in developed financial markets examine closed-end fund performance (typically referred to as unit trusts) separately from open-end fund performance (typically referred to as mutual funds), the sample in this study consists of both closed-end funds and open-end funds. Two reasons for including both closed-end and open-end funds are that (1) changing fund type from

[3] As the name suggested, flexible portfolio funds have a portfolio mix of fixed income instruments, common stocks, and any financial instruments; the mixture of which depend on fund manager's decision.

closed-end type to open-end type has been a common occurrence in the Thai fund industry, a developing financial market. Since Thai closed-end funds have a maturity date, the majority of closed-end funds, whose terms are mature, have changed fund type to be open-end funds. (2) In practice, although fund has changed from closed-end fund to open-end fund, money that has been pooled in funds has been continually managed. Therefore, return of funds should be continually calculated as the funds have been continually operating. If separately calculated, it may lead to an over estimate for returns for open-end funds. Among the 86 funds in this sample, 49 began as closed-end funds and later converted into open-end funds. Having unit trusts and mutual funds in the one sample set is the practice adopted by earlier relevant studies (e.g. Robson 1986). However, since a closed-end fund and an open-end fund have their own characteristics, combining closed-end fund and open-end funds into one sample may influence fund performance results in this study. List of the 86 Thai equity funds and their histories are presented in Appendix A.

Source of data

The 86 funds in the sample set, for which monthly data were obtained, were managed by 11 fund management companies, as follows:

(1) Aberdeen Asset Management Company Limited

(2) Ayudhya Jardine Fleming Asset Management Company Limited

(3) BOA Asset Management Company Limited

(4) ING Mutual Funds Management (Thailand) Company Limited

(5) MFC Asset Management Public Company Limited

(6) ONE Asset Management Company Limited

(7) SCB Asset Management Company Limited

(8) TISCO Asset Management Company Limited

(9) Thai Farmers Asset Management Company Limited

(10) BBL Asset Management Company Limited

(11) National Asset Management Company Limited

The data of the last two companies were obtained from the MFC Asset Management Public Company Limited.

The data is net asset value (NAV) and all dividend distributions. As defined by the Association of Investment Management Companies (1999), the NAV is the total value of the fund's assets at current market value minus current liabilities and any prior charges. The NAV data are on the last Friday of each month (excepting data for December 1992, 1993, and 1999 which is for Wednesday 30 December 1992, Thursday 30 December 1993 and Thursday 30 December 1999 respectively).

Fund rates of return

In computing fund monthly rates of return, it will be assumed that all dividend distributions are reinvested on the ex-dividend date at the ex-dividend net asset value. Thus the monthly rates of return are computed as the change in total value of the fund for an investor reinvesting dividend distributions. Since the monthly NAV data is a time-series data, the logarithmic transformations are used as a means of removing growth over time in the variance of the data (Pindyck and Rubinfeld, 1998). The returns are expressed as a percentage of the beginning-of-month asset value, as follows:

$$R_{jt} = \log\left[\frac{NAV_{jt} + D_{jt}}{NAV_{jt-1}}\right] \tag{3-1}$$

where,
R_{jt} = rate of return for fund j in month t,
NAV_{jt} = the net asset value per unit of fund j on the last Friday of month t,
NAV_{jt-1} = the net asset value per unit of fund j on the last Friday of the preceding month, and
D_{jt} = the total of dividend distributions during month t.

What is measured in this study is management performance, which does not consider taxes, selling commissions and redemption fees.

For those funds that commenced operations during the study period (January 1992 - December 2000), the net asset value per unit of the preceding month (NAV_{jt-1}) before its commencement is assumed to be 10 baht (an initial value of each fund when it starts trading in the marekt). However, the NAV data available for this study is the last Friday of each month. Some funds had inception dates after the last Friday. For example, the inception date of RKF4 was Monday 27 June 1994 but the last Friday of that month was 24 June 1994. The first available data for RKF4 was Friday 29 July 1994. In this case, the NAV of the preceding month (NAV_{jt-1}) for RKF4 is Friday 24 June 1994.

Periods

In accordance with the primary aim of this study, equity fund performance will be examined in three time periods: (1) the nine-year period (January 1992 - December 2000); (2) the expansionary market period (January 1992 - January 1996); and (3) the contractionary market period (February 1996 - December 2000).

The expansionary market and contractionary market periods in this study are defined by movements in the SET Index. In order to illustrate the two market environments, Figure 3.1 exhibits the SET Index during the observation period, January 1992 - December 2000. The observation period is divided into two sub-periods by considering the last peak of the SET index before its sharp decline. This peak was 6 February 1996, at the index level of 1,415.04 points. The SET index 31 January 1996 was 1,410.33 points and the SET index 28 February 1996 was 1,321.87 points. Therefore, the expansionary market period ended January 1996. To depict, the dashed line in Figure 3.1 separates the observation period into the two sub-periods of the expansionary market environment (January 1992 - January 1996) and the contractionary market environment (February 1996 - December 2000).

Figure 3.1 Two-sub periods: January 1992 - January 1996, and February 1996 - December 2000

Source: The Stock Exchange of Thailand

3.2.2 Benchmark portfolio

Since the capital market in Thailand is a developing market, the selection of a Thai market benchmark for this study proved difficult because there was no publicly available market index that included dividend distributions. The Stock Exchange of Thailand (SET) publishes only two market indices. The first index is the SET Index, which consists of the population of equity securities in the Thai stock market. The data of this index is available for the entire period 1992-2000. The second index is the SET 50 Index, which consists of the top 50 equity securities (by market capitalisation) in the Thai stock market. This index was first published 16 August 1995 and therefore is not available for the full nine-year period 1992-2000. For this reason, the SET 50 index is not appropriate for this study.

As explained by the Stock Exchange of Thailand, the SET Index is composite index calculated from prices of common stocks on the main board. It is a market capitalization weighted price index which compares the current market value of all listed common stocks with the value on the base date of 30 April, 1975, which was when the SET Index was established and set at 100 points. The SET Index calculation is adjusted in line with new listings, delisting, and capitalization changes in order to eliminate other effects-beyond price movement-form the index.

Since Thai equity funds invest mainly in the common stocks listed in the Stock Exchange of Thailand (at least 65 per cent of total assets of the portfolio must be common stocks). Employing the SET Index to be a proxy of the equity market portfolio is appropriate.

Although the SET Index has the limitation of not including dividend distributions, no other index in Thailand is superior as a market portfolio indicator for the period of this study. Hence, this index will be utilised in this study as the benchmark portfolio indicator. The SET index is widely used as the market portfolio proxy in all Thai studies; including Kongcharoen (1992), Bhovichitra (1996), Mainkamnurd (1996) and Pornchaiya (2000). This index has also been used by the Association of Investment Management Companies (AIMC). This means that all asset management companies in Thailand have used the SET Index as the benchmark for comparing the performance of their equity funds.

The monthly SET Index data for this study will consist of data as at the same day as utilised in the fund data set, namely, the closing value on the last Friday of each month. These data are obtained from the Stock Exchange of Thailand (SET).

Market portfolio rates of return

The monthly rates of return for the market portfolio *(R_{mt})* will be computed as follows:

$$R_{mt} = \log\left[\frac{SET_t}{SET_{t-1}}\right] \tag{3-2}$$

where,
R_{mt} = rate of return for the Thai market portfolio in month t,
SET_t = the SET Index at the last Friday of month t, and
SET_{t-1} = the SET Index at the last Friday of the preceding month.

3.2.3 Risk-free estimates

Unlike studies in the U.S.A., the U.K., Australia, and other developed capital markets that can utilise the Government Bond rate as a proxy for the risk-free rate, this practice is not possible in this study: the Thai government did not issue new Government Bonds during the period 1990 - 1998. Hence, there was no risk-free yield curve during that period. However, since the deposit rate of commercial banks in Thailand gets a full guarantee from the Thai government, it is effectively risk free. Hence, although there is no yield curve for Government Bonds over the entire period of this study, deposit rates of commercial banks can be used as a proxy for the risk-free rate. The risk-free rate estimate for this study will be the 12-month deposit interest rate of Thai commercial banks (transformed into equivalent monthly rates). All prior studies of Thai mutual fund performances also utilised deposit rates of commercial banks as a proxy for the risk-free rate (Kongcharoen 1992; Bhovichitra 1996; Mainkamnurd 1996; Pornchaiya 2000).

12-month deposit rates for the commercial banks during the period January 1992 - December 2000 are obtained from the Monthly Economic Report published by the Bank of Thailand. The annual yield will be converted into equivalent monthly figures by the following equation:

$$R_{ft} = [1 + ((i_{min\,t} + i_{max\,t}) / 2)]^{1/12} - 1 \qquad (3\text{-}3)$$

where,

R_{ft} = average monthly risk-free rate for month t,

$i_{min\,t}$ = minimum 12-month Thai deposit rate in month t, and

$i_{max\,t}$ = maximum 12-month Thai deposit rate in month t.

3.3 FUND PERFORMANCE MEASUREMENTS

Thai equity funds will be estimated using both risk-adjusted and non risk-adjusted performance measures.

3.3.1 Risk-adjusted performance measurements

Although further development of fund performance evaluation measures have been proposed in the finance literature, most of the newer performance evaluation measures are not possible of application in this study because of the non availability of data in Thailand. For instance, monthly data on fund size and book-to-market in the early 1990s is not available, as well as data on a small-cap or a large-cap stock portfolio and other required data for each measure does not exist.

The three well-known risk-adjusted performance measures; the Treynor measure (Treynor 1965), the Sharpe ratio (Sharpe 1966), and the Jensen (Jensen 1968), are traditionally used to measure fund performance for many decades. In particular, the more currently risk-adjusted performance measure, M^2 (Modigliani and Modigliani 1997), is of interest and is used to examine fund performance due to its advantages (as referred in 2.4.2). These four measures will be employed to examine equity fund performance in Thailand.

The Treynor and Sharpe measures differ only in term of their risk-adjustment factor, systematic risk for the Treynor and total risk for the Sharpe. The Treynor measure provides result on fund's excess return per unit of systematic risk while the Sharpe ratio provides result on fund's excess return per unit of total risk. In addition, both the

Treynor and Jensen measures are derived from the CAPM and apply the same risk-adjustment factor, systematic risk. However, while the Traynor's result is associated with fund's excess return per unit of systematic risk, the Jensen Alpha's result identifies that part of the rate of return on mutual fund that is attributable to the fund manager's ability to derive above average returns adjusted for systematic risk (Reilly and Norton 1995).

The measures to be used in this study are recalled as follows.

3.3.1.1 The Treynor measure

As reviewed in 2.2.1, the Treynor measure evaluates excess return adjusted for the systematic risk of the fund. The Treynor measure is recalled as follows:

$$\textit{Treynor measure} = \frac{\bar{R}_p - \bar{R}_f}{\beta_p} \qquad (3\text{-}4)$$

where,

$\bar{R}_p$ = the average rate of return for fund p during the given time period,

$\bar{R}_f$ = the average risk-free rate during the same time period, and

β_p = the sensitivity (volatility) of fund p's returns to change in the market portfolio return (the systematic risk (beta) for fund p). The β_p is calculated using the following formula:

$$\beta_p = \frac{(N \times \Sigma X_i Y_i) - (\Sigma Y_i \times \Sigma X_i)}{(N \times \Sigma X_i^{\,2}) - (\Sigma X_i)^2}$$

Y = the rate of return for fund p in period i,

X = the rate of return for the market portfolio in period,

N = the number of observations (months), and

All summations are to be carried out over n, where n goes from 1 to N.

It is noted that the Treynor value for the market portfolio ($Treynor_{market}$) is given by:

$$Treynor_{market} = \frac{\bar{R}_m - \bar{R}_f}{\beta_m} = \bar{R}_m - \bar{R}_f \qquad (3\text{-}5)$$

where,

$\bar{R}_m$ = the average rate of return for the market portfolio during a given time period,

$\bar{R}_f$ = the average risk-free rate during the same time period, and

β_m = beta of market portfolio, always equal to 1.00.

If the Treynor value for fund p is greater than the Treynor value for the market portfolio, this indicates that fund p has outperformed the market. Alternatively, if the Treynor value for fund p is less than the Treynor value for the market portfolio, this indicates that the fund has not performed as well as the market.

If the 86 equity funds in this study had the same time horizon, the result of any one fund performance could be compared directly with other funds. However, the 86 funds in this study do not have the same time horizon. The number of observations (months) for Thai equity funds varies because most funds commenced operations after January 1992 and some terminated before December 2000. The range of observations during 1992 - 2000 is from 20 to 108 months. Therefore, comparing fund performance in this study by way of ranking Treynor results could lead to possible bias. Therefore ranking of fund performance during 1992-2000 will not be reported.

In the case of terminated funds: for example, suppose that fund j operated from October 1994 to September 1999, 60 months of observations are available. The Treynor market portfolio value compared with fund j will be calculated by using the same time period of 60 months - October 1994 to September 1999.

3.3.1.2 The Sharpe Ratio

As reviewed in 2.2.2, the Sharpe ratio evaluates excess returns adjusted for total risk of the fund by using the standard deviation of the returns of the fund. The Sharpe ratio recalled as follows:

$$\text{Sharpe ratio} = \frac{\bar{R}_p - \bar{R}_f}{\sigma_p} \tag{3-6}$$

where,

$\bar{R}_p$ = the average rate of return for fund p during a given time period,

$\bar{R}_f$ = the average risk-free rate during the same time period, and

σ_p = the standard deviation of the returns for fund p during the same time period (see p 50 for the estimation of standard deviation).

The benchmark for the Sharpe ratio is the slope of the CML which is given by,

$$Sharpe_{market} = \frac{\bar{R}_m - \bar{R}_f}{\sigma_m} \tag{3-7}$$

where,

$\bar{R}_m$ = the average rate of return for market portfolio during a given time period,

$\bar{R}_f$ = the average risk-free rate for the same time period, and

σ_m = the standard deviation of market portfolio returns for the same time period.

If the value of the Sharpe ratio is higher than the $Sharpe_{market}$ value, indicating superior performance. In contrast, if the Sharpe ratio is lower than the $Sharpe_{market}$ value, indicating inferior performance.

It is important to note, again, that equity funds in this study do not have the same time horizon (because of different inception and termination dates). Therefore, comparing fund performance in this study by ranking the Sharpe ratio results introduces a potential bias. Therefore ranking of fund performance during 1992-2000 will not be reported.

3.3.1.3 The Jensen Alpha

As reviewed in 2.2.3, the Jensen alpha measure evaluates risk-adjusted abnormal returns by relating actual return to expected return based on the systematic risk of a fund. The Jensen alpha for a fund is derived from the following regression equation:

$$R_{pt} - R_{ft} = \alpha_p + \beta_p [R_{mt} - R_{ft}] + \varepsilon_p \qquad (3\text{-}8)$$

where,

R_{pt} = the rate of return for fund p in period t,

R_{ft} = the risk-free rate in period t,

R_{mt} = the expected return on the market portfolio in period t,

α_p = the intercept term in the regression equation (Jensen alpha),

β_p = the systematic risk (beta) for fund p, and

ε_p = the residual term.

The Jensen measure of performance requires using the appropriate risk-free rate for each time period (monthly data in this case). This is unlike the Treynor and Sharpe measures that utilise average figures for all variables.

Since the Jensen alpha can be "legitimately compared across funds of different risk levels and differing time periods irrespective of general economic and market conditions" (Jensen 1968, p. 394), fund performance ranking on the basis of the Jensen alpha measure is acceptable and will be reported.

The Jensen alpha (α_p) in equation (3-8), estimated by using simple linear regression, is the intercept term from the linear regression and is the estimation of fund performance. A positive value of α_p for a fund indicates that the fund outperforms the market. In contrast, a negative value of α_p indicates that the fund underperforms relative to the market benchmark. (A *t*-test is used to determine whether the alpha value is significant).

As noted by Grinblatt and Titman (1989a), criticisms of the Jensen measure by Roll (1978), Jensen (1972), and Dybvig and Ross (1985), are based on the sensitivity of this measure to the choice of a benchmark portfolio and to timing ability. However, in Thailand there is no choice of benchmark because only one possible benchmark is available cover the period 1992-2000. It is also known that Jensen alpha is biased upwards for high-yield funds (Grinblatt and Titman 1989b). Hence, interpretation of Jensen results in this study may be subject to bias.

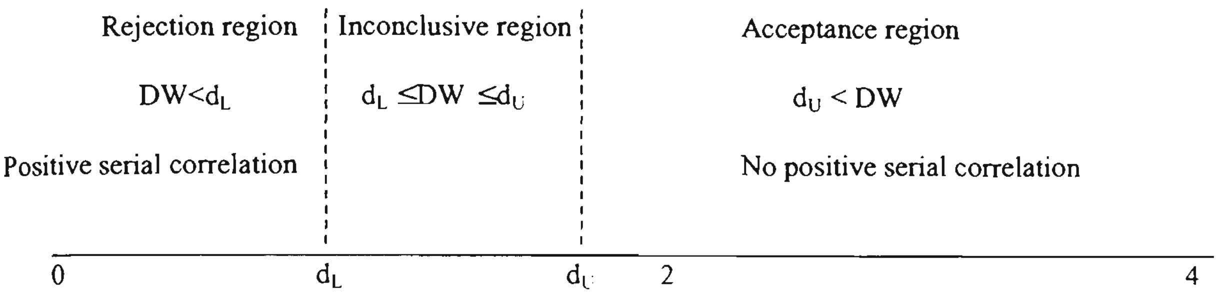
Serial correlation

Since the residual term (ε_j) should be serially independent (Jensen 1968, p. 394), the Durbin-Watson (DW) test is utilised to test fund residuals[2]. However, this test has the limitation that it is sometimes inconclusive (see Figure 3.2). The Durbin-Watson test has three possibility regions: acceptance, rejection, and inconclusive, as follows:

---

[2] Residuals are tested for positive serial correlation. 'Econometricians almost never test that there is negative serial correlation in the residuals because negative serial correlation is quite difficult to explain theoretically in economic or business analysis. Its existence often means that impure serial correlation has been caused by some error of specification'.(Studenmund 1997, p. 345)

Figure 3.2 **Three regions of a one-tail Durbin-Watson test**



Source: Studenmund (1997, p.347)

The Durbin-Watson statistic has values from zero to four (Studenmund 1997). The DW statistic equals zero if there is extreme positive serial correlation, two if there is no serial correlation, and four in the case of extreme negative serial correlation. However, if the DW statistic is between lower critical DW value (d_L) and upper critical DW value (d_U), the test is inconclusive.

The Generalized Least Squares (GLS) method (also called the Aitken estimator) will be utilised to eliminate any positive serial correlation in this study. The use of GLS requires the estimation of ρ (the coefficient of serial correlation), which is most commonly accomplished through the Cochrane-Orcutt iterative method (Studenmund 1997). Therefore, this study will utilise the Cochrane-Orcutt iterative method (to estimate the coefficient of serial correlation).

As stated above, the Durbin-Watson test has the limitation that it can give inconclusive results, and there is also the suggestion of Studenmund (1997, p. 353) that "it's our strong recommendation to avoid the use of GLS when the Durbin-Watson test is inconclusive". This means that the GLS should not be used to eliminate positive serial correlation in a fund yielding an inconclusive result. Hence, for purposes of the Jensen test, any fund that generates an inconclusive result will be excluded from the sample. Although other methods for identifying serial correlation are available[3], the Durbin-Watson method is commonly used and has fewer disadvantages than other methods.

3.3.1.4 The M²

As reviewed in 2.4.2, the M^2 measure utilises standard deviation as the relevant measure of risk and takes a fund's average return and determines what return would have been if the fund had the similar level of total risk as the market portfolio. The M^2 is calculated as follows:

$$M^2 = \frac{\sigma_M}{\sigma_p}(\bar{R}_p - \bar{R}_f) + \bar{R}_f \tag{3-9}$$

where,

$\bar{R}_p$ = average return of fund p during a given time period,

$\bar{R}_f$ = risk-free rate for the same time period,

σ_p = standard deviation of R_p , and

σ_M = standard deviation of R_M (average return of the market portfolio for the same time period).

M^2 can be compared directly with the average return on the market portfolio (R_M) over the same time period in order to see whether the performance of the portfolio is superior or inferior to the market benchmark on a risk-adjusted basis. It is noted that if funds have the same time horizon, ranking a set of funds by the M^2 and the Sharpe ratio will yield the same results.

---

[3] For example Ramanathan (1998, p. 437) suggests that an alternative method, which does not suffer from any inconclusive result, is the Lagrange Multiplier test (LM test). However, the LM test requires at least 30 d.f. (degree of freedom) because the LM test is a large-sample test. Therefore, this method is not appropriate for this study.

However, it should be noted again that equity funds in this study do not have the same time horizon (because of different inception and termination dates). Comparing fund performance in this study by ranking the M^2 results introduces potential for bias. Therefore M^2 raking for fund performance during 1992-2000 will not be reported.

3.3.2 Non risk-adjusted performance (rate of return)

Non risk-adjusted performance in this study is defined as a mean of the rate of return expressed in terms of per cent per month. To measure a mean rate of return, monthly returns for each individual fund (R_{jt}, computed by equation 3-1) will be averaged by using the geometric mean (GM) which is equivalent to a buy and hold strategy. To compare a fund performance with the market portfolio performance, monthly returns for the market portfolio (R_{mt}, computed by equation 3-2) during the same time period of each individual fund will be averaged using the geometric mean.

The geometric mean is expressed as follows:

$$GM = [\,\pi\,(R_{jt} + 1)]^{1/n} - 1 \qquad (3\text{-}10)$$

where,

GM = geometric mean,

$\pi\,(R_{jt} + 1)$ = the product of the returns (R_{jt}) as follows: $(R_{j1} + 1) \times (R_{j2} + 1) \times (R_{j3} + 1) \times \ldots \times (R_{jn} + 1)$, and

n = number of periods.

If a mean rate of return for a fund is greater than a mean rate of return for the market portfolio, it indicates that the fund outperforms relative to the market benchmark. Alternatively, if a mean rate of return for a fund is less than a mean rate of return for the market portfolio, it indicates that the fund underperforms the market benchmark.

It is important to note, again, that equity funds in this study do not have the same time horizon because of different inception and termination dates. Therefore, ranking fund performance during the period 1992-2000 in terms of the rate of return will not be reported.

An examination for annual performance of Thai equity funds, 1992-2000

After examining the fund performance during 1992-2000 and the two sub-periods of different market environments, it would be useful to look at the results on the average values of the fund performance for every year in the data set, which is an examination for a short-term investment performance. The four risk-adjusted performance measures (Treynor, Sharpe, Jensen and M^2) and the non risk-adjusted performance measure (rate of return) will be employed to examine fund performance in each year.

To examine one-year performance, the sample of funds in each year consists of the funds that have 12-month return data. Two reasons for using the 12-month data are (1) fund performance rankings can be provided by all measures; and (2) a short period of return data may provide biased estimates of the systematic risk (beta) (Alexander and Chervany, 1980).

Funds with a shorter period (than 12 months) in this case mean both commencing funds and terminated funds in each year. For example, if a new fund issues in October, this fund will have only 3-month returns (October to December) to estimate beta. This short period would lead to an unreliable beta. However, for testing one-year performance, the longest data is 12-month return data, so using full 12-month data is acceptable. Commencing funds are excluded from each sample set only in the inception year of each fund and terminated funds are excluded only in the terminated year. In sum, two limitations of an examination on a short-term investment performance are a short period of beta estimating and survivorship bias.

3.4 PERSISTENCE OF FUND PERFORMANCE

In fund performance persistence studies, performance in the prior period is typically compared to the performance in the subsequent period. The selection of the length of both periods has important implications for the results of any study (Bers and Madura 2000). In this study, to investigate the relationship between a prior period and subsequent period performance, the time frame is split into the subsequent period (1999-2000), and varying prior periods of two years (1997-98), three years (1996-98), four years (1995-98), five years (1994-98), six years (1993-98) and seven years (1992-98). This enables a comparison of the relationship between current period performance and a series of past period performance of varying length (Hallahan 1999).

A reason of using a two-year recent information (1999-2000) to represent a current period is that a two-year period is a compromise between using the most recent information as Krueger and Callaway (1995), Gruber (1996) and Elton et al (1996b) did in looking at three-year performance persistence and measuring shorter-term performance persistence as several researchers (such as Goetzmann and Ibbotson 1994; Malkiel 1995; Carhart 1997) did using a one-year period. Utilising a two-year recent information to represent a current period was also investigated by Hallahan (1999).

Figure 3.3 Prior period of varying lengths and subsequent period

<table>
<tr><td></td><td></td><td></td><td></td><td></td><td colspan="2">2-year prior period</td><td colspan="2">subsequent period</td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="3">3-year prior period</td><td colspan="2">subsequent period</td></tr>
<tr><td></td><td></td><td></td><td colspan="4">4-year prior period</td><td colspan="2">subsequent period</td></tr>
<tr><td></td><td></td><td colspan="5">5-year prior period</td><td colspan="2">subsequent period</td></tr>
<tr><td></td><td colspan="6">6-year prior period</td><td colspan="2">subsequent period</td></tr>
<tr><td colspan="7">7-year prior period</td><td colspan="2">subsequent period</td></tr>
<tr><td>1992</td><td>1993</td><td>1994</td><td>1995</td><td>1996</td><td>1997</td><td>1998</td><td>1999</td><td>2000</td></tr>
</table>

Persistence of fund performance can only be tested with a sample that includes funds that have existed in both prior and subsequent period. In addition, funds in each sub-period will be those funds that existed for the entire horizon of that period. Hence, the sample characteristics are, unavoidably, subject to survivorship bias.

For each sub-period, funds will be estimated using both risk-adjusted and non risk-adjusted performance measures. The risk-adjusted performance measures will be calculated in terms of the Treynor measure, Sharpe ratio, Jensen alpha and M^2. Following the study by Hallahan (1999), the non risk-adjusted performance will be calculated in terms of raw returns. The raw return data is defined as an arithmetic average of the rate of return (equation 3-1) for each sub-period, which is also called mean monthly return (Krueger and Callaway 1995). All measures will be calculated using Excel and SPSS programs.

The persistence of Thai equity fund performances will be tested through the use of four methodologies: (1) Regression analysis; (2) Spearman rank correlation coefficient; (3) Quartile comparison tables; and (4) Contingency tables.

3.4.1 Regression analysis and explanatory power (R^2)

As suggested by a number of researchers including Grinblatt and Titman (1992), Goetzmann and Ibbotson (1994), Kahn and Rudd (1995), Hallahan (1999), and Bers and Madura (2000), persistence can be tested by comparing the measure of performance (alpha) over a prior period with alpha for the subsequent period. The test procedure is divided into three steps as follows:

step 1: The total sample of monthly returns is split into two sub-periods (prior and subsequent periods, as in Figure 3.2).

step 2: The abnormal returns for each fund are calculated for each sub-period using the Jensen measure (time-series regression (equation 3-8)).

step 3: The cross-sectional regression of subsequent period (1999-00) abnormal returns on prior period abnormal returns for each of the prior periods will be then obtained as follows:

$$\alpha_{j.\,99\text{-}00} = a_{jk} + \phi_k\, \alpha_{j.k} + \varepsilon_{j.k} \qquad (3\text{-}11)$$

where,

$\alpha_{j.99\text{-}00}$ = fund j's Jensen alpha for the subsequent period (1999-2000),
$\alpha_{j.k}$ = fund j 's Jensen alpha over period k, k = 92-98, 93-98, 94-98, 95-98, 96-98 and 97-98,
a_{jk} = the intercept term,
ϕ_k = a measure of persistence of fund performance, and
$\varepsilon_{j.k}$ = error term.

The existence of a relationship between prior and subsequent period performance is inferred when the coefficient, ϕ_k, (equation 3-11) is positive (with significant t-statistic) (Hallahan 1999; Bers and Madura 2000). This also provides confirmation of the information content of prior period performance. A significant positive coefficient is evidence of performance persistence and a significant negative coefficient is evidence of performance reversal.

Explanatory power (R^2)

For testing the information content of performance history, it will be examined whether, *ceteris paribus*, longer-term past performance contains more information related to future performance than does short-term past performance. This can be determined by noting the explanatory power (R^2) of the regressions (Hallahan 1999). The R^2 criterion is the p-value on the ϕ_k in the regression equation 3-11 that matters. The R^2 indicates the percentage of the variation of the $\alpha_{j,\ 99\text{-}00}$ (the dependent variable) that is explained by $\alpha_{j.k}$ (the independent variable).A pattern of increasing R^2 values corresponding to increasing the length, past performance periods, would indicate that the length of the past period is important. However, it is possible that R^2 values may decrease as the past performance period lengthens. A pattern of decreasing R^2 values would indicate that the longer the period of prior performance, the lower the explanatory power. In addition, it is possible that all R^2 values are equal. If all R^2 values are equal, it would indicate that the information content of prior period performance is invariant to the length of the period of prior performance (Hallahan 1999).

3.4.2 Spearman rank correlation coefficient analysis

To determine persistence of fund performance, i.e. performance ranking from a prior period to a subsequent period, the Speaman rank correlation coefficient (r_s) will be tested. The Spearman statistic measures the degree of association between two sets of ranked data: fund performance ranking in prior, and in subsequent periods. The Spearman value ranges from -1 to +1. A value of zero indicates no relationship between the data sets. A value of -1 indicates perfect negative correlation and a value of +1 indicates perfect positive correlation between the data sets. Any value between these two extremes (of -1 and +1) will provide an indication of the degree to which ranking from a prior period is similar to ranking for the subsequent period. It is noted that the SPSS program provides results of the Speaman rank correlation coefficient with approximate *t*-statistic and approximate significance.

3.4.3 Quartile comparison table analysis

To obtain another perspective on the value of fund performance history, quartile comparison tables will be constructed to establish whether Thai equity funds tend to remain in the same quartile through time. Funds will be classified as performing in the first, second, third and fourth quartiles depending on their performance ranking (where performance is measured by the five measures: Treynor measure, Sharpe ratio, Jensen alpha, M^2 and raw returns).

If past performance predicts future performance perfectly, it would be expected that all first quartile funds would remain in the first quartile, all second quartile funds would remain in the second quartile, and so on (Dunn and Theisen 1983). All cells on the diagonal from the top left to the bottom right of the quartile comparison table (see Table 3.1) would show 100 per cent. Remaining cells would show zero, as follows:

Table 3.1 Quartile comparison table when past performance perfectly predicts future performance

		percentage of funds in subsequent period in respective quartiles			
		Q 1	Q 2	Q 3	Q 4
percentage of funds in prior period in respective quartiles	Q 1	100	0	0	0
	Q 2	0	100	0	0
	Q 3	0	0	100	0
	Q 4	0	0	0	100

Source: Dunn and Theisen (1983, p. 47).

The more that results deviate from the perfect diagonal, the less is the reliability of past performance as an indicator of future performance. If there is no predictive power in past performance, all cells would show an even distribution of 25 per cent throughout the table, as follows:

Table 3.2 Quartile comparison table when past performance does not predict future performance

		percentage of funds in subsequent period in respective quartiles			
		Q 1	Q 2	Q 3	Q 4
percentage of funds in prior period in respective quartiles	Q 1	25	25	25	25
	Q 2	25	25	25	25
	Q 3	25	25	25	25
	Q 4	25	25	25	25

Source: Dunn and Theisen (1983, p. 48).

The Pearson chi-square statistic, a measure of the degree of independence of prior period and subsequent period results, will be computed for each table (Dunn and Theisen 1983; Ed Vos, Brown and Christie 1995). The Exact or Monte Carlo significance will be used to confirm the findings. When quartile comparison tables show that most cells have an expected count less than five, the appropriate significance to be used is the Exact significance[4]. However, the Exact significance method uses a large amount of computer memory and in some cases cannot be computed due to insufficient memory. In cases of insufficient memory, the Monte Carlo[5] statistic will be utilised.

3.4.4 Contingency table analysis

Another perspective on the value of fund performance history is to determine whether funds classified as winners (or losers) in a prior period tend to repeat performance as winners (or losers) in a subsequent period. Funds will be classified as winners when the specified performance measure is above the median value for the period and be classified as losers when the performance is below the median value for the period. WW (Winner ⇨Winner) refers to a fund which is above the median return in both prior and subsequent periods; WL (Winner ⇨Loser) refers to a fund which achieves return above the median in the prior period but below the median in the subsequent period, and so on (Hallahhan 1999). To gain insight into this perspective on the value of fund performance persistence, 2 x 2 contingency tables are constructed to test for independence in the winner-loser results from the prior period to a subsequent period. Table 3.3 presents the structure of 2 x 2 contingency table, as follows:

---

[4] The Exact Method is also known as the Fisher's Exact Test. A *p*-value of this method is computed by using a true distribution of statistical test, which provides more correctly *p*-value than using Asymptotic method used in the Peason Chi-square. (Vanichbancha 2001, p.397)

[5] The Monte Carlo Method provides an approximate value of the Exact significance. When the SPSS program cannot report result of the Exact significance due to inefficient memory of computer, the Monte Carlo technique will be used instead of the Exact method to solve a problem by generating suitable random numbers and observing that fraction of the numbers obeying some property or properties. The advantage of Monte Carlo method is that it provides an unbiased estimator of significance value (Vanichbancha 2001, p.398).

Table 3.3 2 x 2 contingency table

		subsequent period	
		winner	*loser*
prior period	*winner*	WW	WL
	loser	LW	LL

Independence in the winner-loser results from the prior period to a subsequent period is summarised by the use of the Cross Product Ratio (CPR), also referred to as the Odds Ratio (Fienberg 1989; Christensen 1997). The Cross Product Ratio provides the ratio of the number of repeat performance (WW, LL) to the number of non-repeat performance (WL, LW). A CPR value of one indicates no relationship between the winning (losing) funds for prior and subsequent periods. The higher the CPR value, the higher the degree of relationship between the data sets.

In addition, if the one value does not fall within the CPR confidence interval, the null hypothesis that performance in the prior period is not related to performance in the subsequent period can be rejected (Vanichbancha 2001). However, conclusions about CPR are tentative when small sample size is used (Hallahan 1999). Since seven-year (1992-98) and six-year (1993-98) prior periods have small sample sizes (6 and 14 respectively), Fisher's exact test, an alternative statistic, is employed to test independence on variables of 2 x 2 contingency table.

3.5 STATISTICAL TESTING OF HYPOTHESES

This section discusses the statistical tests that need to be conducted to test the seven hypotheses of this study. The statistical tests are as follows (3.5.1 to 3.5.7).

3.5.1 Thai equity fund performance during the period 1992-2000

As stated in 3.1.1, to examine fund performance, average performance of Thai equity funds and proportion of outperforming funds will be estimated. The two-stage hypothesis for average fund performance is in (1) and for proportion of outperforming funds is in (2), as follows:

(1) Average fund performance

In testing for any significant difference between fund and market performance, the number of observations (months) of fund and market operation will be the same, and therefore the paired (dependent) *t*-test is used to compare the means of the paired differences between fund (μ_f) and market (μ_m) performance.

Two-stage hypotheses are tested for, firstly, any significant difference between fund and market performance, and, secondly, the direction of the difference. Performance is estimated using the Treynor, Sharpe, M^2 and rate of return measures. The two-stage hypotheses are:

stage 1 $H_{01.1}$: $\mu_f - \mu_m = 0$

$H_{A1.1}$: $\mu_f - \mu_m \neq 0$

stage 2 $H_{01.1(a)}$: $\mu_f - \mu_m \geq 0$ *or* $H_{01.1(a)}$: $\mu_f - \mu_m \leq 0$

$H_{A1.1(a)}$: $\mu_f - \mu_m < 0$ $H_{A1.1(a)}$: $\mu_f - \mu_m > 0$

Where fund performance is estimated using the Jensen alpha, the one-sample *t*-test, which was used in Ippolito (1993), is used to determine whether mean fund performance (μ_f) during the 1992-2000 period is different from zero (and if so, the direction of the difference). The corresponding two-stage hypotheses are:

stage 1 $H_{01.1}$: $\mu_f = 0$

$H_{A1.1}$: $\mu_f \neq 0$

stage 2 $H_{01.1(a)}$: $\mu_f \geq 0$ *or* $H_{01.1(a)}$: $\mu_f \leq 0$

$H_{A1.1(a)}$: $\mu_f < 0$ $H_{A1.1(a)}$: $\mu_f > 0$

(2) Proportion of outperforming funds

The binomial test, which was used in Bird et al. (1983) and Robson (1986), is used to evaluate whether during 1992-2000, the proportion of outperforming funds is different from 50 per cent of the total number of funds (and if so, the direction of the difference). The variable tested in a binomial test should be a dichotomous variable, a variable that can take only two possible outcomes. The two possible outcomes in this case are (i) outperforming fund and (ii) underperforming fund. The proportion of outperforming funds existing during 1992-2000 will be defined as being $\gamma_{92\text{-}00}$. The two-stage hypotheses are:

stage 1 $H_{01.2}$: $\gamma_{92\text{-}00} = 0.5$

$H_{A1.2}$: $\gamma_{92\text{-}00} \neq 0.5$

stage 2 $H_{01.2(a)}$: $\gamma_{92\text{-}00} \geq 0.5$ *or* $H_{01.2(a)}$: $\gamma_{92\text{-}00} \leq 0.5$

$H_{A1.2(a)}$: $\gamma_{92\text{-}00} < 0.5$ $H_{A1.2(a)}$: $\gamma_{92\text{-}00} > 0.5$

3.5.2 Fund performance: expansionary market environment (January 1992 - January 1996)

Again, average fund performance and proportion of outperforming funds will be investigated. The two-stage hypotheses for average fund performance are in (1), and for proportion of outperforming funds are in (2), following.

(1) Average fund performance

Where fund performance is estimated using the Treynor, Sharpe, M^2 and rate of return measures, the paired (dependent) t-test is used to compare the means of the paired differences between fund (μ_f) and market (μ_m) performance during the expansionary market environment. Two-stage hypotheses are tested for, firstly, any significant difference between fund and market performance, and, secondly, the direction of the difference. The two-stage hypotheses are:

stage 1 $H_{02.1}$: $\mu_f - \mu_m = 0$

$H_{A2.1}$: $\mu_f - \mu_m \neq 0$

stage 2 $H_{02.1(a)}$: $\mu_f - \mu_m \geq 0$ *or* $H_{02.1(a)}$: $\mu_f - \mu_m \leq 0$

$H_{A2.1(a)}$: $\mu_f - \mu_m < 0$ $H_{A2.1(a)}$: $\mu_f - \mu_m > 0$

Where fund performance is estimated using the Jensen alpha, the one-sample t-test is used to determine whether the mean fund performance (μ_f) during the expansionary market environment differs from zero (and if so, the direction of the difference). The two-stage hypotheses are:

stage 1 $H_{02.1}$: $\mu_f = 0$

$H_{A2.1}$: $\mu_f \neq 0$

stage 2 $H_{02.1(a)}$: $\mu_f \geq 0$ *or* $H_{02.1(a)}$: $\mu_f \leq 0$

$H_{A2.1(a)}$: $\mu_f < 0$ $H_{A2.1(a)}$: $\mu_f > 0$

(2) Proportion of outperforming funds

The binomial test is used to evaluate whether, during the expansionary market environment, the proportion of outperforming funds is different from 50 per cent of the total number of funds (and if so, the direction of the difference). The proportion of outperforming funds during this period is given by $\gamma_{Jan92\text{-}Jan96}$. The two-stage hypotheses are:

stage 1 $H_{02.2}$: $\gamma_{Jan92\text{-}Jan96} = 0.5$

$H_{A2.2}$: $\gamma_{Jan92\text{-}Jan96} \neq 0.5$

stage 2 $H_{02.2(a)}$: $\gamma_{Jan92\text{-}Jan96} \geq 0.5$ or $H_{02.2(a)}$: $\gamma_{Jan92\text{-}Jan96} \leq 0.5$

$H_{A2.2(a)}$: $\gamma_{Jan92\text{-}Jan96} < 0.5$ $H_{A2.2(a)}$: $\gamma_{Jan92\text{-}Jan96} > 0.5$

3.5.3 Fund performance: contractionary market environment (February 1996 - December 2000)

(1) Average fund performance

Where fund performance is estimated using the Treynor, Sharpe, M^2, and rate of return measures, the paired (dependent) *t*-test is used to compare the means of the paired differences between fund (μ_f) and market (μ_m) performance during the contractionary market environment. Two-stage hypotheses are tested for, firstly, any significant difference and, secondly, the direction of any difference. The two-stage hypotheses are:

stage 1 $H_{03.1}$: $\mu_f - \mu_m = 0$

$H_{A3.1}$: $\mu_f - \mu_m \neq 0$

stage 2 $H_{03.1(a)}$: $\mu_f - \mu_m \geq 0$ or $H_{03.1(a)}$: $\mu_f - \mu_m \leq 0$

$H_{A3.1(a)}$: $\mu_f - \mu_m < 0$ $H_{A3.1(a)}$: $\mu_f - \mu_m > 0$

Where fund performance is estimated using Jensen alpha, the one-sample *t*-test is used to determine whether the mean fund performance (μ_f) during the contractionary market environment differs from zero (and if so, the direction of the difference). The two-stage hypotheses are:

stage 1 $H_{03.1}$: $\mu_f = 0$

$H_{A3.1}$: $\mu_f \neq 0$

stage 2 $H_{03.1(a)}$: $\mu_f \geq 0$ *or* $H_{03.1(a)}$: $\mu_f \leq 0$

$H_{A3.1(a)}$: $\mu_f < 0$ $H_{A3.1(a)}$: $\mu_f > 0$

(2) Proportion of outperforming funds

The binomial test is used to evaluate whether, during the contractionary market environment, the proportion of outperforming funds is different from 50 per cent of the total number of funds (and if so, the direction of the difference). The proportion of outperforming funds existing during this period is given by $\gamma_{Feb96\text{-}Dec00}$. The two-stage hypotheses are:

stage 1 $H_{03.2}$: $\gamma_{Feb96\text{-}Dec00} = 0.5$

$H_{A3.2}$: $\gamma_{Feb96\text{-}Dec00} \neq 0.5$

stage 2 $H_{03.2(a)}$: $\gamma_{Feb96\text{-}Dec00} \geq 0.5$ *or* $H_{03.2(a)}$: $\gamma_{Feb96\text{-}Dec00} \leq 0.5$

$H_{A3.2(a)}$: $\gamma_{Feb96\text{-}Dec00} < 0.5$ $H_{A3.2(a)}$: $\gamma_{Feb96\text{-}Dec00} > 0.5$

3.5.4 Relationship between investment performance and risk

The relationship between the four major risk-adjusted performance measures and relevant risk measures will be tested using Pearson's correlation coefficient (ρ) analysis, and linear regression analysis by measuring coefficient *B*. That is, the relationship between Treynor performance and beta ($H_{04.1}$), Sharpe performance and S.D. ($H_{04.2}$), Jensen performance and beta ($H_{04.3}$), as well as M^2 performance and S.D. ($H_{04.4}$) will be tested. The relationship between non risk-adjusted performance (rate of return) and systematic risk ($H_{04.5}$), as well as rate of return and total risk ($H_{04.6}$) will be also tested. The test hypotheses for each analysis are:

(i) Pearson correlation coefficient: H_{04}: $\rho = 0$

H_{A4}: $\rho \neq 0$

(ii) Linear regression: H_{04}: $B = 0$

H_{A4}: $B \neq 0$

Under the null hypothesis that both parameters are set equal to zero, results of t-statistic, p-value, and conclusion of the Pearson correlation coefficient analysis and the linear regression analysis will produce identical results. However, conceptually there is difference between the two analyses (Keller and Warrack 2003). The Pearson correlation coefficient is tested to determine whether investment performance is correlated with fund risk. This coefficient value also provides a degree of association. The values of the coefficient range from -1 to +1, with a value of zero indicating no relationship between the data sets. A value of -1 indicates perfect negative correlation and a value of +1 indicates perfect positive correlation. In addition, the linear regression analysis is tested to determine how the fund risk (independent variable) is related to the investment performance (dependent variable). Since Pearson's correlation coefficient and regression analysis assumes normality for variables, the Kolmogorov-Smirnov test will be used to check for normality. A significant t-statistic for the coefficients (ρ, B) will result in the rejection of the null hypothesis.

3.5.5 Relationship between risk-adjusted performance measures

The relationship between the fund performance measures (Treynor measure, Sharpe ratio, Jensen alpha and M^2) will be tested using Pearson's correlation coefficient (λ_i). The test hypotheses are:

$$H_{05}: \quad \lambda_i = 0$$

$$H_{A5}: \quad \lambda_i \neq 0$$

The Pearson's correlation coefficient will be utilised to measure the strength of any linear relationship between each pair of fund performance results; i.e. Treynor and Sharpe, Sharpe and Jensen, and Jensen and M^2, and M^2 and Treynor. As stated above, the values of the coefficient range from -1 to +1, with a value of zero indicating no relationship between the data sets. A value of -1 indicates perfect negative correlation and a value of +1 indicates perfect positive correlation. Since Pearson's correlation coefficient assumes normality for each pair of variables, the Kolmogorov-Smirnov test will be used to check for normality. A significant statistic for the coefficient (λ_i) would result in the rejection of the null hypothesis.

3.5.6 Persistence of fund performance

To test for the relationship between fund performance in prior and subsequent periods, four methodologies will be applied: (i) regression analysis, (ii) the Spearman rank correlation coefficient, (iii) quartile comparison tables and (iv) contingency tables. The statistical tests (one for each methodology) are as follows:

(i) Regression analysis

As stated in 3.4.1, testing for the relationship between the abnormal return for prior and subsequent periods, the slope coefficient (ϕ_k) of each cross-sectional regression (from equation 3-11) will be estimated. Hence the test hypotheses are:

$$H_{06.1}: \ \phi_k = 0$$

$$H_{A6.1}: \ \phi_k \neq 0$$

(i = 1992-98 c.f. 1999-00, 1993-98 c.f. 1999-00, ...1997-98 c.f. 1999-00)

A significant *t*-statistic for the slope coefficient (ϕ_k) would result in the rejection of the null hypothesis. A significant positive coefficient is evidence of performance persistence and a significant negative coefficient is evidence of performance reversal (Hallahan 1999; Bers and Madura 2000).

(ii) Spearman rank correlation coefficient

To test for any relationship between performance rankings in prior and subsequent periods, the Spearman rank correlation coefficient (Spearman's rho (r_s)) will be estimated. Hence, the test hypotheses are:

$$H_{06.2}: r_{s\ i\ vs.\ 99\text{-}00} = 0$$

$$H_{A6.2}: r_{s\ i\ vs.\ 99\text{-}00} \neq 0$$

(i = 1992-98, 1993-98, 1994-98, 1995-98, 1996-98 and 1997-98)

Spearman's rho (r_s) ranges in value from -1 to +1. A zero value indicates no relationship between the rankings of the two data sets. A value of -1 indicates perfect negative correlation and a value of +1 indicates perfect positive correlation. Any value between these two extremes will provide an indication of the degree to which rankings from a prior period are similar to rankings in the subsequent period. A significant t-statistic for the Spearman's rho (r_s) will result in the rejection of the null hypothesis.

(iii) Quartile comparison tables

To test for the relationship between quartile performance rankings in prior and subsequent periods, quartile comparison tables will be constructed. The test hypotheses are:

> $H_{06.3}$: *Prior and subsequent period quartile rankings are independent.*
>
> $H_{A6.3}$: *Prior and subsequent period quartile rankings are not independent.*

As in 3.4.3, the Pearson chi-square statistic, a measure of the degree of independence of results from prior to subsequent periods, will be computed for each table and the Exact significance and Monte Carlo significance will be used to verify the findings. In cases of insufficient memory (see 3.4.3), the Monte Carlo statistic will be used to verify the finding instead of the Exact test. A significant Exact (or Monte Carlo) statistic for the Pearson chi-square will result in rejection of the null hypothesis.

In addition, the test of top (and bottom) quartile ranking performance persistence will be drawn from results of the quartile ranking tables. Independence in quartile performance is evidenced by a quartile percentage figure of 25 per cent, and 100 per cent indicates perfect prediction of future results (Dunn and Thiesen 1983; Hallahan 1999).

(iv) Contingency tables

To test whether funds classified as winners (or losers) in prior period tend to repeat performance as winners (or losers) in subsequent period, 2 x 2 contingency tables will be constructed and the Cross Product Ratio (*CPR*) will be estimated. The test hypotheses are:

$$H_{06.4}: CPR_{i\ vs.\ 99\text{-}00} = 1$$

$$H_{A6.4}: CPR_{i\ vs.\ 99\text{-}00} \neq 1$$

(i = 1992-98, 1993-98, 1994-98, 1995-98, 1996-98 and 1997-98)

As stated in 3.4.4, the Cross Product Ratio (CPR), a ratio of the number of repeat performance (WW, LL) to the number of non-repeat performance (WL, LW), will be computed for each table. A CPR value of one indicates no relationship between the winning (losing) funds for prior and subsequent periods. The higher the value of CPR, the higher the degree of relationship between the data sets. If the one value does not fall within the CPR confidence interval, the null hypothesis can be rejected (Vanichbancha 2001). Since conclusions about CPR are tentative when small sample size is used (Hallahan 1999), the Fisher Exact statistic will used to confirm the findings. That is, a significant Fisher Exact statistic will result in rejection of the null hypothesis.

3.5.7 Optimal past performance

To test whether the information content (as determined by R^2 values) of prior period performance varies with the length of the period of prior performance, the coefficient (ϕ_k) results of regressions (equation 3-11) are first tested for positive significance. Then, the explanatory power (R^2) values of those regressions that have shown significant coefficient results are tested for a pattern of persistency; i.e. are tested for degree of persistence. The appropriate test hypotheses are:

H_{07}: *There is no pattern of persistency in R^2 values.*

H_{A7}: *There is a pattern of persistency in R^2 values.*

If the null hypothesis (H_{07}) is rejected, it will be examined whether, *ceteris paribus*, longer-term past performance contains more information related to future performance than does shorter-term past performance. As stated in 3.4.1, this can be considered by checking for any pattern of the explanatory power (R^2) values of the regressions (Hallahan 1999). A pattern of increasing R^2 values as the past performance period lengthens in time would indicate that the length of the past performance is important. If a pattern of performance persistence is verified, higher R^2 values for longer past periods would point to greater longer-term persistence. In contrast, if the null hypothesis (H_{07}) is not rejected (due to fluctuating R^2 values), it would indicate that increasing the length of the past performance period will not lead to a monotonic increase in information content.

However, it is possible that R^2 values may decrease as the past performance period lengthens. A pattern of decreasing R^2 values would indicate that the longer the period of prior performance, the lower the explanatory power. It is also possible that all R^2 values are equal. A pattern of equal R^2 values would indicate that the information content of prior period performance is invariant to the length of the period of prior performance (Hallahan 1999).

3.6 SUMMARY

The primary aim of this study is to examine the performance of Thai equity funds for the period 1992-2000, and the secondary aim is to investigate for persistence of fund performance and to explore the optimal past performance information set for equity funds in Thailand.

Four major risk-adjusted performance measures (the Treynor measure, Sharpe ratio, Jensen alpha and M^2) and non risk-adjusted measure (rate of return) will be utilised to estimate the performance of 86 Thai equity funds. The SET Index will be used as a proxy for the market portfolio and the 12-month deposit interest rates of Thai commercial banks will be used as a proxy for the risk-free rate. Equity fund performance will be examined in three time periods, the nine-year period 1992-2000, the expansionary market environment period, and the contractionary market environment period. The relationship between investment performance and risk as well as relationship between the four major risk-adjusted performance measures will be tested.

To investigate for persistence of fund performance, the time frame is split into a series of prior periods of varying lengths and a subsequent period of two years (1999-00).

The prior periods are set to six different lengths: two years (1997-98), three years (1996-98), four years (1995-98), five years (1994-98), six years (1993-98) and seven years (1992-98). Fund performance persistence will be tested through the use of four methodologies: (i) regression analysis; (ii) Spearman rank correlation coefficient; (iii) quartile comparison tables (including top and bottom quartile rankings); and (iv) contingency tables.

The test of sub-periods of varying lengths is not only to investigate for any relationship between past and future performance but also to examine the information content of fund performance history; in particular, to explore the optimal past performance information set (if any). This test will be investigated by way of regression analysis (explanatory power, R^2).

Chapter 4

THE PERFORMANCE OF EQUITY FUNDS

The aim of this chapter is to measure the performance of Thai equity funds. The results of tests for hypotheses one to five, each of which relates to fund performance, are presented.

The chapter consists of five sections. First, the results of Thai equity fund performance during 1992-2000; second, the results of Thai equity fund performance in two different market environments; third, the relationship between investment performance and risk; forth, the relationship between performance measures. The fifth section summarises the findings. A comparative exploration between the results of this research and the extant empirical findings will be provided in Chapter 6 (6.1.3).

4.1 THAI EQUITY FUND PERFORMANCE, 1992 -2000

This section presents the results of the performance of Thai equity funds; in particular, the results of statistical tests of hypotheses $H_{01.1}$, $H_{01.1(a)}$, $H_{01.2}$ and $H_{01.2(a)}$ (see 3.1.1). Results of average fund performance are presented in 4.1.1; results of the proportion of outperforming funds are presented in 4.1.2. Fund performance as measured by the risk-adjusted measures (Treynor, Sharpe, Jensen measures and M^2) is reported in 4.1.3, 4.1.4, 4.1.5, and 4.1.6 respectively. Fund performance as measured by the non risk-adjusted measure (rate of return) is reported in 4.1.7. Annual performance of Thai equity funds is presented in 4.1.8. Fund diversification and R^2 is presented in 4.1.9. A summary of fund performance during 1992-2000 is reported in 4.1.10.

4.1.1 Average fund performance, 1992-2000

As stated in 3.5.1, for the Treynor, Sharpe, M^2, and rate of return measures, a paired (dependent) *t*-test is used to compare the means of the paired differences between fund and market performance. In the case of Jensen alpha, a one-sample *t*-test is used to test whether the mean of Jensen alpha differs from zero.

Table 4.1 shows that the means of the paired differences between fund and market performance in the Treynor, Sharpe and M^2 measures are negative values (- 0.5230, - 0.0167, and - 0.2044 respectively). The mean fund performance as indicated by Jensen alpha (- 0.3607) is also lower than zero. However, the mean of the paired differences between fund rate of return and market rate of return is positive (0.6241). Two-stage hypothesis tests are employed to determine whether, firstly, equity fund performance is significantly different from the market portfolio performance, and secondly, the direction of any difference.

Table 4.1 Thai equity fund performance, 1992 - 2000

measure	mean (paired) differences[(a)]	std. error mean	*t*-stat	*p*-value (2-tail)	*p*-value (1-tail)	n	reject / not reject	
							$H_{01.1}$	$H_{01.1(a)}$
Treynor	-0.5230	0.0757	-6.9116	0.0000*	0.0000*	86	rej	rej
Sharpe	-0.0167	0.0056	-2.9723	0.0038*	0.0019*	86	rej	rej
Jensen	-0.3607	0.0495	-7.2943	0.0000*	0.0000*	86	rej	rej
M^2	-0.2044	0.0669	-3.0558	0.0030*	0.0015*	86	rej	rej
Rate of return	0.6241	0.0592	10.5506	0.0000*	0.0000*	86	rej	rej

(a) Mean paired differences are reported for the Treynor measure, Sharpe ratio, M^2, and rate of return. Mean difference is reported for the Jensen measure.

* significant at the 0.01 level

(i) Risk-adjusted performance measures

Results from risk-adjusted performance measures show that null hypothesis 1.1 ($H_{01.1}$) for the first stage hypothesis test that the average performance of Thai equity funds during the period 1992-2000 is not different from that of the market (two-tail test), is rejected at the 0.05 significance level. The average performance of Thai equity funds as measured by risk-adjusted performance measures is significantly different from that of the market.

Since the null first-stage hypothesis ($H_{01.1}$) is rejected and the direction is *negative*, the second-stage hypothesis, $H_{01.1(a)}$, is tested, that the average performance of Thai equity funds during the period 1992-2000 is not below that of the market (one-tail (left) test). The *p*-values for the *t*-test associated with the Treynor, Sharpe, Jensen and M^2 measures are all lower than 0.05 (0.00 < 0.05) and *t*-values are negative. The hypothesis is rejected (at the 5 per cent level). The average performance of Thai equity funds during the period 1992-2000 is *inferior* to the market benchmark.

(ii) Non risk-adjusted performance measure

Results from non risk-adjusted measure, rate of return (per cent per month), show that the null hypothesis 1.1 ($H_{01.1}$) for the first stage hypothesis is rejected at the 0.05 significance level. The performance of Thai equity funds as measured by rate of return is significantly different from that of the market.

Since the null first-stage hypothesis ($H_{01.1}$) is rejected and the direction is *positive*, the second-stage hypothesis, $H_{01.1(a)}$, is tested that the average performance of Thai equity funds during the period 1992-2000 is not above that of the market (one-tail (right) test). The *p*-values for the *t*-test associated with the rate of return is lower than 0.05 and *t*-value is positive. The hypothesis is rejected (at the 5 per cent level). The average performance of Thai equity funds as measured by the non risk-adjusted (rate of return) during the period 1992-2000 is *superior* to the market benchmark.

In summary, the results from all four risk-adjusted measures are consistent and reveal that the average performance of Thai equity funds significantly *underperformed* relative to the performance of the market portfolio during the period 1992-2000. However, results from the non risk-adjusted measure (rate of return) reveal that the average performance of Thai funds *outperformed* the market benchmark.

The finding of different results from risk-adjusted and non risk-adjusted measures is not, however, surprising because they are different measures. The risk-adjusted performance measures express fund excess return per unit of risk while rate of return expresses only a rate of return (disregarding risk). More details on risk-adjusted performance results are discussed further in section 4.1.3 - 4.1.5.

4.1.2 Proportion of outperforming and underperforming funds, 1992 - 2000

Table 4.2 shows the number of outperforming and underperforming funds, using risk-adjusted performance measures (the Treynor, Sharpe, Jensen and M^2 measures) and a non risk-adjusted performance measure (rate of return). A fund is classified as having outperformed the market where the Treynor (Sharpe, rate of return) value for the fund is higher than the Treynor (Sharpe, rate of return) value for the market portfolio; whilst the M^2 value for the fund is higher than the average return on the market portfolio. A positive Jensen alpha indicates that the fund has outperformed the market portfolio. For each performance measure the binomial test is used to evaluate the proportion of outperforming funds. Two-stage hypotheses will be tested to determine, firstly, whether half of the funds outperformed the market benchmark; and secondly, the direction of that difference if the proportion of funds that outperformed the market was different from half.

Table 4.2 Numbers and percentage of outperforming and underperforming funds, 1992 - 2000

measure	outperforming funds		underperforming funds		*Z*-stat	*p*-value (2-tail)	*p*-value (1-tail)	reject / not reject H_0	
	number	%	number	%				$H_{01.2}$	$H_{01.2(a)}$
Treynor	18	20.93	68	79.07	-5.3916	0.0000*	0.0000*	rej	rej
Sharpe	33	38.37	53	61.63	-2.1567	0.0405*	0.0203*	rej	rej
Jensen	18	20.93	68	79.07	-5.3916	0.0000*	0.0000*	rej	rej
M^2	33	38.37	53	61.63	-2.1567	0.0405*	0.0203*	rej	rej
Rate of return	75	87.21	11	12.79	6.9013	0.0000*	0.0000*	rej	rej

* significant at the 0.05 level
n = 86 funds

(i) Risk-adjusted performance measures

For the first stage of the two-stage test, the null hypothesis ($H_{01.2}$) is rejected at the 5 per cent level, for all four risk-adjusted performance measures. The proportion of Thai equity funds that outperformed the market benchmark was significantly different from half of the total number of Thai equity funds.

Since the null hypothesis for the first stage of the test is rejected and the direction is *negative*, the second-stage null hypothesis, $H_{01.2(a)}$, is tested that during the period 1992-2000, 50 per cent (or more) of the total number of Thai equity funds outperformed the market benchmark (one-tail (left) test). Table 4.2 shows that the

p-values for all four measures (Treynor, Sharpe, Jensen and M^2) are less than 0.05 (0.00, 0.02, 0.00, 0.02 < 0.05) and the Z-values are negative. The hypothesis is rejected at the 0.05 significance level. The majority of the Thai equity funds existing during 1992- 2000 in terms of risk-adjusted performance measures *underperformed* the market portfolio.

(ii) Non risk-adjusted performance measure

Results from non risk-adjusted measure, rate of return, show that the first stage null hypothesis ($H_{01.2}$) is rejected at the 5 per cent level. The proportion of Thai equity funds that outperformed the market benchmark was significantly different from half of the total number of Thai equity funds.

Since the null hypothesis for the first stage of the test is rejected and the direction is *positive*, the second-stage null hypothesis, $H_{01.2(a)}$, is tested that during the period 1992-2000, 50 per cent (or less) of the total number of Thai equity funds outperformed the market benchmark (one-tail (right) test). Table 4.2 shows that the p-value for rate of return measure is less than 0.05 and the Z-value is positive. The hypothesis is rejected at the 0.05 significance level. The majority of the Thai equity funds in terms of rate of return *outperformed* the market portfolio during 1992-2000.

In summary, all four risk-adjusted measures strongly indicate that the majority of Thai equity funds existing during 1992-2000 *underperformed* relative to the performance of the Thai market portfolio. However, when funds were measured in terms of rate of return, the majority of funds achieved *superior* performance when compared to the market benchmark. Again, the finding of different results from risk-adjusted and non risk-adjusted performance measures is reported.

4.1.3 Fund performance as measured by the Treynor Measure

The Treynor measure evaluates fund performance by considering the risk-adjusted return earned per unit of systematic risk, average excess return divided by beta (see 3.3.1.1). Table 4.3 shows that 18 funds, which existed during the period January 1992 to December 2000, outperformed the market benchmark.

Since there is the limitation that the 86 funds have varying life spans, interpretation of the mean values in the last row of Table 4.3 warrants caution. The mean values under this limitation report that the mean Treynor measure is - 3.0164, whilst the mean Treynor market measure is - 2.4934. In fact, 68 of the 86 funds underperformed the market portfolio.

The systematic risk (beta[1]) in table 4.3 shows that the beta range is from 0.5048 to 0.9004. This indicates that the level of risk in the equity fund industry is lower than that of the overall market (for which beta =1). All beta estimates were significant at the 5 per cent level. The relationship between fund performance in terms of the Treynor measure and beta will be reported in section 4.3.1.

Another point to be noted from Table 4.3 is that the excess return values (R_p - R_f) are negative because all fund returns (R_p) are less than the risk-free rates (R_f). This finding implies that investors who held risk-free assets during 1992-2000 gained higher returns than investors who subscribed to equity funds. In addition, the excess return of the market portfolio (R_m-R_f), which in this case is the Treynor market, are also negative because the market returns (R_m) are less than the risk-free rates (R_f).

There was a severe financial market crisis in the middle of the period of this study, which has had a significant impact on the behaviour of equity returns and therefore, on the performance of equity funds. A possible reason on the negative equity premium (negative excess return) is due to lower rates of returns of funds which were effected by the crisis. In addition, since Thailand is an emerging market, high interest rate is a normal condition of the market. Risk free rates of this study are represented by commercial bank deposit rates which were every high, particularly in 1997 to the middle of 1998 (see Appendix E for more detail). Therefore, in estimating for the excess return (R_p - R_f), it is not surprising to see negative risk premium values for the Thai equity funds.

---

[1] As stated in 2.1.3, the beta values are obtained from the beta coefficient of each fund (the slope of the fund's characteristic line). This value expresses the sensitivity (volatility) of fund's return to change in the market portfolio return.

Table 4.3 Fund performance as measured by the Treynor Measure, 1992-2000

Name	Rp- R_f	Beta	Treynor funds	> or <	Treynor market	performance	months	Name	Rp- R_f	Beta	Treynor funds	> or <	Treynor market	performance	months
SSB	-1.3970	0.8005	-1.7452	<	-1.5443	underperform	108	THANA1	-1.9512	0.7001	-2.7870	>	-2.8248	outpeerform	84
SF4	-1.4354	0.7692	-1.8662	<	-1.5443	underperform	108	SCBTS3	-2.3969	0.5718	-4.1915	<	-2.7198	underperform	83
SF5	-1.5071	0.7943	-1.8974	<	-1.5443	underperform	108	SCBMF4	-2.8948	0.7255	-3.9902	<	-2.7198	underperform	83
SW2	-1.1782	0.7916	-1.4883	>	-1.5443	outperform	108	BKA2	-2.3261	0.7592	-3.0639	<	-2.6733	underperform	82
TNP	-1.3159	0.9004	-1.4615	>	-1.5443	outperform	108	UNF	-2.6746	0.8529	-3.1357	<	-2.6733	underperform	82
RPF2	-1.1000	0.8659	-1.2703	>	-1.5443	outperform	108	ONE-UB4	-1.9895	0.6894	-2.8859	<	-2.6733	underperform	82
SAN	-1.1337	0.8726	-1.2992	>	-1.6601	outperform	106	TDF	-2.0688	0.7204	-2.8719	<	-2.6733	underperform	82
RKF	-0.8185	0.7014	-1.1670	>	-1.5640	outperform	103	CMICRK	-1.9561	0.6392	-3.0602	<	-2.6733	underperform	82
THOR	-1.3324	0.5947	-2.2404	<	-1.6622	underperform	102	THOR 4	-1.9484	0.5926	-3.2879	<	-2.5716	underperform	81
ONE-G	-1.0769	0.7206	-1.4944	>	-1.6622	outperform	102	SPF	-2.4327	0.7571	-3.2133	<	-2.5716	underperform	81
ONE-D	-0.9117	0.6913	-1.3187	>	-1.6622	outperform	102	TS	-2.4753	0.8223	-3.0102	<	-2.5716	underperform	81
SCBMF	-1.3989	0.649	-2.1555	<	-1.6571	underperform	101	SF7	-2.9030	0.8768	-3.3110	<	-2.7198	underperform	79
PPSD	-0.9850	0.5266	-1.8706	<	-1.8545	underperform	97	KKF	-1.9195	0.7492	-2.5622	>	-2.6597	outpeerform	78
THOR2	-1.2850	0.6367	-2.0181	<	-1.8545	underperform	97	BKD	-2.5871	0.758	-3.4129	<	-2.6597	underperform	78
RRF1	-2.3240	0.8824	-2.6338	<	-1.9991	underperform	95	SCBMF5	-3.1873	0.7208	-4.4217	<	-2.6597	underperform	78
ONE-WE	-1.3601	0.7001	-1.9428	<	-1.8875	underperform	92	RKF4	-2.2801	0.6163	-3.6996	<	-2.6597	underperform	78
ONE-FF	-1.0893	0.6312	-1.7259	>	-1.8821	outperform	91*	SCDF	-2.6270	0.7888	-3.3304	<	-2.6597	underperform	78
RKF2	-1.1709	0.6754	-1.7335	>	-2.0333	outperform	89	DE-1	-2.8706	0.8464	-3.3915	<	-2.7676	underperform	77
SCBMF2	-2.1642	0.7348	-2.9453	<	-2.0899	underperform	88	SCBDA	-3.4296	0.7864	-4.3613	<	-2.8639	underperform	76
SCBMF3	-2.4360	0.7233	-3.3679	<	-2.1262	underperform	87	BTP	-2.4235	0.7178	-3.3762	<	-2.9248	underperform	75
ONE-PRO	-1.7092	0.7275	-2.3494	<	-2.1262	underperform	87	RKEC	-2.2541	0.6344	-3.5532	<	-2.8537	underperform	73
ONE-UB	-1.7073	0.7102	-2.4039	<	-2.1262	underperform	87	OSA	-2.4864	0.6884	-3.6116	<	-2.8537	underperform	73
ONE-UB2	-1.8092	0.7316	-2.4730	<	-2.4373	underperform	86	TVF	-2.2135	0.6031	-3.6699	<	-2.8940	underperform	72
STD	-2.7135	0.7838	-3.4618	<	-2.4373	underperform	86	ONE-PF	-2.1870	0.6635	-3.2962	<	-2.8940	underperform	72
SCIF	-2.6893	0.7655	-3.5130	<	-2.4373	underperform	86	SCBRT	-2.7958	0.6645	-4.2076	<	-2.8940	underperform	72
RKF3	-1.8683	0.6128	-3.0490	<	-2.4373	underperform	86	SRT	-2.3792	0.6981	-3.4080	<	-2.7651	underperform	71
SCBTS	-2.5238	0.5374	-4.6961	<	-2.4373	underperform	86	APF	-1.9717	0.7259	-2.7162	>	-2.8838	outpeerform	70
NPAT-PRO	-1.9546	0.7082	-2.7598	<	-2.5032	underperform	85	B-SUB	-2.7217	0.7547	-3.6063	<	-2.8838	underperform	70
SCBTS2	-2.4934	0.5048	-4.9389	<	-2.5032	underperform	85	BMBF	-3.1477	0.7315	-4.3031	<	-2.8228	underperform	69
ONE+1	-1.9572	0.6847	-2.8583	<	-2.5032	underperform	85	SF8	-3.2625	0.8241	-3.9589	<	-2.8228	underperform	69
ONE-UB3	-2.0713	0.6854	-3.0220	<	-2.5032	underperform	85	SCBPMO	-3.0898	0.5847	-5.2845	<	-2.8417	underperform	68
RKF-HI	-2.1688	0.6106	-3.5517	<	-2.5032	underperform	85	SPT	-2.8844	0.6840	-4.2171	<	-2.8417	underperform	68
STD2	-2.9933	0.7130	-4.1983	<	-2.5032	underperform	85	BMF	-0.7894	0.5350	-1.4755	>	-2.6129	outpeerform	68*
USD2	-1.7538	0.6719	-2.6101	<	-2.5032	underperform	85	PISD	-3.0556	0.8012	-3.8137	<	-3.1361	underperform	64
USD	-1.8065	0.6653	-2.7155	<	-2.5032	underperform	85	ONE-UB5	-1.8558	0.6352	-2.9217	<	-2.6586	underperform	60*
BKA	-2.1139	0.7889	-2.6794	<	-2.5032	underperform	85	THOR 3	-2.2065	0.5203	-4.2406	<	-3.3478	underperform	60*
KPLUS	-2.0917	0.7018	-2.9804	<	-2.8248	underperform	84	ONEUB-G	-1.7184	0.6546	-2.6250	>	-3.1229	outpeerform	59*
KPLUS2	-2.1023	0.7015	-2.9969	<	-2.8248	underperform	84	RKEDC	-2.8295	0.6295	-4.4946	<	-3.0651	underperform	50
ONE-FAS	-2.1808	0.7272	-2.9989	<	-2.8248	underperform	84	BCAP	-2.5199	0.7392	-3.4092	<	-3.0858	underperform	49
SCIF2	-2.6153	0.7454	-3.5086	<	-2.8248	underperform	84	AJFSCAP	-0.7360	0.5232	-1.4068	>	-2.1471	outpeerform	42
SCBPG	-2.6053	0.5697	-4.5730	<	-2.8248	underperform	84	NSG	-1.1867	0.7834	-1.5147	>	-2.1471	outpeerform	42
ONE-PR	-1.9451	0.7042	-2.7619	>	-2.8248	outperform	84	N_SAFETY	-2.4040	0.6780	-3.5459	>	-4.3256	outpeerform	35*
AGF	-2.6744	0.7922	-3.3761	<	-2.8248	underperform	84	INGTEF	-3.9421	0.8479	-4.6490	<	-3.0078	underperform	20
								mean[(a)]	-2.1157	0.7070	-3.0164	-	-2.4934	-	-

(a) Interpretation of the mean values in this table warrants caution because funds do not have the same time horizon (numbers of observations (months) vary).

* Funds terminated before December 2000

4.1.4 Fund performance as measured by the Sharpe Ratio

The Sharpe ratio evaluates fund performance by measuring the excess return divided by the standard deviation of fund returns (see 3.3.1.2). Table 4.4 shows that 33 funds, which existed during the period January 1992 to December 2000, outperformed the market benchmark.

Since there is the limitation that the 86 funds have varying life spans, interpretation of the mean values in the last row of Table 4.4 warrants caution. The mean values under this limitation report that the mean Sharpe measure is - 0.2243, whilst the mean Sharpe market measure is - 0.2076. In fact, 53 funds of the 86 funds underperformed the market benchmark.

Another point to be noted from Table 4.4 is the total risk of individual funds, which Sharpe defines as the standard deviation of returns. The fund standard deviation range is 6.8466 to 13.1763. Comparing the standard deviation values for each fund to the market for the same time period, 85 of the 86 funds have standard deviation values less than the standard deviation of the market. All standard deviation estimates were significant at the 5 per cent level. The relationship between the Sharpe ratio investment performance and S.D. will be presented in section 4.3.2.

Table 4.4 Fund performance as measured by the Sharpe Ratio, 1992-2000

name	$(R_p - R_f)$	$(R_m - R_f)$	Fund S.D.	Market S.D.	Sharpe ratio	> or <	Sharpe market	performance	months
SSB	-1.3970	-1.5443	10.8319	11.4298	-0.1290	>	-0.1351	outperform	108
SF4	-1.4354	-1.5443	9.6391	11.4298	-0.1489	<	-0.1351	underperform	108
SF5	-1.5071	-1.5443	9.8073	11.4298	-0.1537	<	-0.1351	underperform	108
SW2	-1.1782	-1.5443	9.7760	11.4298	-0.1205	>	-0.1351	outperform	108
TNP	-1.3159	-1.5443	10.8269	11.4298	-0.1215	>	-0.1351	outperform	108
RPF2	-1.1000	-1.5443	10.4100	11.4298	-0.1057	>	-0.1351	outperform	108
SAN	-1.1337	-1.6601	10.7851	11.4978	-0.1051	>	-0.1444	outperform	106
RKF	-0.8185	-1.564	9.1276	11.5679	-0.0897	>	-0.1352	outperform	103
THOR	-1.3324	-1.6622	8.2728	11.5812	-0.1611	<	-0.1435	underperform	102
ONE-G	-1.0769	-1.6622	9.0928	11.5812	-0.1184	>	-0.1435	outperform	102
ONE-D	-0.9117	-1.6622	8.8936	11.5812	-0.1025	>	-0.1435	outperform	102
SCBMF	-1.3989	-1.6571	9.3791	11.6389	-0.1492	<	-0.1424	underperform	101
PPSD	-0.9850	-1.8545	8.5252	11.7215	-0.1155	>	-0.1582	outperform	97
THOR2	-1.2850	-1.8545	8.5583	11.7215	-0.1501	>	-0.1582	outperform	97
RRF1	-2.3240	-1.9991	11.8620	11.7937	-0.1959	<	-0.1695	underperform	95
ONE-WE	-1.3601	-1.8875	9.1450	11.9634	-0.1487	>	-0.1578	outperform	92
ONE-FF	-1.0893	-1.8821	8.4537	11.9919	-0.1289	>	-0.1569	outperform	91*
RKF2	-1.1709	-2.0333	9.4158	12.1226	-0.1244	>	-0.1677	outperform	89
SCBMF2	-2.1642	-2.0899	10.0782	12.1801	-0.2147	<	-0.1716	underperform	88
SCBMF3	-2.4360	-2.1262	9.8668	12.2458	-0.2469	<	-0.1736	underperform	87
ONE-PRO	-1.7092	-2.1262	9.9610	12.2458	-0.1716	>	-0.1736	outperform	87
ONE-UB	-1.7073	-2.1262	9.5761	12.2458	-0.1783	<	-0.1736	underperform	87
ONE-UB2	-1.8092	-2.4373	9.4871	11.9674	-0.1907	>	-0.2037	outperform	86
STD	-2.7135	-2.4373	10.2217	11.9674	-0.2655	<	-0.2037	underperform	86
SCIF	-2.6893	-2.4373	9.7795	11.9674	-0.2750	<	-0.2037	underperform	86
RKF3	-1.8683	-2.4373	8.3857	11.9674	-0.2228	<	-0.2037	underperform	86
SCBTS	-2.5238	-2.4373	7.5533	11.9674	-0.3341	<	-0.2037	underperform	86
NPAT-PRO	-1.9546	-2.5032	9.1894	12.0228	-0.2127	<	-0.2082	underperform	85
SCBTS2	-2.4934	-2.5032	7.3232	12.0228	-0.3405	<	-0.2082	underperform	85
ONE+1	-1.9572	-2.5032	8.9794	12.0228	-0.218	<	-0.2082	underperform	85
ONE-UB3	-2.0713	-2.5032	9.0308	12.0228	-0.2294	<	-0.2082	underperform	85
RKF-HI	-2.1688	-2.5032	8.4155	12.0228	-0.2577	<	-0.2082	underperform	85
STD2	-2.9933	-2.5032	9.5433	12.0228	-0.3137	<	-0.2082	underperform	85
USD2	-1.7538	-2.5032	9.5161	12.0228	-0.1843	>	-0.2082	outperform	85
USD	-1.8065	-2.5032	9.4989	12.0228	-0.1902	>	-0.2082	outperform	85
BKA	-2.1139	-2.5032	10.2905	12.0228	-0.2054	>	-0.2082	outperform	85
KPLUS	-2.0917	-2.8248	9.1557	11.7235	-0.2285	>	-0.2409	outperform	84
KPLUS2	-2.1023	-2.8248	9.1279	11.7235	-0.2303	>	-0.2409	outperform	84
ONE-FAS	-2.1808	-2.8248	9.2387	11.7235	-0.2361	>	-0.2409	outperform	84
SCIF2	-2.6153	-2.8248	9.4528	11.7235	-0.2767	<	-0.2409	underperform	84
SCBPG	-2.6053	-2.8248	7.6666	11.7235	-0.3398	<	-0.2409	underperform	84
ONE-PR	-1.9451	-2.8248	9.0670	11.7235	-0.2145	>	-0.2409	outperform	84
AGF	-2.6744	-2.8248	10.1199	11.7235	-0.2643	<	-0.2409	underperform	84

name	$(R_p - R_f)$	$(R_m - R_f)$	Fund S.D.	Market S.D.	Sharpe ratio	> or <	Sharpe market	performance	months
THANA1	-1.9512	-2.8248	9.0011	11.7235	-0.2168	>	-0.2409	outperform	84
SCBTS3	-2.3969	-2.7198	7.7843	11.7539	-0.3079	<	-0.2314	underperform	83
SCBMF4	-2.8948	-2.7198	9.6208	11.7539	-0.3009	<	-0.2314	underperform	83
BKA2	-2.3261	-2.6733	9.7598	11.8181	-0.2383	<	-0.2262	underperform	82
UNF	-2.6746	-2.6733	10.7528	11.8181	-0.2487	<	-0.2262	underperform	82
ONE-UB4	-1.9895	-2.6733	8.8915	11.8181	-0.2238	>	-0.2262	outperform	82
TDF	-2.0688	-2.6733	9.4799	11.8181	-0.2182	>	-0.2262	outperform	82
CMICRK	-1.9561	-2.6733	8.5783	11.8181	-0.2280	<	-0.2262	underperform	82
THOR 4	-1.9484	-2.5716	8.1931	11.8549	-0.2378	<	-0.2169	underperform	81
SPF	-2.4327	-2.5716	9.7227	11.8549	-0.2502	<	-0.2165	underperform	81
TS	-2.4753	-2.5716	10.4626	11.8549	-0.2366	<	-0.2169	underperform	81
SF7	-2.9030	-2.7198	11.1455	11.9430	-0.2605	<	-0.2277	underperform	79
KKF	-1.9195	-2.6597	10.8577	12.0082	-0.1768	>	-0.2215	outperform	78
BKD	-2.5871	-2.6597	9.8988	12.0082	-0.2614	<	-0.2215	underperform	78
SCBMF5	-3.1873	-2.6597	9.6946	12.0082	-0.3288	<	-0.2215	underperform	78
RKF4	-2.2801	-2.6597	8.3861	12.0082	-0.2719	<	-0.2215	underperform	78
SCDF	-2.6270	-2.6597	10.0958	12.0082	-0.2602	<	-0.2215	underperform	78
DE-1	-2.8706	-2.7676	10.7546	12.0486	-0.2669	<	-0.2297	underperform	77
SCBDA	-3.4296	-2.8639	10.6351	12.0985	-0.3225	<	-0.2367	underperform	76
BTP	-2.4235	-2.9248	9.5756	12.1681	-0.2531	<	-0.2404	underperform	75
RKEC	-2.2541	-2.8537	8.8976	12.2855	-0.2533	<	-0.2323	underperform	73
OSA	-2.4864	-2.8537	9.2530	12.2855	-0.2687	<	-0.2323	underperform	73
TVF	-2.2135	-2.8940	8.6555	12.3665	-0.2557	<	-0.2340	underperform	72
ONE-PF	-2.1870	-2.8940	9.0907	12.3665	-0.2406	<	-0.2340	underperform	72
SCBRT	-2.7958	-2.8940	9.0754	12.3665	-0.3081	<	-0.2340	underperform	72
SRT	-2.3792	-2.7651	9.3943	12.4068	-0.2533	<	-0.2229	underperform	71
APF	-1.9717	-2.8838	9.8760	12.4543	-0.1996	>	-0.2315	outperform	70
B-SUB	-2.7217	-2.8838	10.2542	12.4543	-0.2654	<	-0.2315	underperform	70
BMBF	-3.1477	-2.8228	9.9168	12.5363	-0.3174	<	-0.2252	underperform	69
SF8	-3.2625	-2.8228	11.0915	12.5363	-0.2941	<	-0.2252	underperform	69
SCBPMO	-3.0898	-2.8417	8.3387	12.6281	-0.3705	<	-0.2250	underperform	68
SPT	-2.8844	-2.8417	9.5879	12.6281	-0.3008	<	-0.2250	underperform	68
BMF	-0.7894	-2.6129	7.9692	10.7996	-0.0991	>	-0.2419	outperform	68*
PISD	-3.0556	-3.1361	11.7601	12.8501	-0.2598	<	-0.2441	underperform	64
ONE-UB5	-1.8558	-2.6586	8.7512	12.6646	-0.2121	<	-0.2099	underperform	60*
THOR 3	-2.2065	-3.3478	7.7847	12.0046	-0.2834	<	-0.2789	underperform	60*
ONEUB-G	-1.7184	-3.1229	9.6175	13.2350	-0.1787	>	-0.2360	outperform	59*
RKEDC	-2.8295	-3.0651	10.3632	14.3185	-0.2730	<	-0.2141	underperform	50
BCAP	-2.5199	-3.0858	12.0395	14.4658	-0.2093	>	-0.2133	outperform	49
AJFSCAP	-0.7360	-2.1471	10.8353	15.3177	-0.0679	>	-0.1402	outperform	42
NSG	-1.1867	-2.1471	13.1763	15.3177	-0.0901	>	-0.1402	outperform	42
N_SAFETY	-2.4040	-4.3256	6.8466	9.1680	-0.3511	>	-0.4718	outperform	35*
INGTEF	-3.9421	-3.0078	9.3527	10.6589	-0.4215	<	-0.2822	underperform	20
mean[(a)]	-2.1157	-2.4934	9.5180	12.0543	**-0.2243**		**-0.2076**	-	-

(a) Interpretation of the mean values in this table warrants caution because funds do not have the same time horizon (numbers of observations (months) vary).

* Funds terminated before December 2000

4.1.5 Fund performance as measured by the Jensen Alpha

The third risk-adjusted measure used is the Jensen alpha, which evaluates fund performance by considering risk-adjusted abnormal return and relating actual return to expect return based on the systematic risk of a fund (3.3.1.3). Since the Jensen alpha can be legitimately compared across differing time periods, fund performance rankings are also reported in Table 4.5.

Table 4.5 Fund performance and ranking as measured by the Jensen Alpha, 1992-2000

rank	name	Jensen Alpha[(a)]	*t*-stat	sig of *t*-stat	performance	months	rank	name	Jensen Alpha[(a)]	*t*-stat	sig of *t*-stat	performance	months
1	BMF	0.6091	0.8831	0.3804	outperform	68**	44	BTP	-0.3250	-0.6939	0.4899	underperform	75
2	N_SAFETY	0.5214	0.9570	0.3455	outperform	35**	45	THOR	-0.3440	-0.7479	0.4563	underperform	102
3	NSG	0.4941	0.5765	0.5675	outperform	42	46	ONE-UB3	-0.3564	-0.8676	0.3881	underperform	85
4	AJFSCAP	0.3880	0.3377	0.7373	outperform	42	47	TS	-0.3621	-0.8340	0.4068	underperform	81
5	ONEUB-G	0.3271	0.5813	0.5633	outperform	59**	48	RKF3	-0.3758	-0.8375	0.4047	underperform	86
6	SAN	0.3150	0.8073	0.4213	outperform	106	49	UNF	-0.3950	-0.9267	0.3569	underperform	82
7	RKF	0.2778	0.6663	0.5067	outperform	103	50	THOR 4	-0.4254	-0.8847	0.3790	underperform	81
8	ONE-D	0.2369	0.6097	0.5434	outperform	102	51	AGF	-0.4360	-0.9605	0.3396	underperform	84
9	RPF2	0.2368	0.7529	0.4532	outperform	108	52	RKEC	-0.4449	-0.8590	0.3933	underperform	73
10	RKF2	0.2015	0.4018	0.6888	outperform	89	53	SRT	-0.4503	-1.0143	0.3140	underperform	71
11	APF	0.1217	0.2480	0.8049	outperform	70	54	THOR 3	-0.4647	-0.8746	0.3854	underperform	60**
12	ONE-G	0.1207	0.3331	0.7397	outperform	102	55	TVF	-0.4690	-0.8788	0.3825	underperform	72
13	ONE-FF	0.0992	0.2471	0.8054	outperform	91**	56	SPF	-0.4867	-1.1395	0.2579	underperform	81
14	TNP	0.0749	0.2282	0.8199	outperform	108	57	SCIF2	-0.5099	-1.2541	0.2134	underperform	84
15	KKF	0.0731	0.1030	0.9183	outperform	78	58	SF7	-0.5193	-1.1717	0.2449	underperform	79
16	ONE-PR	0.0443	0.1048	0.9168	outperform	84	59	OSA	-0.5235	-1.1571	0.2511	underperform	73
17	SW2	0.0438	0.1214	0.9036	outperform	108	60	DE-1	-0.5277	-1.3130	0.1932	underperform	77
18	THANA1	0.0266	0.0638	0.9493	outperform	84	61	SCDF	-0.5298	-1.3006	0.1973	underperform	78
19	PPSD	-0.0087	-0.0144	0.9886	underperform	97	62	PISD	-0.5453	-0.7404	0.4618	underperform	64
20	ONE-UB2	-0.0265	-0.0656	0.9478	underperform	86	63	B-SUB	-0.5462	-1.0797	0.2841	underperform	70
21	ONE-WE	-0.0391	-0.1005	0.9201	underperform	92	64	RRF1	-0.5601	-0.9404	0.3495	underperform	95
22	USD2	-0.0737	-0.1318	0.8955	underperform	85	65	BKD	-0.5710	-1.2587	0.2120	underperform	78
23	THOR2	-0.1055	-0.2447	0.8072	underperform	97	66	SCBMF2	-0.6290	-1.2491	0.2150	underperform	88
24	KPLUS	-0.1089	-0.2403	0.8107	underperform	84	67	RKF-HI	-0.6407	-1.4007	0.1650	underperform	85
25	KPLUS2	-0.1204	-0.2694	0.7883	underperform	84	68	RKF4	-0.6416	-1.3977	0.1663	underperform	78
26	ONE-FAS	-0.1272	-0.3171	0.7520	underperform	84	69	STD	-0.8038	-1.7898	0.0771*	underperform	86
27	BKA	-0.1399	-0.3148	0.7537	underperform	85	70	SCIF	-0.8238	-2.1777	0.0322*	underperform	86
28	TDF	-0.1419	-0.2986	0.7660	underperform	82	71	SCBTS3	-0.8430	-1.9023	0.0607*	underperform	83
29	USD	-0.1432	-0.2513	0.8022	underperform	85	72	SCBRT	-0.8721	-1.8590	0.0672*	underperform	72
30	ONE-UB4	-0.1469	-0.3628	0.7177	underperform	82	73	SCBMF3	-0.8983	-1.8898	0.0622*	underperform	87
31	SSB	-0.1613	-0.2853	0.7760	underperform	108	74	RKEDC	-0.8991	-1.2053	0.2340	underperform	50
32	ONE-PRO	-0.1627	-0.3338	0.7393	underperform	87	75	SCBMF4	-0.9214	-1.8255	0.0716*	underperform	83
33	ONE-UB5	-0.1648	-0.3594	0.7206	underperform	60**	76	SF8	-0.9359	-1.8654	0.0665*	underperform	69
34	NPAT-PRO	-0.1823	-0.4743	0.6365	underperform	85	77	SPT	-0.9421	-1.8123	0.0745*	underperform	68
35	ONE-UB	-0.1975	-0.4508	0.6533	underperform	87	78	SCBPG	-0.9972	-2.3564	0.0208*	underperform	84
36	BCAP	-0.2386	-0.2923	0.7714	underperform	49	79	BMBF	-1.0811	-2.3021	0.0244*	underperform	69
37	ONE-1	-0.2432	-0.6097	0.5437	underperform	85	80	SCBDA	-1.1784	-2.0906	0.0400*	underperform	76
38	CMICRK	-0.2477	-0.5362	0.5933	underperform	82	81	STD2	-1.2089	-2.5892	0.0114*	underperform	85
39	SF4	-0.2482	-0.6444	0.5207	underperform	108	82	SCBTS	-1.2144	-2.7803	0.0067*	underperform	86
40	SF5	-0.2814	-0.7787	0.4379	underperform	108	83	SCBTS2	-1.2306	-2.7076	0.0082*	underperform	85
41	ONE-PF	-0.2862	-0.5777	0.5653	underperform	72	84	SCBMF5	-1.2702	-2.4946	0.0148*	underperform	78
42	BKA2	-0.2970	-0.6795	0.4988	underperform	82	85	INGTEF	-1.3912	-2.4174	0.0265*	underperform	20
43	SCBMF	-0.3243	-0.5784	0.5643	underperform	101	86	SCBPMO	-1.4277	-2.9482	0.0044*	underperform	68
								mean	-0.3607	-0.7673	0.5533	-	-

(a) None has got positive serial correlation.
* significant at the 0.10 level
** Funds terminated before December 2000 (most of the terminated funds are closed-end funds whose terms had matured - automatically terminated funds).

Table 4.5 shows that 18 funds had positive Jensen alpha; i.e. 18 funds outperformed the market portfolio. These funds are the same funds that outperformed the market when performance was estimated by the Treynor and Sharpe measures.

The mean Jensen alpha value, for all funds is - 0.3607. This indicates that an average performance for the equity fund industry is inferior to the market portfolio. Only 17 out of the 86 Jensen alpha estimates on an individual fund basis were significant at the 10 per cent level. This is approximately 20 per cent of the sample. However, this is a higher percentage of statistically significant estimates than in Jensen's study which is only 10 per cent (Jensen 1968). Of the seventeen significant Jensen alpha estimates, all were negative. The mean Jensen Alpha for the 18 funds that outperformed the market is 0.2340; and for the 68 funds that underperformed is - 0.5182.

4.1.6 Fund performance as measured by the M^2

The M^2 evaluates fund performance by utilising standard deviation as the relevant measure of risk and takes a fund's average return and determines what it would have been if the fund had the same level of total risk as the market benchmark (Sharpe et al. 1999). M^2 can be compared directly with the average return on the market portfolio over the same time period in order to consider whether a fund is superior or inferior to the market benchmark on a risk-adjusted basis (see 3.3.1.4). Table 4.6 shows that 33 funds, which existed during the period January 1992 to December 2000, outperformed the market benchmark. These funds are the same funds that outperformed the market when performance was estimated by the Sharpe measure.

Table 4.6 Fund performance as measured by the M^2, 1992-2000

name	Rp	R_f	Fund S.D.	Market S.D.	M^2	> or <	market return	performance	months
SSB	-0.7410	0.6560	10.8319	11.4298	-0.8181	>	-0.8883	outperform	108
SF4	-0.7793	0.6560	9.6391	11.4298	-1.0460	<	-0.8883	underperform	108
SF5	-0.8511	0.6560	9.8073	11.4298	-1.1004	<	-0.8883	underperform	108
SW2	-0.5221	0.6560	9.7760	11.4298	-0.7215	>	-0.8883	outperform	108
TNP	-0.6599	0.6560	10.8269	11.4298	-0.7332	>	-0.8883	outperform	108
RPF2	-0.4440	0.6560	10.4100	11.4298	-0.5517	>	-0.8883	outperform	108
SAN	-0.4807	0.6530	10.7851	11.4978	-0.5556	>	-1.0071	outperform	106
RKF	-0.1668	0.6518	9.1276	11.5679	-0.3856	>	-0.9122	outperform	103
THOR	-0.6813	0.6511	8.2728	11.5812	-1.2142	<	-1.0111	underperform	102
ONE-G	-0.4258	0.6511	9.0928	11.5812	-0.7206	>	-1.0111	outperform	102
ONE-D	-0.2606	0.6511	8.8936	11.5812	-0.5361	>	-1.0111	outperform	102
SCBMF	-0.7489	0.6500	9.3791	11.6389	-1.0860	<	-1.0071	underperform	101
PPSD	-0.3393	0.6457	8.5252	11.7215	-0.7086	>	-1.2088	outperform	97
THOR2	-0.6392	0.6457	8.5583	11.7215	-1.1142	>	-1.2088	outperform	97
RRF1	-1.6791	0.6449	11.8620	11.7937	-1.6657	<	-1.3542	underperform	95
ONE-WE	-0.7163	0.6437	9.1450	11.9634	-1.1355	>	-1.2438	outperform	92
ONE-FF	-0.4157	0.6736	8.4537	11.9919	-0.8716	>	-1.2086	outperform	91*
RKF2	-0.5284	0.6424	9.4158	12.1226	-0.8650	>	-1.3908	outperform	89
SCBMF2	-1.5222	0.6420	10.0782	12.1801	-1.9736	<	-1.4479	underperform	88
SCBMF3	-1.7945	0.6415	9.8668	12.2458	-2.3819	<	-1.4847	underperform	87
ONE-PRO	-1.0677	0.6415	9.9610	12.2458	-1.4598	>	-1.4847	outperform	87
ONE-UB	-1.0658	0.6415	9.5761	12.2458	-1.5417	<	-1.4847	underperform	87
ONE-UB2	-1.1675	0.6417	9.4871	11.9674	-1.6405	>	-1.7955	outperform	86
STD	-2.0718	0.6417	10.2217	11.9674	-2.5352	<	-1.7955	underperform	86
SCIF	-2.0475	0.6417	9.7795	11.9674	-2.6492	<	-1.7955	underperform	86
RKF3	-1.2266	0.6417	8.3857	11.9674	-2.0246	<	-1.7955	underperform	86
SCBTS	-1.8821	0.6417	7.5533	11.9674	-3.3569	<	-1.7955	underperform	86
NPAT-PRO	-1.3126	0.6419	9.1894	12.0228	-1.9153	<	-1.8612	underperform	85
SCBTS2	-1.8514	0.6419	7.3232	12.0228	-3.4515	<	-1.8612	underperform	85
ONE+1	-1.3153	0.6419	8.9794	12.0228	-1.9786	<	-1.8612	underperform	85
ONE-UB3	-1.4293	0.6419	9.0308	12.0228	-2.1156	<	-1.8612	underperform	85
RKF-HI	-1.5269	0.6419	8.4155	12.0228	-2.4566	<	-1.8612	underperform	85
STD2	-2.3514	0.6419	9.5433	12.0228	-3.1291	<	-1.8612	underperform	85
USD2	-1.1119	0.6419	9.5161	12.0228	-1.5738	>	-1.8612	outperform	85
USD	-1.1646	0.6419	9.4989	12.0228	-1.6446	>	-1.8612	outperform	85
BKA	-1.4720	0.6419	10.2905	12.0228	-1.8278	>	-1.8612	outperform	85
KPLUS	-1.4488	0.6428	9.1557	11.7235	-2.0355	>	-2.1819	outperform	84
KPLUS2	-1.4595	0.6428	9.1279	11.7235	-2.0573	>	-2.1819	outperform	84
ONE-FAS	-1.5380	0.6428	9.2387	11.7235	-2.1245	>	-2.1819	outperform	84
SCIF2	-1.9725	0.6428	9.4528	11.7235	-2.6007	<	-2.1819	underperform	84
SCBPG	-1.9624	0.6428	7.6666	11.7235	-3.3410	<	-2.1819	underperform	84
ONE-PR	-1.3022	0.6428	9.0670	11.7235	-1.8721	>	-2.1819	outperform	84
AGF	-2.0316	0.6428	10.1199	11.7235	-2.4554	<	-2.1819	underperform	84

name	Rp	R_f	Fund S.D.	Market S.D.	M^2	> or <	market return	performance	months
THANA1	-1.3084	0.6428	9.0011	11.7235	-1.8985	>	-2.1819	outperform	84
SCBTS3	-1.7526	0.6443	7.7843	11.7539	-2.9749	<	-2.0755	underperform	83
SCBMF4	-2.2506	0.6443	9.6208	11.7539	-2.8924	<	-2.0755	underperform	83
BKA2	-1.6804	0.6457	9.7598	11.8181	-2.1710	<	-2.0276	underperform	82
UNF	-2.0289	0.6457	10.7528	11.8181	-2.2939	<	-2.0276	underperform	82
ONE-UB4	-1.3438	0.6457	8.8915	11.8181	-1.9986	>	-2.0276	outperform	82
TDF	-1.4231	0.6457	9.4799	11.8181	-1.9334	>	-2.0276	outperform	82
CMICRK	-1.3104	0.6457	8.5783	11.8181	-2.0492	<	-2.0276	underperform	82
THOR 4	-1.3019	0.6466	8.1931	11.8549	-2.1727	<	-1.9250	underperform	81
SPF	-1.7861	0.6466	9.7227	11.8549	-2.3196	<	-1.9250	underperform	81
TS	-1.8287	0.6466	10.4626	11.8549	-2.1581	<	-1.9250	underperform	81
SF7	-2.2550	0.6480	11.1455	11.9430	-2.4627	<	-2.0718	underperform	79
KKF	-1.2713	0.6482	10.8577	12.0082	-1.4747	>	-2.0115	outperform	78
BKD	-1.9389	0.6482	9.8988	12.0082	-2.4902	<	-2.0115	underperform	78
SCBMF5	-2.5391	0.6482	9.6946	12.0082	-3.2997	<	-2.0115	underperform	78
RKF4	-1.6320	0.6482	8.3861	12.0082	-2.6168	<	-2.0115	underperform	78
SCDF	-1.9789	0.6482	10.0958	12.0082	-2.4765	<	-2.0115	underperform	78
DE-1	-2.2227	0.6479	10.7546	12.0486	-2.5681	<	-2.1197	underperform	77
SCBDA	-2.7821	0.6475	10.6351	12.0985	-3.2540	<	-2.2163	underperform	76
BTP	-1.7762	0.6472	9.5756	12.1681	-2.4324	<	-2.2776	underperform	75
RKEC	-1.6087	0.6455	8.8976	12.2855	-2.4669	<	-2.2082	underperform	73
ASD	-1.8409	0.6455	9.2530	12.2855	-2.6558	<	-2.2082	underperform	73
TVF	-1.5693	0.6441	8.6555	12.3665	-2.5184	<	-2.2498	underperform	72
ONE-PF	-1.5429	0.6441	9.0907	12.3665	-2.3310	<	-2.2498	underperform	72
SCBRT	-2.1517	0.6441	9.0754	12.3665	-3.1656	<	-2.2498	underperform	72
SRT	-1.7366	0.6427	9.3943	12.4068	-2.4995	<	-2.1224	underperform	71
APF	-1.3311	0.6406	9.8760	12.4543	-1.8458	>	-2.2432	outperform	70
B-SUB	-2.0811	0.6406	10.2542	12.4543	-2.6650	<	-2.2432	underperform	70
BMBF	-2.5110	0.6367	9.9168	12.5363	-3.3425	<	-2.1862	underperform	69
SF8	-2.6259	0.6367	11.0915	12.5363	-3.0509	<	-2.1862	underperform	69
SCBPMO	-2.4568	0.6330	8.3387	12.6281	-4.0462	<	-2.2086	underperform	68
SPT	-2.2514	0.6330	9.5879	12.6281	-3.1660	<	-2.2086	underperform	68
BMF	-0.0392	0.7503	7.9692	10.7996	-0.3196	>	-1.8626	outperform	68*
PISD	-2.4382	0.6174	11.7601	12.8501	-2.7214	<	-2.5187	underperform	64
ONE-UB5	-1.1205	0.7353	8.7512	12.6646	-1.9504	<	-1.9233	underperform	60*
THOR 3	-1.4467	0.7597	7.7847	12.0046	-2.6428	<	-2.5881	underperform	60*
ONEUB-G	-1.0635	0.6548	9.6175	13.2350	-1.7099	>	-2.4681	outperform	59*
RKEDC	-2.2617	0.5678	10.3632	14.3185	-3.3416	<	-2.4973	underperform	51
BCAP	-1.9554	0.5645	12.0395	14.4658	-2.4632	>	-2.5213	outperform	49
AJFSCAP	-0.1937	0.5424	10.8353	15.3177	-0.4982	>	-1.6047	outperform	42
NSG	-0.6443	0.5424	13.1763	15.3177	-0.8371	>	-1.6047	outperform	42
N_SAFETY	-1.6077	0.7963	6.8466	9.1680	-2.4228	>	-3.5292	outperform	35*
INGTEF	-3.6063	0.3358	9.3527	10.6589	-4.1569	<	-2.6720	underperform	20
mean[(a)]	-1.4729	0.6428	9.5180	12.0543	-2.0550	-	**-1.8506**	-	-

(a) Interpretation of the mean values in this table warrants caution because funds do not have the same time horizon (numbers of observations (months) vary).

* Funds terminated before December 2000

Since there is the limitation that the 86 funds have varying life spans, interpretation of the mean values in the last row of Table 4.6 warrants caution. The mean values under this limitation report that the mean M^2 measure is - 2.0550, whilst the mean market return is - 1.8506. In fact, 53 funds of the 86 funds underperformed the market benchmark.

The relationship between the M^2 investment performance and its relevant measure of risk, standard deviation (S.D.), will be presented in section 4.3.4.

4.1.7 Fund performance as measured by non risk-adjusted performance measure (rate of return)

Non risk-adjusted performance in this section is defined by rate of return (per cent per month). An average rate of return for each fund is estimated utilising the geometric average return (3.3.2). Table 4.7 exhibits that 75 of 86 funds, which existed during the period January 1992 to December 2000, had rate of return higher than the market rate of return. This indicates that the majority of the Thai equity funds outperformed the market portfolio.

Since there is the limitation that the 86 funds have varying life spans, interpretation of the mean values in the last row of Table 4.7 warrants caution. The mean values under this limitation report that the mean rate of return of funds is -1.9319, whilst the mean rate of return of the market is -2.5560.

Table 4.7 Rate of return of Thai equity funds (% per month), 1992-2000

Name	Fund return (%)	> or <	Market return (%)	performance	months	Name	Fund return (%)	> or <	Market return (%)	performance	months
SSB	-1.3269	>	-1.5230	outperform	108	THANA1	-1.7138	>	-2.8485	outperform	84
SF4	-1.2376	>	-1.5230	outperform	108	SCBTS3	-2.0621	>	-2.7456	outperform	83
SF5	-1.3236	>	-1.5230	outperform	108	SCBMF4	-2.7352	>	-2.7456	outperform	83
SW2	-0.9956	>	-1.5230	outperform	108	BKA2	-2.1686	>	-2.7052	outperform	82
TNP	-1.2418	>	-1.5230	outperform	108	UNF	-2.6162	>	-2.7052	outperform	82
RPF2	-0.9788	>	-1.5230	outperform	108	ONE-UB4	-1.7402	>	-2.7052	outperform	82
SAN	-1.0599	>	-1.6486	outperform	106	TDF	-1.8699	>	-2.7052	outperform	82
RKF	-0.5753	>	-1.5610	outperform	103	CMICRK	-1.6803	>	-2.7052	outperform	82
THOR	-1.0204	>	-1.6608	outperform	102	THOR 4	-1.6335	>	-2.6070	outperform	81
ONE-G	-0.8372	>	-1.6608	outperform	102	SPF	-2.2663	>	-2.6070	outperform	81
ONE-D	-0.6518	>	-1.6608	outperform	102	TS	-2.3881	>	-2.6070	outperform	81
SCBMF	-1.1851	>	-1.6632	outperform	101	SF7	-2.8866	<	-2.7630	underperform	79
PPSD	-0.7057	>	-1.8731	outperform	97	KKF	-1.8471	>	-2.7104	outperform	78
THOR2	-0.9929	>	-1.8731	outperform	97	BKD	-2.4381	>	-2.7104	outperform	78
RRF1	-2.3873	<	-2.0258	underperform	95	SCBMF5	-3.0307	<	-2.7104	underperform	78
ONE-WE	-1.1294	>	-1.9351	outperform	92	RKF4	-1.9852	>	-2.7104	outperform	78
ONE-FF	-0.7739	>	-1.9025	outperform	91*	SCDF	-2.4980	>	-2.7104	outperform	78
RKF2	-0.9578	>	-2.0993	outperform	89	DE-1	-2.8112	>	-2.8225	outperform	77
SCBMF2	-2.0195	>	-2.1626	outperform	88	SCBDA	-3.3568	<	-2.9241	underperform	76
SCBMF3	-2.2795	<	-2.2068	underperform	87	BTP	-2.2448	>	-2.9930	outperform	75
ONE-PRO	-1.5551	>	-2.2068	outperform	87	RKEC	-2.0036	>	-2.9371	outperform	73
ONE-UB	-1.5178	>	-2.2068	outperform	87	OSA	-2.2733	>	-2.9371	outperform	73
ONE-UB2	-1.6115	>	-2.4877	outperform	86	TVF	-1.9399	>	-2.9878	outperform	72
STD	-2.5910	<	-2.4877	underperform	86	ONE-PF	-1.9573	>	-2.9878	outperform	72
SCIF	-2.5304	<	-2.4877	underperform	86	SCBRT	-2.5711	>	-2.9878	outperform	72
RKF3	-1.5785	>	-2.4877	outperform	86	SRT	-2.1817	>	-2.8654	outperform	71
SCBTS	-2.1734	>	-2.4877	outperform	86	APF	-1.8044	>	-2.9908	outperform	70
NPAT-PRO	-1.7347	>	-2.5592	outperform	85	B-SUB	-2.6200	>	-2.9908	outperform	70
SCBTS2	-2.1269	>	-2.5592	outperform	85	BMBF	-3.0095	<	-2.9439	underperform	69
ONE+1	-1.7187	>	-2.5592	outperform	85	SF8	-3.2506	<	-2.9439	underperform	69
ONE-UB3	-1.8371	>	-2.5592	outperform	85	SCBPMO	-2.8131	>	-2.9771	outperform	68
RKF-HI	-1.8844	>	-2.5592	outperform	85	SPT	-2.7161	>	-2.9771	outperform	68
STD2	-2.8155	<	-2.5592	underperform	85	BMF	-0.3404	>	-2.4370	outperform	68*
USD2	-1.5517	>	-2.5592	outperform	85	PISD	-3.1497	>	-3.3122	outperform	64
USD	-1.6032	>	-2.5592	outperform	85	ONE-UB5	-1.4935	>	-2.6865	outperform	60*
BKA	-2.0025	>	-2.5592	outperform	85	THOR 3	-1.7386	>	-3.2744	outperform	60*
KPLUS	-1.8613	>	-2.8485	outperform	84	ONEUB-G	-1.5219	>	-3.3077	outperform	59*
KPLUS2	-1.8690	>	-2.8485	outperform	84	RKEDC	-2.7946	>	-3.4757	outperform	50
ONE-FAS	-1.9648	>	-2.8485	outperform	84	BCAP	-2.6860	>	-3.5192	outperform	49
SCIF2	-2.4256	>	-2.8485	outperform	84	AJFSCAP	-0.7717	>	-2.7223	outperform	42
SCBPG	-2.2623	>	-2.8485	outperform	84	NSG	-1.4745	>	-2.7223	outperform	42
ONE-PR	-1.7132	>	-2.8485	outperform	84	N_SAFETY	-1.8403	>	-3.9568	outperform	35*
AGF	-2.5550	>	-2.8485	outperform	84	INGTEF	-4.0534	<	-3.2342	underperform	20
						mean(a)	-1.9319		-2.5560		

(a) Interpretation of the mean values is this table warrants caution because funds do not have the same time horizon (number of observation (months) vary).

* Funds terminated before December 2000.

4.1.8 Annual performance of Thai equity funds, 1992-2000

Table 4.8 shows results of annual performance, a measure of short-term investment performance of Thai equity funds. All four risk-adjusted performance measures, Panels A, B, C and D, reveal similar results that the performance of Thai equity funds in year 1992, 1993, 1994, 1995, 1996, 1997 and 2000 outperformed the market portfolio. However, the performance of Thai equity funds in year 1998 and 1999 underperformed the market portfolio. These results imply that funds, which were held by investors for one year (buy at the beginning of a year and sell at the end of that year) outperformed the market portfolio in each year from 1992 to 1997 and 2000, excepting 1998 and 1999. A possible explanation of the underperformance in years 1998 and 1999 may be that the fund performances in these two years were effected by a severe financial crisis during which the economy collapsed in 1997.

Table 4.8 Annual performance of Thai equity funds, 1992- 2000[2]

year	funds	market portfolio	performance	funds	market portfolio	performance
Panel A: Treynor				***Panel B: Sharpe***		
1992	1.6248	1.2608	outperformed	0.1874	0.1590	outperformed
1993	5.7714	4.6138	outperformed	0.5303	0.4450	outperformed
1994	-1.5746	-2.4095	outperformed	-0.2034	-0.3416	outperformed
1995	-1.2547	-1.3541	outperformed	-0.1882	-0.2062	outperformed
1996	-3.8440	-4.3235	outperformed	-0.6761	-0.7751	outperformed
1997	-7.3020	-7.8643	outperformed	-0.5149	-0.6108	outperformed
1998	-2.7868	-0.7877	underperformed	-0.1109	-0.0372	underperformed
1999	0.9708	2.1243	underperformed	0.0745	0.1680	underperformed
2000	-4.9825	-5.1586	outperformed	-0.5729	-0.6104	outperformed
Panel C: Jensen				***Panel D: M^2***		
1992	0.0028	0	outperformed	2.2275	2.0022	outperformed
1993	0.0106	0	outperformed	6.1611	5.2766	outperformed
1994	0.0069	0	outperformed	-0.7998	-1.7745	outperformed
1995	0.0006	0	outperformed	-0.3823	-0.5005	outperformed
1996	0.0047	0	outperformed	-3.0062	-3.5581	outperformed
1997	0.0083	0	outperformed	-5.8505	-7.0848	outperformed
1998	-0.0097	0	underperformed	-0.9276	-0.0227	underperformed
1999	-0.0081	0	underperformed	0.6123	2.5200	underperformed
2000	0.0020	0	outperformed	-4.2036	-4.8530	outperformed
Panel E: Rate of returns (% per month)					*Number of funds*	
1992	1.8171	1.7096	outperformed		6	
1993	5.6459	4.8338	outperformed		16	
1994	-1.0568	-2.0079	outperformed		47	
1995	-0.3775	-0.6948	outperformed		74	
1996	-3.2129	-3.7056	outperformed		81	
1997	-5.1758	-7.8712	outperformed		82	
1998	-1.4271	-1.9276	outperformed		82	
1999	0.7415	1.7870	underperformed		81	
2000	-4.9578	-5.2129	outperformed		80	

[2] Details on annual performance rankings of Thai equity funds are presented in Appendix G.

Although the SET Index started a sharp decline in 1996 and the economic crisis is identified at July 1997, the performance of Thai equity funds in 1996 and 1997 was superior to the market. This indicates that fund managers did a good job in these two years. However, in 1998 and 1999, it is possible that the fund managers could not resist the effect of the crisis and therefore the performance of equity funds was inferior to the performance of the market portfolio.

Panel E of Table 4.8 shows that when funds were measured in terms of the non risk-adjusted performance (rate of return), the performance of Thai equity funds in 1992, 1993, 1994, 1995, 1996, 1997, 1998 and 2000 outperformed the market portfolio. However, the performance of Thai equity funds in year 1999 underperformed the market portfolio. This shows that results on fund performances as measured by risk-adjusted and non risk-adjusted techniques are mostly similar, excepting the result of the year 1998.

The inconclusive results are that the risk-adjusted performance measures report that, in 1998, an average performance of Thai funds underperformed the market portfolio but the rate of return reported that funds outperformed the market. A possible explanation of the inconclusive results is the degree of risk that Thai funds are associated. The following Table exhibits a summary statistical value of total risk (S.D.) and systematic risk (beta) for every year from 1992 to 2000. This makes explicit the degree of risk to which Thai funds and the Thai market were exposed.

Table 4.9 Summary of average values total risk (S.D.) and systematic risk (beta), 1992-2000

year	S.D. of funds	S.D. of the market	beta of funds	beta of the market	number of funds
1992	7.0346	7.9284	0.8078	1	6
1993	10.1903	10.3682	0.9433	1	16
1994	6.7919	7.0533	0.8812	1	47
1995	5.7870	6.5680	0.8320	1	74
1996	5.6590	5.5782	0.9956	1	81
1997	10.7743	12.8757	0.8024	1	82
1998	13.5342	21.1525	0.5333	1	82
1999	9.8281	12.6447	0.8013	1	81
2000	8.9061	8.4506	0.9857	1	80

Theoretically, the higher beta value characterizes a fund that is more sensitive to market returns and that has greater systematic risk. The fourth column of Table 4.9 reports average beta values of funds in each year. It is noticed that all beta values are less than the beta value of the market portfolio, which always equal to 1. This indicates that fund managers intended to get lower systematic risk than the market portfolio.

In the year 1998, the lowest average beta value of funds is found at 0.5333. Compared to the prior year, the beta in 1997 is higher than the beta in 1998, indicating that fund managers attempted to reduce the systematic risk in their portfolios from 0.8024 in 1997 to 0.5333 in 1998. It is possible that fund managers attempted to reduce risk as much as possible due to the financial crisis. However, the average total risk (S.D.) of funds in 1998 was very high at 13.5342, which is the highest value comparing to other years. These contrast results imply that although fund managers attempted to reduce systematic risk, a high degree of total risk still remained in funds. In other words, in

1998 the Thai equity funds appeared to contain substantial unsystematic risk[3], more than any other years.

In sum, although the non risk-adjusted performance measure which expresses only return rate (ignoring risk), reports the result of outperfoming of funds in year 1998, all risk-adjusted measures claim that the performance of Thai funds in that year was inferior to the market portfolio. The inconclusive result could be due to a very high total risk of the Thai funds in 1998.

Since some fund management companies in Thailand provide information by reporting only the rate of return, the inconclusive results above raise one suggestion that it would be better for investors to consider fund performance information not only rate of return but also risk-adjusted performance information.

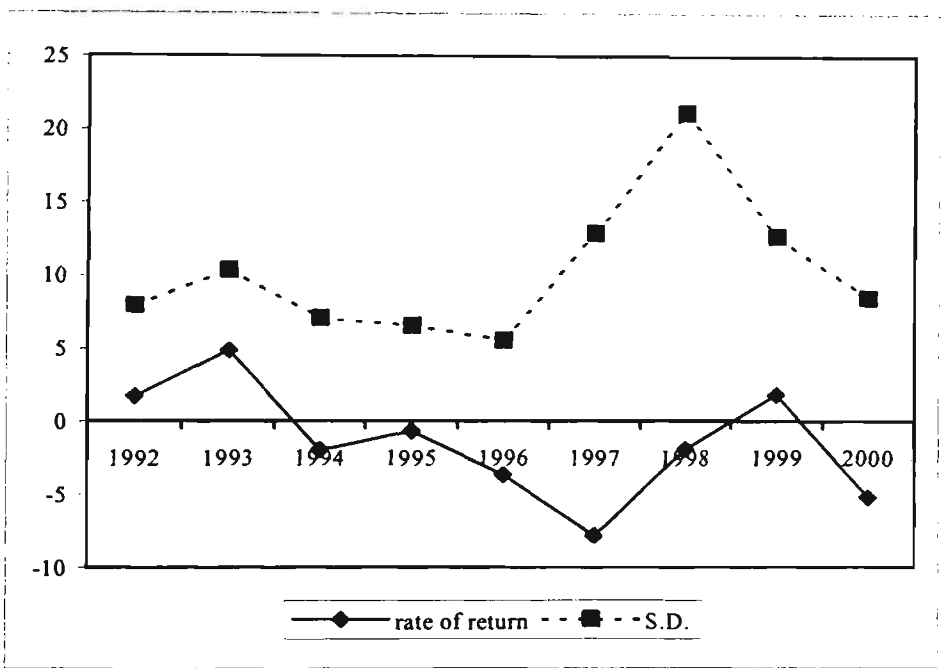
Another point should be considered in this section is that the overall performance of Thai fund during nine-year period, 1992-2000 underperformed relative to the SET index (see 4.1.1). However, when funds are measured for each year, the risk-adjusted performance results exhibit that Thai fund performance outperformed the market portfolio for 7 years. An explanation is that an examination of annual performance result is a test for a short-term investment, assuming that investors buy funds at the beginning of a year and sell at the end of that year. But the examination of the nine-year period assumes that investors use the 'buy and hold strategy', which is buy funds at the beginning of 1992 (or since funds have issued into the market) and sell at the end of 2000. Therefore, the finding of different results is not surprising.

[3] Total risk = systematic risk + unsystematic risk

The performance of the Thai equity market

Another interesting result is the performance of the Thai equity market. Results of rate of return of the market portfolio (Table 4.8) and total risk (S.D.) of the market portfolio (Table 4.9) are presented in Figure 4.1 as line chart over 1992-2000 as follows.

Figure 4.1 Line chart of rate of return (% per month) and total risk (S.D.) of the Thai equity market, 1992 to 2000



The performance of the Thai equity market, which is the market portfolio of this study in Figure 4.1 shows that during 1992-1994 and 1999-2000, rate of return and total risk of the Thai market have a similar direction, namely, high risk - high return (or low risk -low return). In contrast, during the periods of pre and post economic crisis in Thailand (1996-1999), the risk and return of the Thai equity market demonstrated performance in terms of 'high risk-low return'. This appears that the words 'high risk-high return' could not be applied for the period of recession.

4.1.9 Fund diversification and R^2

A further point to note is the R^2 estimate. The R^2 value for returns of funds compared with the market benchmark, can serve as a measure of fund diversification (Shawsky 1982, Reilly and Brown 2000). The more completely diversified the fund, the closer the R^2 is to 1.00. Table 4.10 exhibits R^2 results for all 86 funds existing during 1992-2000 sorted from the highest R^2 value to the lowest R^2 value.

Table 4.10 R^2 values, return of funds compared with SET index returns, 1992- 2000

Name	R^2	months	Name	R^2	months	Name	R^2	months
INGTEF	0.9338	20	ONE-UB4	0.8396	82	SCBMF4	0.7856	83
RPF2	0.9039	108	ONE-WE	0.8387	92	SCBPMO	0.7841	68
TNP	0.9035	108	APF	0.8381	70	RKF4	0.7788	78
DE-1	0.8992	77	ASD	0.8355	73	CMICRK	0.7755	82
SF7	0.8827	79	ONE-UB3	0.8326	85	RRF1	0.7697	95
SCDF	0.8802	78	BTP	0.8320	75	RKEC	0.7673	73
UNF	0.8788	82	SF4	0.8318	108	PISD	0.7665	64
SCIF	0.8776	86	THANAI	0.8315	84	RKF3	0.7647	86
TS	0.8681	81	NSG	0.8294	42	RKFHI	0.7611	85
SF8	0.8676	69	ONE-PR	0.8292	84	THOR2	0.7605	97
SAN	0.8654	106	ONE-UB	0.8248	87	SCBPG	0.7589	84
NPAT-PRO	0.8586	85	N_SAFETY	0.8241	35	RKEDC	0.7566	50
SF5	0.8569	108	SCBRT	0.8198	72	RKF2	0.7562	89
SW2	0.8566	108	KPLUS2	0.8117	84	SCBTS3	0.7456	83
BMBF	0.8551	69	SPT	0.8116	68	TVF	0.7426	72
SCIF2	0.8546	84	ONEUB-G	0.8115	59	THOR4	0.7352	81
SPF	0.8521	81	ONE-D	0.8104	102	SCBTS	0.7250	86
ONE-UB2	0.8517	86	KPLUS	0.8076	84	USD2	0.7207	85
ONE-FAS	0.8515	84	STD2	0.8068	85	SSB	0.7135	108
SRT	0.8501	71	TDF	0.8065	82	USD	0.7090	85
BKA	0.8496	85	SCBMF3	0.8059	87	THOR	0.6932	102
BKD	0.8456	78	ONE-FF	0.8016	91	SCBTS2	0.6869	85
BKA2	0.8451	82	SCBDA	0.8003	76	KKF	0.6865	78
ONE-UB5	0.8449	60	ONE-PRO	0.7999	87	SCBMF	0.6486	101
ONE-G	0.8425	102	ONE-PF	0.7991	72	THOR3	0.6438	60
AGF	0.8422	84	SCBMF5	0.7972	78	AJFSCAP	0.5471	42
STD	0.8422	86	RKF	0.7902	103	BMF	0.5257	68
ONE+1	0.8406	85	BCAP	0.7888	49	PPSD	0.5242	97
B-SUB	0.8402	70	SCBMF2	0.7886	88	average $R^{2\,(a)}$	0.7991	-

(a) Interpretation of the average values in this table warrants caution because funds have varying life spans.
* Funds terminated before December 2000

Although the average R^2 based on the data of this study is reasonably high at 0.7991, the range of R^2 values is large, from 0.5242 to 0.9338. This indicates that a number of these funds are not well diversified. Of the 86 funds, 32 had R^2 values lower than this average (accounted for 37.21 percent of the total number of funds). Again, the limitation needs to be noted that 86 funds have varying life spans.

4.1.10 Summary of fund performance, 1992-2000

All four risk-adjusted performance measures reveal similar results: that the performance of Thai equity funds during 1992-2000, on average, was different from that of the market. In particular, the evidence strongly suggests that the average performance of Thai equity funds was inferior to the market portfolio. In addition, the findings on the proportion of outperforming funds indicate that the majority of funds underperformed relative to the market benchmark.

However, when fund performance was measured in terms of non risk-adjusted performance (i.e. rate of return), average performance during 1992-200 was superior to the market benchmark, and the majority of the funds also outperformed the market portfolio.

Further, it is noted that all fund returns (R_p) were less than the risk-free rates (R_f), implying that investors who held risk-free assets during 1992-2000 gained higher returns than investors who subscribed to equity funds. In addition, beta values of all funds were less than one, indicating that the level of systematic risk in the equity fund industry was lower than that of the overall market. The standard deviation (the measure of total risk) of returns of all but one fund were less than the standard deviation of the market during the same time period, supporting the finding of the beta results.

Moreover, results from the Treynor measure revealed that 18 funds outperformed the market portfolio and these funds are the same funds that outperformed the market when performance was estimated by the Jensen measure. These 18 funds are a subset of the 33 funds that outperformed the market when funds were measured by the Sharpe ratio as well as by the M^2 measure. In addition, result of an examination of annual performance of Thai equity funds, which is an investigation for a short-term investment, was also reported. The four risk-adjusted performance measures reveal that the average performance of Thai equity funds outperformed the market portfolio for 7 years, excepting the year 1998 and 1999. Finally, R^2 values indicate that a significant proportion (37 per cent) of funds were not well diversified.

4.2 THAI EQUITY FUND PERFORMANCE IN TWO MARKET ENVIRONMENTS

This section presents the performance of equity funds in Thailand in two different market environments: an expansionary market environment and a contractionary market environment. The expansionary market period is January 1992 - January 1996; and the contractionary market period is February 1996 - December 2000. Results of fund performance in the expansionary and contractionary market periods are presented in 4.2.1 and 4.2.2 respectively. A summary of fund performance in the two market environments is presented in 4.2.3.

4.2.1 Fund performance in the expansionary market environment

This section is concerned with hypotheses $H_{02.1}$, $H_{02.1(a)}$, $H_{02.2}$, and $H_{02.2(a)}$ (see 3.1.1), and presents the results of the performance of equity funds during the expansionary market environment. Average fund performance and the proportion of outperforming funds will be investigated.

4.2.1.1 Average fund performance in the expansionary market environment

As stated in 3.5.2, for the Treynor measure, Sharpe ratio, M^2 and rate of return, a paired (dependent) *t*-test is employed to compare the means of the paired differences between fund and market performance. In the case for the Jensen alpha, a one-sample *t*-test is used to test whether the mean of Jensen alpha differs from zero.

Table 4.11 Thai equity fund performance, expansionary market environment, January 1992 - January 1996

measure	mean (paired) differences[a]	std. error	*t*-stat	*p*-value (2-tail)	*p*-value (1-tail)	n	reject / not reject	
							$H_{02.1}$	$H_{02.1(a)}$
Treynor	0.4962	0.0852	5.8184	0.0000*	0.0000*	81	rej	rej
Sharpe	0.0692	0.0116	5.9874	0.0000*	0.0000*	81	rej	rej
Jensen	0.4141	0.0546	7.5791	0.0000*	0.0000*	75[b]	rej	rej
M^2	0.4914	0.0745	6.5926	0.0000*	0.0000*	81	rej	rej
Rate of return	0.5581	0.0656	8.5055	0.0000*	0.0000*	81	rej	rej

(a) Mean paired differences statistics are reported for the Treynor measure, Sharpe ratio, M^2 and rate of return. Mean difference statistic is reported for the Jensen measure.
(b) Number of funds as measured by Jensen Alpha remains 75 funds (6 funds are excluded because they fall into the inconclusive region when tested for serial correlation (Durbin-Watson statistic)).
* significant at the 0.01 level

(i) Risk-adjusted performance measures

Table 4.11 shows that the means of the paired differences between fund and market performance, as measured by the Treynor, Sharpe, and M^2 measures, are positive (0.4962, 0.0692, 0.4914 respectively) and significant (at the 5 per cent level). The mean fund performance as measured by the Jensen alpha is also higher than the market (0.4141 > 0) and significant.

Null hypothesis 2.1 ($H_{02.1}$) for the first stage hypothesis test is that the average performance of Thai equity funds during the expansionary market environment is not different from that of the market. Since *p*-values (2-tail test) in the cases of risk-adjusted measures are less than 0.05, this hypothesis is rejected at the 5 per cent level and the alternative hypothesis is accepted that the performance of Thai equity funds is different from the market performance.

Since the null first-stage hypothesis ($H_{02.1}$) is rejected and the direction is *positive*, the second stage hypothesis, $H_{02.1(a)}$, is tested. Null Hypothesis 2.1(a) is that the average performance of Thai equity funds during the expansionary market period is not superior to that of the market (one-tail (right) test). The *p* values for the *t*-test associated with the Treynor, Sharpe, Jensen and M^2 measures are all lower than 0.05 (0.00 < 0.05), and the *t*-values are positive. Null hypothesis $H_{02.1(a)}$ is rejected (at the 5 per cent level). The average performance of Thai equity funds during the expansionary market period is *superior* to the market benchmark[4].

[4] The results of individual fund performances in the expansionary market environment, as measured by the Treynor, Sharpe, Jensen, M^2 and rate of return measures, are shown in Appendix B.

(ii) Non risk-adjusted performance measure

Results from the non risk-adjusted performance measure, rate of return (per cent per month) show that the null hypothesis 2.1 ($H_{02.1}$) for the first stage hypothesis is rejected at the 5 per cent level. The performance of Thai equity funds as measured by rate of return is significantly different from that of the market.

Since the null first-stage hypothesis ($H_{02.1}$) is rejected and the direction is *positive*, the second-stage hypothesis, $H_{02.1(a)}$, is tested that the average performance of Thai equity funds during the expansionary market environment is not above that of the market (one-tail (right) test). The *p*-values for the *t*-test associated with the rate of return is lower than 0.05 and *t*-value is positive at 8.51. The hypothesis is rejected (at the 5 per cent level). The average performance of Thai equity funds as measured by rate of return during expansionary market environment is *superior* to the market benchmark.

In summary, the results from all four risk-adjusted and the non risk-adjusted measures are consistent, and reveal that the average performance of Thai equity funds significantly outperformed the Thai market portfolio during the expansionary market period, January 1992 - January 1996.

4.2.1.2 Proportion of outperforming funds in the expansionary market environment

Table 4.12 shows the numbers and percentages of outperforming and underperforming funds as measured by the Treynor, Sharpe, Jensen, M^2 and rate of return measures. Again, for each performance measure the binomial test is used to evaluate the proportion of outperforming funds. Two-stage hypotheses will be tested to determine, firstly, whether half of the funds outperformed the market benchmark; and secondly, the direction of that difference if the proportion of funds that outperformed the market was different from half.

Table 4.12 Numbers and percentages of outperforming and underperforming funds in expansionary market environment, January 1992 - January 1996

measure	outperforming funds		underperforming funds		*Z*-stat	*p*-value (2-tail)	*p*-value (1-tail)	reject / not reject H_o	
	number[(a)]	%	number	%				$H_{02.2}$	$H_{02.2(a)}$
Treynor	61	75.31	20	24.69	4.5556	0.0000*	0.0000*	rej	rej
Sharpe	60	74.07	21	25.93	4.3333	0.0000*	0.0000*	rej	rej
Jensen	59	78.67	16	21.33	4.9652	0.0000*	0.0000*	rej	rej
M^2	60	74.07	21	25.93	4.3333	0.0000*	0.0000*	rej	rej
Rate of return	68	83.95	13	16.05	6.111	0.0000*	0.0000*	rej	rej

(a) Number of funds as measured by Treynor, Sharpe, M^2, and rate of return is 81 funds.
Number of funds as measured by Jensen Alpha is 75 funds (6 funds are excluded because they fall into the inconclusive region when tested for serial correlation (Durbin-Watson statistic)).
* significant at the 0.01 level

(i) Risk-adjusted performance measures

The null hypothesis 2.2 ($H_{02.2}$), the first stage hypothesis, is that during the expansionary market period half of the total number of Thai equity funds outperformed the market benchmark (two-tail test). Since *p*-values (2-tail test) in the cases of risk-adjusted measures are less than 0.05, the null hypothesis is rejected at the 0.05 significance level. The proportion of Thai equity funds that outperformed the market benchmark is significantly different from 50 per cent of the total number of funds.

Since the null hypothesis for the first stage of the test is rejected and the direction is *positive*, the second stage hypothesis, ($H_{02.2(a)}$), is tested. Null hypothesis 2.2(a) is that during the expansionary market period, 50 per cent (or fewer) of the total number of

Thai equity funds outperformed the market benchmark (one-tail (right) test). Again, p-values in all four cases are less than 0.05 and Z-values are positive. The null hypothesis is rejected at the 5 per cent level. During the expansionary market period, more than 50 per cent of the total number of Thai equity funds *outperformed* the market portfolio.

(ii) Non risk-adjusted performance measure

Results from the non risk-adjusted performance measure, rate of return, show that the first stage null hypothesis ($H_{02.2}$) is rejected at the 5 per cent level. The proportion of outperforming funds was significantly different from half of the total number of Thai equity funds during expansionary market environment.

Since the null hypothesis for the first stage of the test is rejected and the direction is *positive*, the second-stage null hypothesis, $H_{02.2(a)}$, is tested that during the expansionary market environment, 50 per cent (or less) of the total numbers of Thai equity funds outperformed the market benchmark (one-tail (right) test). Table 4.10 shows that the p-value for rate of return measure is less than 0.05 and the Z-value is positive at 6.11. The hypothesis is rejected at the 0.05 significance level. The majority of the Thai equity funds in terms of rate of return *outperformed* the market portfolio during expansionary market environment. This finding is consistent with the finding of the four major risk-adjusted performance measures that the majority of Thai equity fund outperformed the market during expansionary market period.

In sum, the evidences from both average fund performance (4.2.1.1) and proportion of outperforming funds (4.2.1.2) strongly indicate that during the expansionary market environment Thai equity funds achieved superior performance when compared to the market benchmark.

4.2.2 Fund performance in the contractionary market environment

This section presents the results of the performance of equity funds in Thailand during the contractionary market environment, February 1996- December 2000. Hypotheses $H_{03.1}$, $H_{03.1(a)}$, $H_{03.2}$, and $H_{03.2(a)}$ (see 3.1.1) are tested. Fund performance will be investigated by considering average performance and the proportion of outperforming funds.

4.2.2.1 Average fund performance in the contractionary market environment

According to 3.5.3, to measure fund performance and market performance by the Treynor measure, Sharpe ratio, M^2 and rate of return, a paired (dependent) *t*-test will be employed to compare the means of the paired differences between fund and market performance. Fund performance as measured by Jensen alpha will use a one-sample *t*-test to determine whether the mean of Jensen alpha differs from zero.

Table 4.13 Thai equity fund performance, contractionary market environment, February 1996 - December 2000

measure	mean (paired) differences[a]	std. error	*t*-stat	*p*-value (2-tail)	*p*-value (1-tail)	n	reject / not reject $H_{03.1}$	reject / not reject $H_{03.1(a)}$
Treynor	-1.2424	0.1077	-11.5308	0.0000*	0.0000*	86	rej	rej
Sharpe	-0.0524	0.0059	-8.8053	0.0000*	0.0000*	86	rej	rej
Jensen	-0.7756	0.0568	-13.6635	0.0000*	0.0000*	85[b]	rej	rej
M^2	-0.6941	0.0776	-8.9431	0.0000*	0.0000*	86	rej	rej
Rate of return	0.6608	0.0739	8.9370	0.0000*	0.0000*	86	rej	rej

(a) Mean paired differences statistics are reported for the Treynor measure, Sharpe ratio, M^2, and rate of return. Mean difference statistic is reported for the Jensen measure.
(b) Number of funds as measured by Jensen Alpha is 85 funds (1 fund is excluded because it falls into the inconclusive region when tested for serial correlation (Durbin-Watson statistic))
* significant at the 0.01 level

(i) Risk-adjusted performance measures

Table 4.13 shows that the mean values of the paired differences between fund performance and the market performance, as measured by the Treynor, Sharpe and M^2 measures, are negative (-1.24, - 0.05 and -0.69 respectively). Further, the mean fund performance as measured by the Jensen alpha is less than the market (-0.78 < 0). Again, two-stage hypotheses are tested.

Null hypothesis 3.1 ($H_{03.1}$), the first stage hypothesis, is that the average performance of Thai equity funds during the contractionary market period is not different from that of the market (two-tail test). This hypothesis ($H_{03.1}$) is rejected at the 0.05 significance level (p-values < 0.05): the performance of Thai equity funds as measured by risk-adjusted measures is different from that of the market.

Since the null hypothesis for the first stage of the test is rejected and the direction is *negative*, the second stage hypothesis, $H_{03.1(a)}$, is tested. Null hypothesis 3.1 (a) is that the average performance of Thai equity funds during the contractionary market period is not inferior to that of the market (one-tail (left) test). Since p-values in all four cases are less than 0.05 and t-values are negative, the hypothesis is rejected at the 0.05 significance level: the average performance of Thai equity funds during the contractionary market period is *inferior* to the market benchmark[5].

(ii) Non risk-adjusted performance measure

Results from the non risk-adjusted performance measure, rate of return, show that the null hypothesis 3.1 ($H_{03.1}$) for the first stage hypothesis is rejected at the 0.05 significance level. The performance of Thai equity funds as measured by rate of return is significantly different from that of the market.

Since the null first-stage hypothesis ($H_{03.1}$) is rejected and the direction is *positive*, the second-stage hypothesis, $H_{03.1(a)}$, is tested that the average performance of Thai equity funds during the contractionary market environment is not above that of the market (one-tail (right) test). The p-values for the t-test associated with the rate of return is lower than 0.05 and t-value is positive at 8.93. The hypothesis is rejected (at the 5 per cent level). The average performance of Thai equity funds as measured by rate of return during contractionary market environment *outperformed* that of the market.

In summary, all four risk-adjusted measures reveal that the average performance of Thai equity funds significantly underperformed relative to the performance of the Thai market portfolio during the contractionary market environment, February 1996 -

[5] The results of individual fund performances in the contractionay market environment, as measured by the Treynor, Sharpe, Jensen, M^2 and rate of return measures, are shown in Appendix C

December 2000. However, the non risk-adjusted measure reveals that the average performance of Thai funds outperformed the market portfolio.

The finding of different results from risk-adjusted and non risk-adjusted measures is, again, not surprising because they are different measures. The risk-adjusted performance measures express fund excess return per unit of risk while rate of return expresses only a rate of return (disregarding risk).

4.2.2.2 Proportion of outperforming funds in the contractionary market environment

Table 4.14 shows the numbers and percentages of outperforming and underperforming funds as measured by the Treynor, Sharpe, Jensen, M^2 and rate of return measures. For each of the five performance measures the binomial test is used to evaluate the proportion of outperforming funds. Two-stage hypotheses are tested to determine whether half of Thai equity funds during the contractionary market environment outperformed the market benchmark. If the proportion of funds outperforming the market was significantly different from half, the second stage hypothesis will be tested to see whether the majority of funds outperformed the market benchmark.

Table 4.14 Numbers and percentages of outperforming and underperforming funds in contractionary market environment, February 1996 - December 2000

measure	outperforming funds		underperforming funds		Z-stat	p-value (2-tail)	p-value (1-tail)	reject / not reject H_o	
	number[(a)]	%	number	%				$H_{03.2}$	$H_{03.2(a)}$
Treynor	6	6.98	80	93.02	-7.9796	0.0000*	0.0000*	rej	rej
Sharpe	8	9.30	78	90.07	-7.5483	0.0000*	0.0000*	rej	rej
Jensen	6	7.05	79	92.95	-7.9180	0.0000*	0.0000*	rej	rej
M^2	8	9.30	78	90.07	-7.5483	0.0000*	0.0000*	rej	rej
Rate of return	73	84.88	13	15.12	6.4700	0.0000*	0.0000*	rej	rej

(a) Number of funds as measured by Treynor, Sharpe, M^2, and rate of return is 86 funds.
Number of funds as measured by Jensen Alpha is 85 funds (one fund is excluded because it fall into the inconclusive region when tested for serial correlation (Durbin-Watson statistic))

* significant at the 0.01 level

(i) Risk-adjusted performance measures

Null hypothesis 3.2 ($H_{03.2}$), the first stage hypothesis, is that during the contractionary market period half of the total number of Thai equity funds outperformed the market benchmark (two-tail test). Since *p*-values in all four risk-adjusted measures are less than 0.05, the hypothesis is rejected at the 0.05 significance level. The proportion of Thai equity funds that outperformed the market benchmark was not equal to 50 per cent of the total number of funds.

Since the null hypothesis for the first stage of the test is rejected and the direction is *negative*, the second stage hypothesis, ($H_{03.2(a)}$), is tested. Null hypothesis 3.2(a) is that during the contractionary market environment, 50 per cent (or more) of the total number of Thai equity funds outperformed the market benchmark (one-tail (left) test). Since *p*-values in all four cases of risk-adjust measures are less than 0.05 and *Z*-values are negative, the hypothesis is rejected at the 0.05 significance level. During the contractionary market environment, the majority of the Thai equity funds in terms of risk-adjusted performance measures *underperformed* the market portfolio.

(ii) Non risk-adjusted performance measure

Results of non risk-adjusted measure (rate of return) in Table 4.14 show that the first stage null hypothesis ($H_{03.2}$) is rejected at the 5 per cent level. The proportion of Thai equity funds during the contractionary market environment that outperformed the market benchmark was significantly different from half of the total number of funds.

Since the null hypothesis for the first stage of the test is rejected and the direction is *positive*, the second-stage null hypothesis, $H_{03.2(a)}$, is tested that during the contractionary market environment, 50 per cent (or less) of the total numbers of Thai equity funds outperformed the market benchmark (one-tail (right) test). Table 4.14 shows that the p-value for the rate of return measure is less than 0.05 and the Z-value is positive at 6.47. The null hypothesis is rejected at the 0.05 significance level. The majority of the Thai equity funds in terms of rate of return *outperformed* the market portfolio during the contractionary market environment.

In summary, the four risk-adjusted measures show that the majority of Thai equity funds underperformed the market benchmark during the contractionary market environment, February 1996 - December 2000. However, when funds were measured in terms of rate of return, the majority of the funds achieved superior performance when compared to the market benchmark. Again, the finding of different results from non risk-adjusted and risk-adjusted performance measures is noted.

The differential performance in the two sub-periods

During the expansionary market environment, January 1992- January 1996, the performance of Thai equity funds outperformed the market portfolio. In contrast, during the contractionary market environment, February 1996 - December 2000, all four risk-adjusted measures indicate that the performance of Thai equity funds underperformed relative to the market benchmark. The following Table exhibits figures of average excess returns, beta and standard deviation of the Thai equity funds and the market portfolio in the two sub-periods.

Table 4.15 **Average excess returns, beta, and standard deviation in the two sub-periods***

measures of testing	expansionary market environment (January 1992 - January 1996)		contractionary market environment (February 1996 - December 2000)	
	funds	market portfolio	funds	market portfolio
excess returns ($R_{p\ or\ m} - R_f$)	0.1783	-0.3421	-3.0880	-3.4136
beta (β)	0.8092	1	0.6776	1
standard deviation (σ, S.D.)	6.5882	7.3396	10.1041	13.3250

* See Appendix B for more detail on fund performance in the expansionary market environment, and Appendix C for fund performance in the contractionary market environment.

Table 4.15 shows that the average beta (systematic risk) of all funds in the sample set reduced from 0.8092 in the expansionary market period to 0.6776 in the contractionary market period. It is possible that fund managers have different attitudes to risk in the different market environments. Since the average beta value in the first period is higher than the second period, this indicates that during the expansionary market environment, fund mangers had a more aggressive investment strategy than in the contractionary market environment. In other words, when the tremendous volatility of the economic crisis occurred, the fund managers changed investment strategy by reducing fund's risk by investing in more stable stocks and avoiding volatile stocks.

Table 4.15 also reports that the average standard deviation (total risk) of the funds increased from 6.5882 in the expansionary market period to 10.1041 in the contractionary market period. These results indicate that although fund managers attempted to reduce beta (systematic risk) in their portfolios, the S.D. (total risk) of those funds still increased in the contractionary market period. This seems to be that the changing of the market environment (due to the financial crisis) increased the volatility of returns.

A fact that happened to the Thai market during the contractionary market period is a possible explanation on the underperforming of the Thai funds, particularly when the funds are measured by the risk-adjusted performance measures. The contractionary market period covers a period of the bubble burst of the Thai economy. The stock market index, the SET Index, declined from 1321.87 points in January 1996 to 269.19 points in December 2000. As reported by the Association of Investment Management Companies (AIMC 1999), during the economic crisis, investors sold stocks in their portfolios at any price, especially foreign investors. Capital flowed out of the country. Liquidity was tight and interest rates increased. 56 finance companies, nearly half of the finance companies in Thailand, were ordered to suspend operations. Mutual fund holders were shocked and heavy redemption occurred. The redemption of mutual funds caused tremendous effects on the NAV of all Thai funds. All funds' NAV fell during the period. In addition, Table 4.15 shows that the average excess returns of funds gained a negative equity premium in the contractionary market period, indicating that fund return rates are lower than commercial bank deposit rates (it is a proxy of the risk-free rates in this study). This finding implies that the investors who held risk-free assets during the contractionary market period gained higher returns than investors who subscribed to equity funds.

Thailand is an emerging market and the capital market relatively under-developed. So long as the Thai capital market is not strong enough (which will effect the behaviour of equity market and therefore, the performance of equity funds), the differential fund performance in a rising and falling market may repeat in the future. In addition, if the regulators including the SEC and the central bank do not sufficiently revise their supervisory roles to match the increasing riskiness that such a system currently demonstrates, it would be difficult for the Thai equity fund industry to grow and to have a significant role in the progress and development of the Thai economy.

The differential performance results in the contractionary market environment when funds were measured by risk-adjusted and non-risk performance measures

As reported earlier, during the contractionary market environment, all four risk-adjusted measures reveal that the performance of Thai equity funds significantly underperformed relative to the performance of the Thai market portfolio. However, when funds were measured in terms of rate of return, the non risk-adjusted measure, the performance of Thai funds outperformed the market portfolio.

The finding of different results from risk-adjusted and non risk-adjusted measures is not surprising because they are different measures. The risk-adjusted performance measures excess fund return per unit of risk while rate of return expresses only a rate of return (disregarding risk).

As stated by Modigliani and Modigliani (1997, p.45), 'total return is an incomplete measure of the performance of a portfolio because it ignores risk. It is well known that investors can increase expected returns simply by accepting a greater level of risk, or uncertainty in the range of possible outcomes, implying a greater chance of loss'. This implies that consideration of fund performance information measured only by the rate of return may lead to an overstatement (or understatement, depending on the degree of risk that occurs in a fund) of fund performance.

The underlying idea of the risk-adjusted performance measures is that before comparing fund performance with market portfolio performance, the excess returns of the fund and the market portfolio should be adjusted to be in at a same risk level. This means that excess return of fund (and market portfolio) should be divided by its risk involved. Then the performance of a fund can be compared directly with the performance of the market portfolio.

To illustrate, as an example, Table 4.16 presents statistical values (excess return, beta, and standard deviation), rate of returns (% per month), and the performance of the four risk-adjusted performance measures of the RKF3 fund and the Thai market portfolio during the contractionary market period, February 1996- December 2000.

Table 4.16 **An example statistical values and the performances of the RKF3 fund compared to the Thai market portfolio during the contractionary market environment, February 1996 - December 2000***

measures	RKF3 fund	market portfolio	performance
rate of returns	-2.6218	-3.6129	outperform
excess returns ($R_{p\ or\ m} - R_f$)	-2.8437	-3.3661	-
beta (β)	0.5608	1	-
standard deviation (σ, **S.D.**)	8.6501	13.2868	-
Treynor measure[6]	(-2.8437 / 0.5608) = -5.0710	(-3.3661 / 1) = -3.3661	underperform
Sharpe ratio[7]	(-2.8437 / 8.6501) = -0.3287	(-3.3661 / 13.2868) = -0.2533	underperform
Jensen alpha[8]	-0.9548	0	underperform
M^2 measure[9]	-3.7698	-2.7679	underperform

* These results are drawn from Appendix C, reports detail of fund performance in the contractionary market environment, February 1996 - December 2000.

Table 4.16 shows that when funds was measured in terms of rate of return (ignoring risk), the RKF3 fund outperformed the market portfolio (-2.6218 > -3.6129). The excess return of the fund is also higher than the market portfolio (-2.8437 > -3.3661). If the fund holders ignore risk in the fund, these results seem to show a better performance of the fund than the market.

Based on the idea of the risk-adjusted performance measures, comparing fund performance with market portfolio performance, the excess returns of the fund and the market portfolio should be adjusted to be at the same risk level. Therefore, the excess returns in Table 4.16 were divided by beta (in terms of the Treynor measure), and by S.D. (in terms of the Sharpe ratio and M^2 measure). Referring to the Treynor row in Table 4.16 as an example, the Treynor value of the fund is calculated by [(-2.8437)/ (0.5608)] = -5.0710, and the Treynor value of the market portfolio is computed by

[6] The Treynor value is given by $[(R_p - R_f)\ \beta_p]$
[7] The Sharpe value is given by $[(R_p - R_f) / \sigma_p]$
[8] The Jensen alpha (α_j)is given by $R_{jt} - R_{ft} = \alpha_j + \beta_j\,[\,R_{mt} - R_{ft}\,] + \varepsilon_{jt}$
[9] The M^2 value is given by $[(\,R_p - R_f)\ (\sigma_M / \sigma_p)] + R_f$

computed by [(-3.3661) / (1)] = -3.3661. After adjusting the fund and the market portfolio performances to be at the same level of risk, the results shows that the RKF3 fund underperformed the market portfolio, (-5.0710 < -3.3661).

Again, since the risk-adjusted performance measures express fund excess return per unit of risk while rate of return ignores risk, the finding of different results from risk-adjusted and non risk-adjusted measures is possible and is not surprising due to different measurements.

4.2.3. Summary of fund performance in two market environments

During the expansionary market environment, both risk-adjusted and non risk-adjusted performance measures indicate that the performance of Thai equity funds, on average, achieved superior performance when compared to the market portfolio. In addition, the finding on the proportion of outperforming funds indicates that the majority of funds outperformed the market. Based on this sample evidence, the overall performance of Thai equity funds during the expansionary market environment was superior to the market portfolio.

In contrast, during the contractionary market environment, all four risk-adjusted measures indicate that the performance of Thai equity funds, on average, was inferior to that of the market and the majority of funds underperformed relative to the market benchmark. However, when funds were measured in terms of the non risk-adjusted performance measure (rate of return), average performance was superior to the market benchmark; and the majority of the funds also outperformed the market portfolio.

4.3 INVESTMENT PERFORMANCE AND RISK

Theoretically, it would be expected that the Treynor, Sharpe and Jensen risk-adjusted performance measures would be independent of the corresponding measures of risk (Friend and Blume 1970) because they are risk-adjusted measures (Reilly and Brown 2000). This expectation would also include M^2, a recent risk-adjusted performance measure. A positive relationship would indicate a bias in a positive direction while negative relationship would indicate a bias in a negative direction (Klemkosky 1973).

In this section, the linear relationship between the four major risk-adjusted performance and relevant risk measures is tested. Null hypothesis 4.1($H_{04.1}$) is tested for the relationship between Treynor performance and beta (systematic risk), hypothesis 4.2 ($H_{04.2}$) for Sharpe performance and S.D. (total risk), hypothesis 4.3 ($H_{04.3}$) for Jensen performance and beta (systematic risk) and hypothesis 4.4 ($H_{04.4}$) for M^2 performance and S.D. (total risk).

The linear relationship between non risk-adjusted performance (rate of return) and systematic risk as well as total risk are also tested. Null hypothesis 4.5 ($H_{04.5}$) is tested for the relationship between rate of return and beta and hypothesis 4.6 ($H_{04.6}$) is tested for the relationship between rate of return and S.D. The expectation is that rate of return and both risk measures are related.

4.3.1 Treynor performance and beta

The linear relationship between fund investment performance in terms of the Treynor measure and fund risk is tested. The Pearson correlation coefficient analysis is tested to determine whether investment performance is correlated with fund risk. This coefficient value also provides a degree of association. In addition, the linear regression analysis is tested to determine how the fund risk (independent variable) is related to the investment performance (dependent variable). Summary statistics on the relationship of Treynor performance and systematic risk (beta) are presented in the following table.

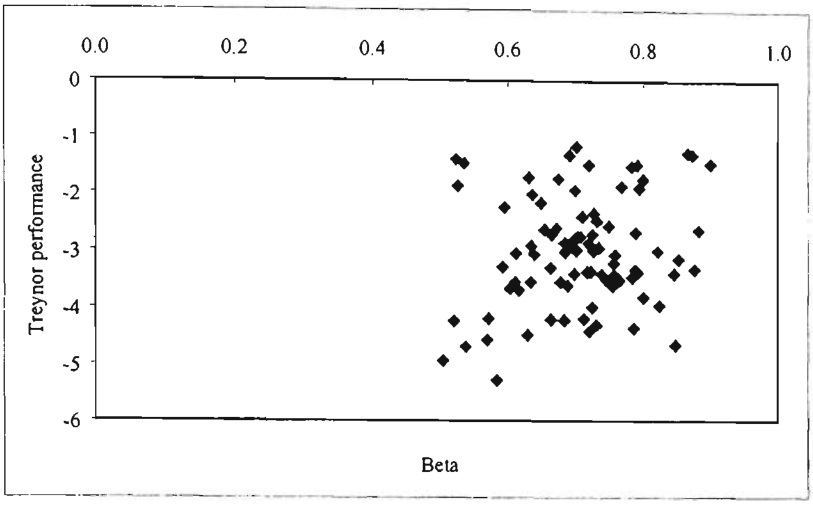
Table 4.17 Relationship between Treynor performance and systematic risk: 1992-2000

measure	*coefficient*	*t-stat*	*p-value. (2-tail)*	*reject/not reject $H_{04.1}$*
Pearson correlation (ρ)	0.1948	1.8201	0.0723	not rej
Regression (B)	2.0807	1.8201	0.0723	not rej

n = 86 funds

Null hypothesis 4.1 ($H_{04.1}$) is that there is no relationship between the Treynor index performance and beta. Table 4.17 shows that the Pearson correlation coefficient is 0.19 and the regression coefficient is 2.08. The value of the test statistic is t = 1.82, which has a p-value of 0.07. Since the p-value is higher than 0.05 (the 5 per cent significance level), the null hypothesis is not rejected by both Pearson correlation analysis and regression analysis. This indicates that there is no relationship between the Treynor performance and beta, a measure of systematic risk. Figure 4.2 presents a scatter diagram of the Treynor performance on systematic risk.

Figure 4.2 Scatter diagram of Treynor's performance measure on systematic risk: 1992-2000



4.3.2 Sharpe performance and S.D.

The relationship between fund investment performance and risk is tested further for any relationship between the Sharpe ratio performance and its risk measurement (S.D.). Again, the Pearson correlation coefficient analysis is calculated to determine whether investment performance is correlated with fund risk and linear regression analysis is tested to determine how the fund risk (independent variable) is related to the investment performance (dependent variable). Summary statistics on the relationship of Sharpe performance and total risk (S.D.) are presented as follows.

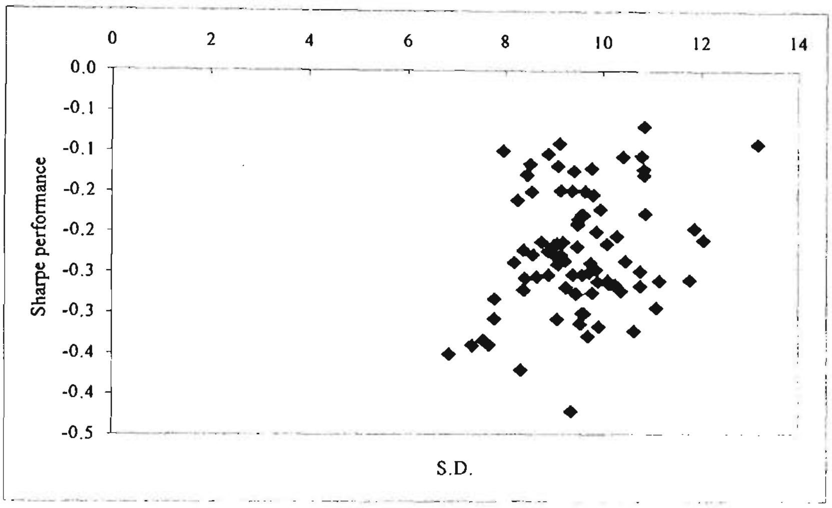
Table 4.18 Relationship between Sharpe performance and total risk: 1992-2000

measure	*coefficient*	*t-stat*	*p-value. (2-tail)*	*reject/not reject $H_{04.2}$*
Pearson correlation (ρ)	0.2497	2.3631	0.0204*	rej
Regression (B)	0.0169	2.3631	0.0204*	rej

* significant at the 0.05 level
n = 86 funds

Null hypothesis 4.2 ($H_{04.2}$) is that there is no relationship between the Sharpe ratio performance and S.D. Table 4.18 shows that the Pearson correlation coefficient is positive (0.2497), the value of the test statistic is $t = 2.36$, which has a p-value of 0.02. The null hypothesis is rejected at the 5 per cent significance level. This indicates that there is a significant relationship between the Sharpe performance and total risk. However, the Pearson coefficient value, a degree of association, is relatively low at 0.2497. This means that there is a slight positive relationship between the Sharpe performance and total risk. Figure 4.3 presents a scatter diagram of the Sharpe performance and total risk.

Figure 4.3 Scatter diagram of Sharpe's performance measure on total risk: 1992-2000



Results from the linear regression analysis indicate that the slope coefficient (B) is 0.0169, the value of the test statistic is $t = 2.36$, which has a p-value of 0.02. The null hypothesis 4.2 is rejected at the 5 per cent significance level. This indicates that the fund risk (independent variable) is related to the investment performance (dependent variable).

Theoretically, it would be expected that the risk-adjusted performance measure would be independent of the measure of risk (Friend and Blume 1970). The result of positive relationship between the Sharpe performance and S.D. indicates that the Sharpe measure is biased in a positive direction when employed to measure Thai equity fund performance. The finding suggests that the performance is an increasing function of the total risk, namely, the Sharpe performance of high-risk funds exhibits higher performance than the comparable performance of low-risk funds. This bias may lead to an overstated performance measurement if any fund in the sample set is a high-risk fund.

This finding can be explained by the fund performance results in section 4.1.4. When funds were measured by the Sharpe ratio, the results showed that, during 1992-2000, 33 out of the 86 funds outperformed the market portfolio. However, both the Treynor and Jensen measures reported a lower number of outperforming funds, 18 funds in total. This seems to be that the bias effects on the performance results generated by this study. The extent of bias found in this study is recognized and remains an issue for resolution in further research. In addition, the finding on positive bias between the Sharpe performance and its risk measure (S.D.) is consistent with the results obtained by Klemkosky (1973).

4.3.3 Jensen performance and beta

The relationship between fund investment performance and risk is tested further for any relationship between the Jensen alpha performance and its risk measurement (beta). Again the Pearson correlation coefficient and linear regression analysis are tested. Summary statistics on the relationship of fund performance and systematic risk are presented in Table 4.19 as follows.

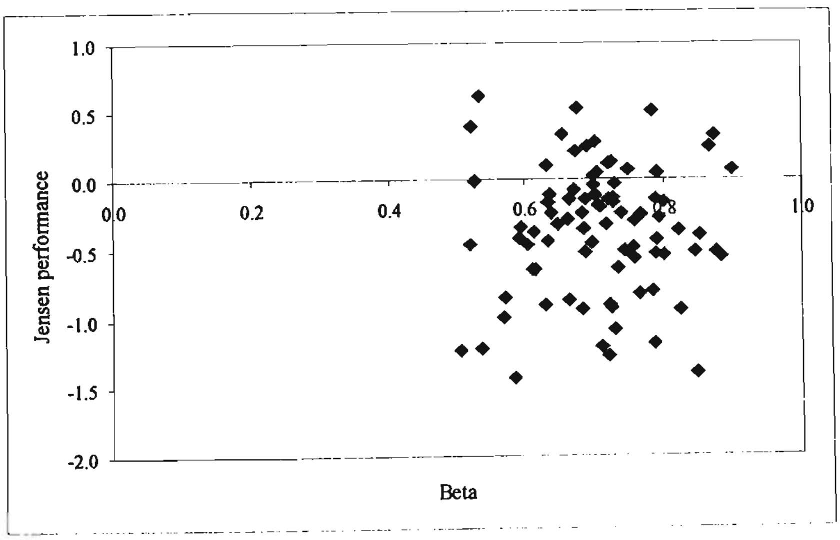
Table 4.19 Relationship between Jensen alpha performance and systematic risk: 1992-2000

Measures of testing	*coefficients*	*t-stat*	*p-value. (2-tail)*	*reject/not reject $H_{04.3}$*
Pearson correlation (ρ)	0.0423	0.3884	0.6987	not rej
Regression (B)	0.2141	0.3884	0.6987	not rej

n = 86 funds

Null hypothesis 4.3 ($H_{04.3}$) is that there is no relationship between the Jensen alpha performance and beta. Table 4.19 shows that the Pearson correlation coefficient is 0.0423 and the regression coefficient is 0.2141. The value of the test statistic is t = 0.3884, which has a p-value of 0.6987. Since the p-value is higher than 0.05 (the 5 per cent significance level), the null hypothesis is not rejected by both Pearson correlation analysis and regression analysis. This indicates that there is no relationship between the Jensen alpha performance and beta, a measure of systematic risk. Figure 4.4 presents a scatter diagram of the Jensen alpha performance on the systematic risk.

Figure 4.4 Scatter diagram of Jensen's performance measure on systematic risk: 1992-2000



4.3.4 M^2 performance and S.D.

The relationship between fund investment performance and risk is tested further for any relationship between the M^2 performance and its risk measurement (S.D.). Again, the Pearson correlation coefficient analysis and linear regression analysis are tested. Summary statistics on the relationship of fund performance and total risk are presented as follows.

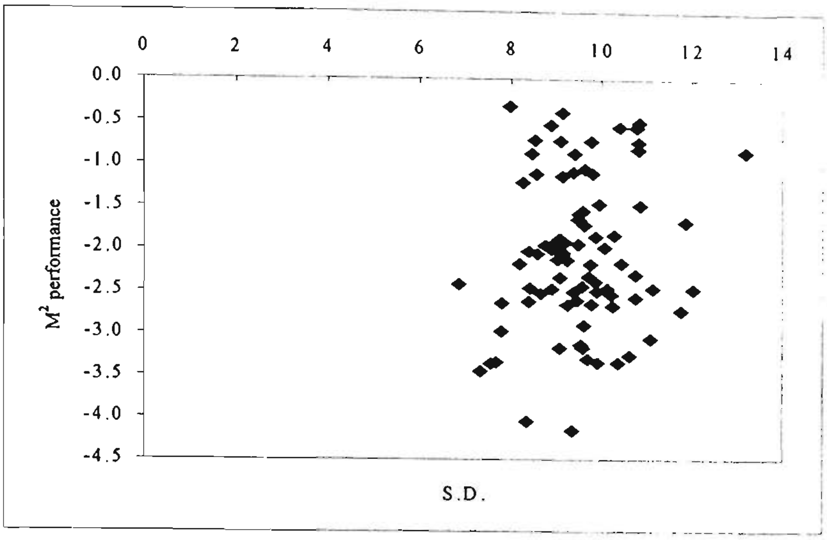
Table 4.20 Relationship between M^2 performance and total risk: 1992-2000

measure	*coefficient*	*t-stat*	*p-value (2-tail)*	*reject/not reject $H_{04.4}$*
Pearson correlation (ρ)	0.1458	1.3504	0.1805	not rej
Regression (B)	0.1193	1.3504	0.1805	not rej

n = 86 funds

Null hypothesis 4.4 ($H_{04.4}$) is that there is no relationship between the M^2 performance and S.D. Table 4.20 shows that the Pearson correlation coefficient is 0.1458 and the regression coefficient is 0.1193. The value of the test statistic is t = 1.3504, which has a p-value of 0.1805. Since the p-value is higher than 0.05 (the 5 per cent significance level), the null hypothesis is not rejected by both Pearson correlation analysis and regression analysis. This indicates that there is no relationship between the M^2 performance and S.D., a measure of total risk. Figure 4.5 presents a scatter diagram of the M^2 performance on the total risk.

Figure 4.5 Scatter diagram of M^2's performance measure on total risk: 1992-2000



4.3.5 Non risk-adjusted performance and risks

The relationship between non risk-adjusted performance (rate of return) and both beta (systematic risk) and S.D. (total risk) are tested in this section. Again, the Pearson correlation coefficient analysis and linear regression analysis are utilised to test the relationship. The expectation is that rate of return should be an increasing function of risk measurements. Summary statistics on the relationships for fund performance and both risks are presented in the following table.

Table 4.21 Relationship between non risk-adjusted performance and risks: 1992-2000

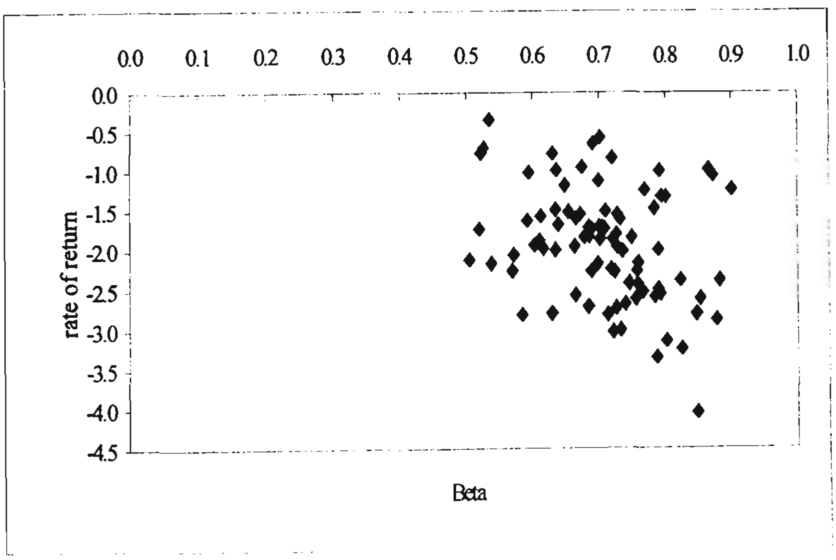
measure	*coefficient*	*t-stat*	*p-value (2-tail)*	*reject/not reject null hypothesis*
Panel A: rate of return and beta				$H_{04.5}$
Pearson correlation (ρ)	-0.3193	-3.0879	0.0027*	rej
Regression (B)	-2.5288	-3.0879	0.0027*	rej
Panel B: rate of return and S.D.				$H_{04.6}$
Pearson correlation (ρ)	-0.2667	-2.5366	0.0130*	rej
Regression (B)	-0.1771	-2.5366	0.0130*	rej

* significant at the 0.05 level
n = 86 funds

4.3.5.1 Non risk-adjusted performance and beta

Results of statistical testing for a relationship between non risk-adjusted performance and systematic risk (beta) are presented in Table 4.21 (Panel A). The null hypothesis 4.5 ($H_{04.5}$) is that there is no relationship between the rate of return and beta. Results show that the Pearson correlation coefficient is negative (-0.3193), the value of the test statistic is t = -3.0879, which has a p-value of 0.0027. The null hypothesis is rejected at the 5 per cent significance level. This indicates that there is a significant negative relationship between the rate of return performance and systematic risk. However, the Pearson coefficient value, a degree of association, is relatively low at -0.3193. This means that there is a small inverse relationship between the rate of return performance and systematic risk. The results for the rate of return performance and systematic risk are also contained in Figure 4.6.

Figure 4.6 Scatter diagram of rate of return on systematic risk: 1992-2000



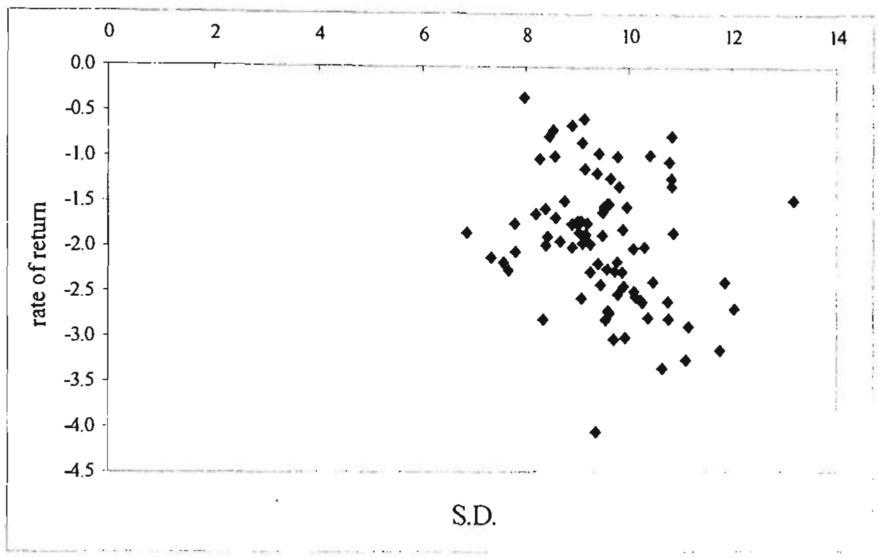
Results from the linear regression analysis indicate that the slope coefficient (B) is -2.5288, the value of the test statistic is t = -3.0879, which has a p-value of 0.0027. The null hypothesis 4.5 ($H_{04.5}$) is rejected at the 5 per cent significant level. This indicates that the systematic risk (independent variable) has a negative relationship with the investment performance (dependent variable), namely, the rate of return performance is an inverse function of systematic risk. Based on the evidence from both Pearson and regression analyses, these findings indicate that lower risk funds appeared to get a higher rate of return than higher risk funds.

A possible reason for the inverse relationship between rate of return and beta may be, as explained by Robson (1986), when the return on market portfolio is less than the return on the risk free rate, a negative relationship between risk and return of funds would be expected. In the case of the Thai market portfolio, it was found that during 1992-2000 the return on the market portfolio was less than the return on the risk-free rate. This can be explained by the value of excess return on the market portfolio (R_m - R_f), which is the value of Treynor market in Table 4.3, that all the values are negative. Therefore, the finding of an inverse relationship between rate of return and beta in this section is not a surprising result.

4.3.5.2 Non risk-adjusted performance and S.D.

Results of statistical testing for a relationship between non risk-adjusted performance (rate of return) and total risk (S.D.) are presented in Table 4.21 (Panel B). The null hypothesis 4.6 ($H_{04.6}$) is that there is no relationship between rate of return and S.D. Results report that the Pearson correlation coefficient is negative (-0.2667), the value of the test statistic is t = -2.5366, which has a p-value of 0.0130. The null hypothesis is rejected at the 5 per cent significance level. This indicates that there is a significant negative relationship between the rate of return performance and total risk. However, the Pearson coefficient value is relatively low at -0.2667. This means that there is a small inverse relationship between the rate of return performance and total risk. Figure 4.7 presents a scatter diagram of the rate of return performance on total risk.

Figure 4.7 Scatter diagram of rate of return on total risk: 1992-2000



Results from the linear regression analysis indicate that the slope coefficient (*B*) is -0.1771, the value of the test statistic is t = -2.5366, which has a p-value of 0.0130. The null hypothesis 4.6 ($H_{04.6}$) is rejected at the 5 per cent significance level. This indicates that the fund risk (independent variable) is related to the investment performance (dependent variable), namely, the rate of return performance is an inverse function of total risk. Based on the evidence from both Pearson and regression analyses, these findings indicate that during 1992-2000 lower risk funds appeared to get a higher rate of return than higher risk funds.

4.3.6 Summary on investment performance and risk

This section (4.3) has sought to determine, whether or not the investment performance of Thai equity funds during 1992-2000 is related to fund risk. For the risk-adjusted performance measures, theoretically, it was expected that the risk-adjusted performance measures should be independent of the risk measure (Friend and Blume 1970). A positive relationship would indicate a bias in a positive direction while negative relationship would indicate a bias in a negative direction (Klemkosky 1973). The relationships were tested between the four major risk-adjusted performances and their risk measures. In addition, the relationships between rate of return and both risk measures (beta and S.D.) were also tested. In this case, it was expected that rate of return and risk measures would be positively related. Results however show that the relationship between fund investment performance and risk varies inconsistently across the different fund measurement techniques as follows.

There was no relationship between Treynor risk-adjusted measure and beta (systematic risk), Jensen performance and beta (systematic risk), and M^2 performance and S.D. (total risk). These results indicate that these measures have no bias in the relationship between fund performance and relative risk measures when employed to measure Thai equity fund performance. However, there was a slight positive relationship between Sharpe investment performance and S.D. (total risk), indicating that the Sharpe measure is biased in a positive direction when employed to measure Thai equity fund performance. The bias would lead to an overstatement in fund performance if any funds in the sample contain high-risk securities in the portfolio.

The finding of no discernible relationship between the Treynor performance and beta, Jensen performance and beta as well as M^2 performance and S.D. is accordance with Friend and Blume (1970) who stated that the risk-adjusted measures should be independent of the risk measure.

In addition, it was expected that rate of return and risk measure would be significantly related. The relationship between return and both risk measures, beta and S.D., reveals a significant slight inverse relationship. Based on this evidence, this finding indicates that during 1992-2000 lower risk funds appeared to get a higher rate of return than higher risk funds. However, this could be a function of the time period of this study. According to Robson (1986), an inverse relationship was expected for risk and return when market portfolio return was less than returns on the risk free rate. This finding is in accordance with Robson's statement.

4.4 RELATIONSHIP BETWEEN RISK-ADJUSTED PERFORMANCE MEASURES

This section examines the relationship among the four risk-adjusted measures, Treynor, Sharpe, Jensen alpha and M^2. It is essentially to see whether the performance of Thai equity funds during 1992-2000 is independent of which of Treynor, Sharpe, Jensen or M^2 measures is used to measure performance. The correlation among the four different measures is ascertained. The work of this section is to test the fifth null hypothesis (H_{05}): that the Treynor, Sharpe, Jensen and M^2 performance measures are not significantly related.

Pearson's correlation coefficient is utilised to measure the strength of any linear relationship between each pair of fund performance results as measured by the four risk-adjusted measures; i.e., between Treynor and Sharpe, Sharpe and Jensen, and Jensen and M^2, and M^2 and Treynor.

Table 4.22 contains the matrix of correlation coefficients for fund performance, and associated probabilities (two-tail). Since all probabilities are less than 0.01, the null hypothesis is rejected. The performance of Thai equity funds as measured by the Treynor, Sharpe , Jensen and M^2 measures are significantly correlated.

Table 4.22 Correlation between fund performance measures

		Treynor measure	Sharpe Ratio	Jensen Alpha	M^2
Treynor measure	Pearson Correlation	1	0.9668*	0.8599*	0.9879*
	Sig. (2-tailed)	-	0.0000	0.0000	0.0000
	N	86	86	86	86
Sharpe Ratio	Pearson Correlation	0.9668*	1	0.8255*	0.9770*
	Sig. (2-tailed)	0.0000	-	0.0000	0.0000
	N	86	86	86	86
Jensen Alpha	Pearson Correlation	0.8599*	0.8255*	1	0.8648*
	Sig. (2-tailed)	0.0000	0.0000	-	-
	N	86	86	86	86
M^2	Pearson Correlation	0.9879*	0.9770*	0.8648*	1
	Sig. (2-tailed)	0.0000	0.0000	0.0000	-
	N	86	86	86	86

* significant at the 0.01 level

The range of the Pearson coefficient is 0.8255 - 0.9879. All coefficients are significant at the 1 per cent level. This indicates that a significant positive relationship exists between the four major risk-adjusted measures. Thus, the high and statistically significant correlations found among the four major risk-adjusted performance measures indicate that they provide fund performance results in the same direction. However, even though the results provide high positive correlation, the correlation is not perfect. For the purpose of gaining insight into fund performance, it is best to consider these measures collectively because they provide different insights regarding the performance of funds. The different insights are: (1) The Treynor measure provides results on fund's excess return per unit of systematic risk; (2) the Sharpe measure generates results on fund's excess return per unit of total risk; (3) the Jensen Alpha's result measures on how much of the rate of return on mutual fund is attributable to the fund manager's ability to derive above average returns adjusted for systematic risk; and (4) for the investors who not intimately familiar with regression analysis and the modern theory of finance, the M^2 is intuitively clear and easier (than the first three measures) to identify the best portfolio, the portfolio that has the highest return for any level of risk. The M^2 is also applicable to any classification of portfolios.

4.5 SUMMARY

In this chapter, empirical results arising from the testing of hypotheses relevant to research questions one, two, three, four and five have been presented. The results can be summarized as follows.

The first research question is whether the performance of Thai equity funds existing during the period 1992-2000 is different from the performance of the Thai market portfolio. Fund performance, as measured by the Treynor, Sharpe, Jensen and M^2 measures, strongly indicate that first, the average performance of Thai equity funds existing during 1992-2000 was inferior to the market portfolio; and second, the majority of funds existing during this period underperformed the market benchmark.

However, when funds were measured in terms of the rate of return, the performance of Thai equity funds in average was superior to that of the market and the majority of the funds also outperformed the return of the market benchmark. In addition, an examination of annual performance of Thai equity funds from 1992 to 2000 reported that when funds were measured in terms of risk-adjusted performance measures, the average performance of the funds outperformed the market portfolio for 7 years, excepting the years 1998 and 1999.

The second research question is whether the performance of Thai equity funds existing during the expansionary market environment, January 1992- January 1996, is different from the performance of the Thai market portfolio. Both risk-adjusted and non risk-adjusted performance measures strongly indicate that the average performance of Thai equity funds existing during the expansionary market environment was superior to the market portfolio. Moreover, the majority of funds outperformed the market benchmark. These results lead to the conclusion that the overall performance of Thai equity funds during the expansionary market environment was superior when compared to the market portfolio.

The third research question is whether the performance of Thai equity funds existing during the contractionary market environment, February 1996 - December 2000, is different from the performance of the Thai market portfolio. In contrast to the results for the expansionary market environment, all four risk-adjusted measures indicate that during the contractionary market environment, the average performance of Thai equity funds was inferior to that of the market; and that the majority of funds underperformed the market benchmark. However, when funds were measured in terms of the rate of return, unadjusted for risk, the performance of Thai equity funds on average outperformed the market portfolio and the majority of the funds were also superior to the returns of the market benchmark.

The fourth research question is whether the performance of funds related to relevant risk measures. Theoretically, it would be expected that the risk-adjusted performance measures would be independent of the risk measures. Results indicate that there appeared to be no discernible relationship between the Treynor measure and beta (systematic risk), Jensen performance and beta as well as M^2 and S.D. (total risk). However, there was a slight positive relationship between Sharpe investment performance and S.D. (total risk), indicating a bias in positive direction. For a relationship between rate of return and risk, it was expected that rate of return and risk measure would be significantly related. Results reveal a significant slight inverse relationship between rate of return and both risk measures, beta and S.D., indicating that during 1992-2000 lower risk funds appeared to get a higher rate of return than higher risk funds.

The fifth research question is whether the performance of funds depends upon which of the four risk-adjusted measures is used to measure performance. Since the evidence indicates the existence of a significant positive relationship between the four major risk-adjusted measures, then any one measure is sufficient to examine fund performance. However, although the results provide high positive correlation, the correlation is not perfect. For the purpose of gaining insight into fund performance, all four measures may be considered because they provide differing insights regarding the performance of funds.

Chapter 5

THE PERSISTENCE OF EQUITY FUND PERFORMANCE

The aim of this chapter is to examine the persistence of fund performance and explore the optimal past performance information set for equity funds in Thailand. This chapter presents results of hypothesis tests and consists of five sections. First regression analysis and testing for optimal past performance; second, Spearman rank correlation coefficient analysis; third, quartile comparisons; fourth, contingency table analysis; and fifth, a summary of findings. A comparative exploration between the results of this research and the extant empirical findings will be follow in the next chapter (6.1.4).

As stated in 3.1.2, the second major objective of this thesis is to examine the persistence of equity fund performance by investigating the relationship between past and future performance, and exploring any optimal past performance information set for equity funds in Thailand. The relevant research questions are research questions 6 and 7. The null hypotheses associated with the research questions are $H_{06\ (6.1\text{-}6.4)}$ and H_{07} (see 3.5.6 for detail).

It is important to note that persistence can only be tested with a sample that includes funds that have existed in both prior and subsequent periods. The sample characteristics in this study must necessarily be influenced by survivorship bias. In addition, interpretations of the following performance persistence results warrant caution due to the dependent nature of the data.

5.1 REGRESSION ANALYSIS

This section, which tests hypotheses $H_{06.1}$ and H_{07}, examines persistence of fund performance and optimal past performance (if any) by means of regression analysis. Results of testing null hypothesis 6.1 are reported in 5.1.1 and results of testing null hypothesis 7 are reported in 5.1.2. A summary of findings is reported in 5.1.3.

5.1.1 Regression analysis for persistence of fund performance

As stated in 3.5.6, the cross-sectional regression is computed to test the null hypothesis 6.1 ($H_{06.1}$) of no significant relationship between the abnormal return in a subsequent period and the abnormal return in the series of prior periods. The existence of a relationship between prior and subsequent period performance is inferred when the estimated coefficient (ϕ_k) in equation (3-11) is significantly positive. This relationship provides confirmation of the information content of prior period performance.

Table 5.1 Regression-based test of persistence in equity fund performance, between a prior period and subsequent period 1999-2000

prior period	intercept	slope			R^2	number	reject / not
	$a_{j,k}$	ϕ_k	*t*-stat	sig.		of funds	reject $H_{06.1}$
7-year (92-98)	-0.8487	0.3633	0.2730	0.7983	0.0183	6	not rej
6-year (93-98)	-0.7384	0.2165	0.3464	0.7351	0.0099	14	not rej
5-year (94-98)	-0.1932	0.9823	4.5833	0.0000*	0.3443	42	rej
4-year (95-98)	-0.2122	0.8259	4.5444	0.0000*	0.2469	65	rej
3-year (96-98)	-0.2327	0.6342	4.5307	0.0000*	0.2268	72	rej
2-year (97-98)	-0.2913	0.6103	5.3875	0.0000*	0.2873	74	rej

* significant at the 0.01 level

Table 5.1 presents the results of cross-sectional regression of subsequent period (1999-00) abnormal returns indicated by Jensen alpha on prior period abnormal returns for each of the prior periods. The table shows a positive significant coefficient (ϕ_k) in the subsequent period (1999-2000) for prior periods of two years (1997-98), three years (1996-80), four years (1995-98), and five years (1994-98); which provides support for the existence of performance persistence with two-year to five-year prior periods. However, the coefficients (ϕ_k) with six year (1993-98) and seven year (1992-98) prior periods are not statistically significant. Accordingly, $H_{06.1}$ is rejected at the 5 per cent level when testing for the relationship between subsequent period and two-year to five-year prior periods. However, $H_{06.1}$ cannot be rejected when testing for the relationship between subsequent period and six-year as well as seven-year prior periods, which indicates that there is no relationship between subsequent period performance and six-year as well as seven-year prior period performance.

5.1.2 Test for optimal past performance information

If the null hypothesis of prior period and subsequent period performance independence ($H_{06.1}$) is rejected, it is interesting to examine whether, *ceteris paribus*, longer-term past performance contains more information related to future performance than does short-term past performance. This can be tested for by checking for any pattern of explanatory power (R^2) in the regressions. A pattern of increasing R^2 values as the past performance period increases would indicate that the length of the past performance period is important. If persistence in performance were verified, then higher R^2 values for longer past periods would indicate greater longer-term persistence (Hallahan 1999). (In 3.5.7 are considered the possibilities that R^2 may decrease or remain constant). The seventh null hypothesis (H_{07}) is tested to see whether the information content of prior period performance varies with the length of the period of prior performance. The null hypothesis (H_{07}) is that there is no pattern of persistency in R^2 values.

As reported in 5.1.1, persistence of fund performance was found between subsequent period (1999-00) and prior periods of two-year (1997-98) to five-year periods (1994-98). The examination as to whether longer-term past performance contains more information related to future performance than does short-term past performance can be tested for the two-year to five-year prior periods.

As reported in Table 5.1, although the coefficients (ϕ_k) of two-year to five-year prior periods are statistically significant, R^2 values do not increase in value as the length of the prior period increases. Fluctuating R^2 values supports the seventh hypothesis (H_{07}) that there is no pattern of persistency in R^2 values. This can be interpreted to mean that increasing the length of the past performance period will not lead to a monotonic increase in information content of past period performance.

The R^2 value of the equation 3-11 can be used to indicate the percentage of the variation of the $\alpha_{j,\ 99\text{-}00}$ (dependent variable) that is explained by the $a_{j.k}$ (independent variable), namely, the percentage of the variation in the subsequent period performance (1999-2000) is explained by the prior period performance (period k). Since the high value of R^2 is a good fit of regression line (Pindyck and Rubinfeld 1998), the higher value of the explanatory power (R^2) would indicate the greater past performance information.

Table 5.1 reports that the highest R^2 value (0.3443) is for the five-year prior period. This indicates that 34.43 % of the variation in the subsequent period performance is explained by the performance of the five-year prior period (1994-1998). Based on this sample evidence and time frame of this study, the optimal past performance period to be used as a guide to future performance appears to be the five-year prior period.

Why there should performance five years earlier (1994-1998) be a better predictor of subsequent performance (1999-2000) than a period only two years earlier (1997-1998)? Based on the time frame of this study, a possible explanation may be related to the events in the Thai equity market during the period which is known as the 1997 economic crisis. During the two-year prior period (1997-1998), the Thai equity market faced the impacts of the "bubble burst". The SET Index fell from 803.13 points at the beginning of 1997 to 355.81 points at the end of 1998. As noted by the AIMC (1999), investors sold stocks at any price, especially foreign investors. Capital flowed out of the country. Mutual fund holders were shocked, and followed by heavy redemption. Therefore, fund performance during that period was subjected to substantial volatility. Compared to the subsequent period (1999-2000), although no sign of economic recovery and the NAV of most funds were still low, investors had more understanding in the situation and redemption reduced. This means that the volatility of the subsequent period was not as heavy as in 1997-1998. Therefore, using average performance on the five-year prior period, covers both pre and post crisis periods, may better predict fund performance than the two-year period of substantial volatility. The results therefore may be a consequence of the period of study chosen.

5.2 SPEARMAN RANK CORRELATION COEFFICIENT ANALYSIS

To investigate further the value of persistence of fund performance, the Speaman rank correlation coefficient (r_s) is computed, to test null hypothesis 6.2 ($H_{06.2}$): there is no significant relationship between the ranking of fund performances in prior periods and a subsequent period.

The results indicate significant correlation of fund performance ranking in risk-adjusted performance when measured between the subsequent period (1999-00) and the two-year (1997-98) to five-year (1994-98) prior periods, but not in six-year (1993-98) and seven-year (1992-98) prior periods. With results ranked by the four major risk-adjusted measures, hypothesis 6.2 ($H_{06.2}$) is rejected at the 0.05 significance level when testing ranking relationship between subsequent period and two-year to five-year prior periods. With results ranked by non risk-adjusted measure (raw returns), hypothesis 6.2 ($H_{06.2}$) is rejected at the 0.05 significance level when testing the ranking relationship between a subsequent period and two-year to four-year prior periods, and the hypothesis is rejected at the 0.10 significance level when testing the ranking relationship between a subsequent period and the five-year prior period. However, with results ranked by all measures, this hypothesis is not rejected when testing the ranking relationship between a subsequent period and six-year as well as seven-year prior periods. These results suggest that fund performance ranking in two-year to five-year prior periods (1997-98, 1996-98, 1995-98, and 1994-98) is related to fund performance ranking in the subsequent period (1999-00).

The highest degree of significance of the Spearman rank correlation coefficients (r_s) for the Treynor (0.5763), Sharpe (0.4610), Jensen (0.6303) and M^2 (0.4610) performance rankings are all found in the five-year prior period (1994-98). This result indicates that the ranking relationship between subsequent period and the five-year prior period is greater than for other prior periods. This supports the regression analysis finding that the five-year prior period seems to be a better guide to future performance than any other prior period. However, when funds were ranked in terms of non risk-adjusted measure (raw returns), the highest Spearman correlation coefficients (r_s) is found in the two-year prior period (1997-98).

As noted in 3.3.1.4, when funds in a sample set have the same time horizon, ranking by the Sharpe ratio and M^2 will yield the same ranking. Hence, the Spearman correlation coefficients (r_s) results of the funds ranked by the Sharpe ratio and M^2 (Panels B and D) report the same r_s values.

Table 5.2 Spearman (r_s) test of persistence in equity fund performance between a prior period and subsequent period (1999-2000)

prior period	r_s	approx.T	approx. sig.	n	rej / not rej $H_{06.2}$
Panel A: Treynor					
7-year (92-98)	0.3143	0.6621	0.5441	6	not rej
6-year (93-98)	0.1516	0.5315	0.6048	14	not rej
5-year (94-98)	**0.5763**	4.5703	0.0000*	44	rej
4-year (95-98)	0.3090	2.6191	0.0110*	67	rej
3-year (96-98)	0.3206	2.8918	0.0050*	75	rej
2-year (97-98)	0.3662	3.4083	0.0011*	77	rej
Panel B: Sharpe					
7-year (92-98)	0.1429	0.2887	0.7872	6	not rej
6-year (93-98)	-0.0418	-0.1448	0.8873	14	not rej
5-year (94-98)	**0.4610**	3.3670	0.0016*	44	rej
4-year (95-98)	0.2659	2.2235	0.0297*	67	rej
3-year (96-98)	0.3008	2.6951	0.0087*	75	rej
2-year (97-98)	0.3527	3.2645	0.0017*	77	rej
Panel C: Jensen[(a)]					
7-year (92-98)	0.3143	0.6621	0.5441	6	not rej
6-year (93-98)	0.2088	0.7396	0.4738	14	not rej
5-year (94-98)	**0.6303**	5.1353	0.0000*	42	rej
4-year (95-98)	0.4124	3.5928	0.0006*	65	rej
3-year (96-98)	0.4113	3.7751	0.0003*	72	rej
2-year (97-98)	0.4383	4.1382	0.0001*	74	rej
Panel D: M^2					
7-year (92-98)	0.1429	0.2887	0.7872	6	not rej
6-year (93-98)	-0.0418	-0.1448	0.8873	14	not rej
5-year (94-98)	**0.4610**	3.3670	0.0016*	44	rej
4-year (95-98)	0.2659	2.2235	0.0297*	67	rej
3-year (96-98)	0.3008	2.6951	0.0087*	75	rej
2-year (97-98)	0.3527	3.2645	0.0017*	77	rej
Panel E: raw returns					
7-year (92-98)	-0.0857	-0.1721	0.8717	6	not rej
6-year (93-98)	-0.0330	-0.1143	0.9109	14	not rej
5-year (94-98)	0.2913	1.9737	0.0550**	44	rej
4-year (95-98)	0.3960	3.4773	0.0009*	67	rej
3-year (96-98)	0.4031	3.7634	0.0003*	75	rej
2-year (97-98)	**0.4371**	4.2089	0.0001*	77	rej

(a) Number of funds as ranked by the Jensen Alpha differs from the other measures. Funds that fall into the inconclusive region when tested for serial correlation (Durbin-Watson statistic) are excluded from sample set.
* significant at the 0.05 level
** significant at the 0.10 level

5.3 QUARTILE COMPARISON TABLE ANALYSIS

This section presents results of the examination of performance persistence to determine whether Thai equity funds tend to remain in the same quartile through time. To gain insight into persistence of quartile ranking performance, results of top quartile performance persistence and bottom quartile performance persistence are reported.

This section is divided into four sub-sections: results of quartile comparison table analysis (5.3.1); results of top quartile performance persistence (5.3.2); results of bottom quartile performance persistence (5.3.3); and summary of findings (5.3.4).

5.3.1 Quartile comparison table results

Hypothesis 6.3 ($H_{06.3}$) is that prior and subsequent period quartile rankings are independent. Quartile comparison tables are constructed to test this hypothesis. The Pearson chi-square statistic (see 3.4.3), a measure of the degree of independence of the result from prior period to subsequent period, is computed for each quartile comparison table.

Table 5.3 shows the results for the testing of null hypothesis $H_{06.3}$. All measures indicate similar results: quartile rankings between the two-year prior period (1997-98) to five-year prior period (1994-98) and subsequent period (1999-00) are related. Hence, null hypothesis $H_{06.3}$ is rejected at the 0.05 level of significance. Subsequent period rankings are not independent of two-year prior period to five-year prior period rankings. However, null hypothesis $H_{06.3}$ cannot be rejected when testing the ranking relationship between six-year (1993-98) and the subsequent period (1999-00).

Table 5.3 **Chi-square values and statistical significance of quartile comparisons (subsequent period 1999-00)**

prior period	Pearson chi-square value[(a)]	df	Exact sig. (2-tail)	Monte Carlo sig. (2-tail)[(c)]	no. of funds[(d)]	rej/ not rej $H_{06.3}$
Panel A: Treynor						
7-year (92-98)	**	**	**	**	6	-
6-year (93-98)	12.2500	9	0.2569	-	14	not rej
5-yaer (94-98)	20.7273	9	0.0139*	-	44	rej
4-year (95-98)	25.5017	9	0.0019*	-	67	rej
3-year (96-98)	19.8119	9	0.0175*	-	75	rej
2-year (97-98)	31.2296	9	(b)	0.0000*	77	rej
Panel B: Sharpe						
7-year (92-98)	**	**	**	**	6	-
6-year (93-98)	3.5000	9	1.0000	-	14	not rej
5-yaer (94-98)	19.2727	9	0.0230*	-	44	rej
4-year (95-98)	20.5463	9	0.0132*	-	67	rej
3-year (96-98)	28.3991	9	0.0006*	-	75	rej
2-year (97-98)	37.0726	9	(b)	0.0001*	77	rej
Panel C: Jensen						
7-year (92-98)	**	**	**	**	6	-
6-year (93-98)	7.0000	9	0.8422	-	14	not rej
5-yaer (94-98)	21.6021	9	0.0081*	-	42	rej
4-year (95-98)	39.5217	9	0.0000*	-	65	rej
3-year (96-98)	31.5556	9	0.0002*	-	72	rej
2-year (97-98)	49.1179	9	(b)	0.0000*	74	rej
Panel D: M^2						
7-year (92-98)	**	**	**	**	6	-
6-year (93-98)	3.5000	9	1.0000	-	14	not rej
5-yaer (94-98)	19.2727	9	0.0230*	-	44	rej
4-year (95-98)	20.5463	9	0.0132*	-	67	rej
3-year (96-98)	28.3991	9	0.0006*	-	75	rej
2-year (97-98)	37.0726	9	(b)	0.0001*	77	rej
Panel E: raw returns						
7-year (92-98)	**	**	**	**	6	-
6-year (93-98)	5.2500	9	0.9605	-	14	not rej
5-yaer (94-98)	17.0909	9	0.0490*	-	44	rej
4-year (95-98)	17.7099	9	0.0367*	-	67	rej
3-year (96-98)	19.1828	9	0.0219*	-	75	rej
2-year (97-98)	24.9577	9	0.0025*	-	77	rej

(a) 2-year prior period reported that 7 cells (43.8 %) have expected count less than 5. The rest of the prior periods reported that 16 cells (100 %) have an expected count less than 5. Therefore, the Exact sig. was utilised.
(b) Cannot be computed because there is insufficient memory in computer when using SPSS program for windows.
(c) The Monte Carlo statistic utilised only when the Exact Test cannot provide result due to insufficient memory of computer.
(d) Number of funds as ranked by the Jensen Alpha differs from other measures. Funds that fall into the inconclusive region when tested for serial correlation (Durbin-Watson statistic) are excluded from the sample set.
* significant at the 0.05 level
** indicates that the relation between prior and subsequent period performance could not be calculated because of too few funds in the seven-year prior period sample set.

It is important to note that relationship between seven-year prior period (1992-98) and the subsequent period could not be calculated due to an insufficient number of funds in sample set (only 6 funds) which should be not ranked for quartile comparison analysis.

Table 5.3 is a summary table. In the following sections, 5.3.1.1 to 5.3.1.5, the quartile comparison data is expanded upon.

5.3.1.1 Quartile comparison tables as ranked by the Treynor measure

This section highlights results drawn from the quartile comparisons, Table 5.4, as ranked by the Treynor measure. Table 5.4 (Panel A) reveals that quartile performance rankings in the subsequent period are not related to quartile performance rankings in six-year prior period at the 5 per cent significance level. Hence, using six-year prior period is unreliable to predict future performance.

Panels B, C, D, and E of Table 5.4 show that quartile rankings in the subsequent period are related to quartile rankings in two-year to five-year prior periods at the 5 per cent significance level. Results in Panels B, C, D, and E reveal that the repeating chance that funds would remain in the first quartile ranges from 29.41 to 54.55 per cent. Moreover, in Panel B, if five-year prior period performance had been used to select a first quartile fund, this would have had a 54.55 per cent chance of repeating that outstanding performance in the subsequent period.

The more interesting result is that each quartile comparison table in Panels B, C, D and E reveals high percentage in the bottom right cell. Namely, more than 50 per cent (50 to 58.82 per cent) of funds in the fourth quartile in prior periods still remained in the fourth quartile in the subsequent period. This result suggests that investors should avoid funds which are ranked in the fourth quartile. In other words, a regular prediction of a poor performance ranking is repeated.

Table 5.4 Quartile comparison tables as ranked by the Treynor measure

Panel A: 6-year prior period (1993-98) vs. subsequent period (1999-00)

		Subsequent period (1999-2000) (%)				
		Q 1	Q 2	Q 3	Q 4	
Prior period	Q 1	50.00	50.00	-	-	
(1993-98)	Q 2	-	25.00	25.00	50.00	
(%)	Q 3	50.00	-	50.00	-	N = 14
	Q 4	-	50.00	50.00	-	Chi-square = 12.25
						Exact sig. = 0.2569

Panel B: 5-year prior period (1994-98) vs. subsequent period (1999-00)

		Subsequent period (1999-2000) (%)				
		Q 1	Q 2	Q 3	Q 4	
Prior period	Q 1	54.55	18.18	18.18	9.09	
(1994-98)	Q 2	27.27	54.55	9.09	9.09	
(%)	Q 3	18.18	18.18	36.36	27.27	N = 44
	Q 4	-	9.09	36.36	54.55	Chi-square = 20.73*
						Exact sig. = 0.0139*

Panel C: 4-year prior period (1995-98) vs. subsequent period (1999-00)

		Subsequent period (1999-2000) (%)				
		Q 1	Q 2	Q 3	Q 4	
Prior period	Q 1	29.41	11.76	29.41	29.41	
(1995-98)	Q 2	52.94	41.18	5.88	-	
(%)	Q 3	11.76	29.41	41.18	17.65	N = 67
	Q 4	6.25	18.75	25.00	50.00	Chi-square = 25.50*
						Exact sig. = 0.0019*

Panel D: 3-year prior period (1996-98) vs. subsequent period (1999-00)

		Subsequent period (1999-2000) (%)				
		Q 1	Q 2	Q 3	Q 4	
Prior period	Q 1	36.84	42.11	21.05	-	
(1996-98)	Q 2	10.53	31.58	36.84	21.05	
(%)	Q 3	26.32	15.79	31.58	26.32	N= 75
	Q 4	27.78	11.11	11.11	50.00	Chi-square = 19.81*
						Exact sig. = 0.0175*

Panel E: 2-year prior period (1997-98) vs. subsequent period (1999-00)

		Subsequent period (1999-2000) (%)				
		Q 1	Q 2	Q 3	Q 4	
Prior period	Q 1	40.00	10.00	30.00	20.00	
(1997-98)	Q 2	45.00	20.00	25.00	10.00	
(%)	Q 3	15.00	45.00	35.00	5.00	N =77
	Q 4	-	29.41	11.76	58.82	Chi-square = 31.23*
						Monte Carlo sig.= 0.0000*

* significant at the 0.05 level

5.3.1.2 Quartile comparison tables as ranked by the Sharpe Ratio

This section highlights results drawn from the quartile comparison table, Table 5.5, as ranked by the Sharpe measure. In Table 5.5, Panel A reveals that quartile rankings in the subsequent period are not significantly related to quartile rankings in six-year prior period. This indicates that using the Sharpe ratio, six-year prior period ranking is an unreliable predictor of future performance. The similarity between Table 5.5 Panel A and Table 3.2 (an example of quartile comparison table when past performance does not predict future performance) is noted, in that ten cells within the table show an even distribution of 25 per cent.

Panels B, C, D and E of Table 5.5 show that quartile rankings in the subsequent period are related to fund quartile rankings in two-year to five-year prior periods (at the 5 per cent level). Panels B, C, D and E also reveal that the chance that funds would remain in the first quartile is in the range 29.41 to 45 per cent. Panel E indicates that if two-year prior period performance had been used to select a first quartile fund, this would have had a 45 per cent chance of duplicating the outstanding performance in the subsequent period.

The interesting result is that each quartile comparison table in Panels B, C, D and E reveals the highest percentage in the bottom right cells. More than 50 per cent (50 to 63.64 per cent) of funds in the fourth quartile in prior periods remained in the fourth quartile in the subsequent period. This result suggests that investors should avoid funds which are ranked in the fourth quartile. Results such as these were typically found in the quartile comparison tables as ranked by the Treynor measure (5.3.1.1).

Table 5.5 Quartile comparison tables as ranked by the Sharpe Ratio

Panel A: 6-year prior period (1993-98) vs. subsequent period (1999-00)

		Subsequent period (1999-2000) (%)				
		Q 1	Q 2	Q 3	Q 4	
Prior period	Q 1	25.00	25.00	25.00	25.00	
(1993-98)	Q 2	25.00	25.00	25.00	25.00	
(%)	Q 3	50.00	25.00	25.00	-	N = 14
	Q 4	-	50.00	50.00	-	Chi-square = 3.50
						Exact sig. = 1.00

Panel B: 5-year prior period (1994-98) vs. subsequent period (1999-00)

		Subsequent period (1999-2000) (%)				
		Q 1	Q 2	Q 3	Q 4	
Prior period	Q 1	36.36	27.27	18.18	18.18	
(1994-98)	Q 2	27.27	45.45	27.27	-	
(%)	Q 3	36.36	27.27	18.18	18.18	N = 44
	Q 4	-	-	36.36	63.64	Chi-square = 19.27*
						Exact sig. = 0.0230*

Panel C: 4-year prior period (1995-98) vs. subsequent period (1999-00)

		Subsequent period (1999-2000) (%)				
		Q 1	Q 2	Q 3	Q 4	
Prior period	Q 1	29.41	17.65	17.65	35.29	
(1995-98)	Q 2	41.18	29.41	29.41	-	
(%)	Q 3	17.65	47.06	23.53	11.76	N = 67
	Q 4	12.50	6.25	31.25	50.00	Chi-square = 20.55*
						Exact sig. = 0.0132*

Panel D: 3-year prior period (1996-98) vs. subsequent period (1999-00)

		Subsequent period (1999-2000) (%)				
		Q 1	Q 2	Q 3	Q 4	
Prior period	Q 1	36.84	5.26	21.05	36.84	
(1996-98)	Q 2	42.11	31.58	26.32	-	
(%)	Q 3	21.05	47.37	21.05	10.53	N= 75
	Q 4	-	16.67	33.33	50.00	Chi-square = 28.40*
						Exact sig. = 0.0006*

Panel E: 2-year prior period (1997-98) vs. subsequent period (1999-00)

		Subsequent period (1999-2000) (%)				
		Q 1	Q 2	Q 3	Q 4	
Prior period	Q 1	45.00	-	30.00	25.00	
(1997-98)	Q 2	40.00	40.00	15.00	5.00	
(%)	Q 3	15.00	45.00	35.00	5.00	N =77
	Q 4	-	17.65	23.53	58.82	Chi-square = 37.07*
						Monte Carlo sig. = 0.0001*

* significant at the 0.05 level

5.3.1.3 Quartile comparison tables as ranked by the Jensen alpha

This section highlights results drawn from the quartile comparison table, Table 5.6, as ranked by the Jensen Alpha. In Table 5.6, Panel A shows that the quartile rankings in the subsequent period are not significantly related to six-year prior period rankings (at the 5 per cent level). This indicates that using the Jensen alpha, six-year prior period ranking is an unreliable predictor of future performance. The similarity between Table 5.6 Panel A and Table 3.2 (an example of quartile comparison table when past performance does not predict future performance) is noted, in that six cells within the table show an even distribution of 25 per cent.

Panels B, C, D and E of Table 5.6 show that quartile rankings in the subsequent period are related to quartile rankings in two-year to five-year prior periods at the 5 per cent level. Results in Panels B, C, D and E reveal that the chance that funds would remain in first quartile is in the range 35.29 to 54.55 per cent. Panel B shows that if the five-year prior period performance had been used to select a first quartile fund, there would have been a 54.55 per cent chance of duplicating that outstanding performance in the subsequent period.

Again, each quartile comparison table in Panels B, C, D and E reveals the highest percentage in the bottom right cells. More than half of funds in the fourth quartile in prior periods (55.56 to 64.71 per cent) remained in the fourth quartile in the subsequent period. This result suggests that investors should avoid funds which are ranked in the fourth quartile. Results such as these were typically found in the quartile comparison tables as ranked by the Treynor (5.3.1.1) and Sharpe measures (5.3.1.2).

Table 5.6 Quartile comparison tables as ranked by the Jensen alpha

Panel A: 6-year prior period (1993-98) vs. subsequent period (1999-00)

		Subsequent period (1999-2000) (%) Q 1	Q 2	Q 3	Q 4	
Prior period	Q 1	25.00	50.00	-	25.00	
(1993-98)	Q 2	50.00	25.00	25.00	-	
(%)	Q 3	25.00	-	50.00	25.00	N = 14
	Q 4	-	50.00	50.00	-	Chi-square = 7.00
						Exact sig. = 0.8422

Panel B: 5-year prior period (1994-98) vs. subsequent period (1999-00)

		Subsequent period (1999-2000) (%) Q 1	Q 2	Q 3	Q 4	
Prior period	Q 1	54.55	18.18	18.18	9.09	
(1994-98)	Q 2	36.36	45.45	9.09	9.09	
(%)	Q 3	9.09	36.36	36.36	18.18	N = 42
	Q 4	-	-	44.44	55.56	Chi-square = 21.60*
						Exact sig. = 0.0081*

Panel C: 4-year prior period (1995-98) vs. subsequent period (1999-00)

		Subsequent period (1999-2000) (%) Q 1	Q 2	Q 3	Q 4	
Prior period	Q 1	35.29	17.65	23.53	23.53	
(1995-98)	Q 2	58.82	23.53	17.65		
(%)	Q 3	5.88	52.94	35.29	5.88	N = 65
	Q 4	-	7.14	28.57	64.29	Chi-square = 39.52*
						Exact sig. = 0.0000*

Panel D: 3-year prior period (1996-98) vs. subsequent period (1999-00)

		Subsequent period (1999-2000) (%) Q 1	Q 2	Q 3	Q 4	
Prior period	Q 1	50.00	5.56	16.67	27.78	
(1996-98)	Q 2	38.89	27.78	22.22	11.11	
(%)	Q 3	11.11	50.00	33.33	5.56	N= 72
	Q 4	-	16.67	27.78	55.56	Chi-square = 31.56*
						Exact sig. = 0.0002*

Panel E: 2-year prior period (1997-98) vs. subsequent period (1999-00)

		Subsequent period (1999-2000) (%) Q 1	Q 2	Q 3	Q 4	
Prior period	Q 1	47.37	5.26	26.32	21.05	
(1997-98)	Q 2	42.11	21.05	26.32	10.53	
(%)	Q 3	5.26	68.42	26.32		N =74
	Q 4	5.88	5.88	23.53	64.71	Chi-square = 49.12*
						Monte Carlo sig. = 0.0000*

* significant at the 0.01 level

5.3.1.4 Quartile comparison tables as ranked by the M^2 measure

This section highlights results drawn from the quartile comparison table as ranked by the M^2 measure. It is noted that M^2 ranking results are exactly the same ranking results as the Sharpe ratio. The following M^2 result interpretation is, therefore, the same as the Sharpe result interpretation, which was reported in section 5.3.1.2.

Table 5.7 Panel A reveals that quartile rankings in the subsequent period are not significantly related to quartile rankings in six-year prior period. This indicates that using the M^2, six-year prior period ranking is an unreliable predictor of future performance. The similarity between Table 5.7 Panel A and Table 3.2 (an example of quartile comparison table when past performance does not predict future performance) is noted that ten cells within the table show an even distribution of 25 per cent.

Panels B, C, D and E of Table 5.7 show that quartile rankings in the subsequent period are related to fund quartile rankings in two-year to five-year prior periods (at the 5 per cent level). Panels B, C, D and E also reveal that the chance that funds would remain in the first quartile is in the range 29.41 to 45 per cent. Panel E indicates that if two-year prior period performance had been used to select a first quartile fund, this would have had a 45 per cent chance of duplicating the outstanding performance in the subsequent period.

Again, each quartile comparison table in Panels B, C, D and E reveals the highest percentage in the bottom right cells. More than half of funds in the fourth quartile (50 to 63.64 per cent) in prior periods remained in the fourth quartile in the subsequent period. This result suggests that investors should avoid funds which are ranked in the fourth quartile. Results such as these were typically found in the quartile comparison tables as ranked by the by the Treynor (5.3.1.1), Sharpe (5.3.1.2) and Jensen measures (5.3.1.3).

Table 5.7 Quartile comparison tables as ranked by the M^2

Panel A: 6-year prior period (1993-98) vs. subsequent period (1999-00)

		Subsequent period (1999-2000) (%)				
		Q 1	Q 2	Q 3	Q 4	
Prior period	Q 1	25.00	25.00	25.00	25.00	
(1993-98)	Q 2	25.00	25.00	25.00	25.00	
(%)	Q 3	50.00	25.00	25.00	-	N = 14
	Q 4	-	50.00	50.00	-	Chi-square = 3.50
						Exact sig. = 1.00

Panel B: 5-year prior period (1994-98) vs. subsequent period (1999-00)

		Subsequent period (1999-2000) (%)				
		Q 1	Q 2	Q 3	Q 4	
Prior period	Q 1	36.36	27.27	18.18	18.18	
(1994-98)	Q 2	27.27	45.45	27.27	-	
(%)	Q 3	36.36	27.27	18.18	18.18	N = 44
	Q 4	-		36.36	63.64	Chi-square = 19.27*
						Exact sig. = 0.0230*

Panel C: 4-year prior period (1995-98) vs. subsequent period (1999-00)

		Subsequent period (1999-2000) (%)				
		Q 1	Q 2	Q 3	Q 4	
Prior period	Q 1	29.41	17.65	17.65	35.29	
(1995-98)	Q 2	41.18	29.41	29.41	-	
(%)	Q 3	17.65	47.06	23.53	11.76	N = 67
	Q 4	12.50	6.25	31.25	50.00	Chi-square = 20.55*
						Exact sig. = 0.0132*

Panel D: 3-year prior period (1996-98) vs. subsequent period (1999-00)

		Subsequent period (1999-2000) (%)				
		Q 1	Q 2	Q 3	Q 4	
Prior period	Q 1	36.84	5.26	21.05	36.84	
(1996-98)	Q 2	42.11	31.58	26.32	-	
(%)	Q 3	21.05	47.37	21.05	10.53	N= 75
	Q 4	-	16.67	33.33	50.00	Chi-square = 28.40*
						Exact sig. = 0.0006*

Panel E: 2-year prior period (1997-98) vs. subsequent period (1999-00)

		Subsequent period (1999-2000) (%)				
		Q 1	Q 2	Q 3	Q 4	
Prior period	Q 1	45.00	-	30.00	25.00	
(1997-98)	Q 2	40.00	40.00	15.00	5.00	
(%)	Q 3	15.00	45.00	35.00	5.00	N =77
	Q 4	-	17.65	23.53	58.82	Chi-square = 37.07*
						Monte Carlo sig. = 0.0001*

* significant at the 0.05 level

5.3.1.5 Quartile comparison tables as ranked by raw returns

This section highlights results drawn from the quartile comparison table, Table 5.8, as ranked by the raw returns. In Table 5.8, Panel A shows that the quartile rankings in the subsequent period are not significantly related to six-year prior period ranking (at the 5 per cent level). This indicates that using the raw returns, six-year prior period ranking is an unreliable predictor of future performance. The similarity between Table 5.8 Panel A and Table 3.2 (an example of quartile comparison table when past performance does not predict future performance) is noted, in that eight cells within the table show an even distribution of 25 per cent.

Panels B, C, D and E of Table 5.8 show that quartile rankings in the subsequent period are related to quartile rankings in two-year to five-year prior periods at the 5 per cent level. Panel E shows that if the two-year prior period performance had been used to select a first quartile fund, there would have been a 50 per cent chance of duplicating that outstanding performance in the subsequent period. However, the first quartiles of the four and five-year prior periods reveal the relatively low percentage values of duplicating outstanding performance (lower than the benchmark of 25 per cent, which are 23.53 and 18.18 per cent respectively).

Results also reveal that the highest percentage of funds that remain in the same quartile are variously distributed in the tables. The highest percentage of funds that remained in the same quartile from the five-year prior period to subsequent period (Panel B) is found in the second quartile (54.44 per cent). The highest percentage of duplicating performance of the four-year prior period (Panel C) is found in the fourth quartile (37.50 per cent) and the highest percentage values for the three-year (Panel D) as well as the two-year prior periods (Panel E) are found in the first quartile (36.84 and 50 per cent respectively).

Table 5.8 Quartile comparison tables as ranked by raw returns

Panel A: 6-year prior period (1993-98) vs. subsequent period (1999-00)

		Subsequent period (1999-2000) (%)				
		Q 1	Q 2	Q 3	Q 4	
Prior period (1993-98) (%)	Q 1	25.00	25.00	50.00	-	
	Q 2	25.00	50.00	-	25.00	
	Q 3	25.00	25.00	25.00	25.00	N = 14
	Q 4	50.00	-	50.00	-	Chi-square = 5.25
						Exact sig. = 0.9605

Panel B: 5-year prior period (1994-98) vs. subsequent period (1999-00)

		Subsequent period (1999-2000) (%)				
		Q 1	Q 2	Q 3	Q 4	
Prior period (1994-98) (%)	Q 1	18.18	27.27	45.45	9.09	
	Q 2	36.36	**54.55**	-	9.09	
	Q 3	27.27	9.09	18.18	45.45	N = 44
	Q 4	18.18	9.09	36.36	36.36	Chi-square = 17.09*
						Exact sig. = 0.0490*

Panel C: 4-year prior period (1995-98) vs. subsequent period (1999-00)

		Subsequent period (1999-2000) (%)				
		Q 1	Q 2	Q 3	Q 4	
Prior period (1995-98) (%)	Q 1	23.53	35.29	29.41	11.76	
	Q 2	47.06	35.29	-	17.65	
	Q 3	23.53	17.65	29.41	29.41	N = 67
	Q 4	6.25	12.50	43.75	**37.50**	Chi-square = 17.71*
						Exact sig. = 0.0367*

Panel D: 3-year prior period (1996-98) vs. subsequent period (1999-00)

		Subsequent period (1999-2000) (%)				
		Q 1	Q 2	Q 3	Q 4	
Prior period (1996-98) (%)	Q 1	**36.84**	42.11	21.05	-	
	Q 2	36.84	26.32	10.53	26.32	
	Q 3	21.05	15.79	26.32	36.84	N= 75
	Q 4	5.56	16.67	44.44	33.33	Chi-square = 19.18*
						Monte Carlo sig. = 0.0219*

Panel E: 2-year prior period (1997-98) vs. subsequent period (1999-00)

		Subsequent period (1999-2000) (%)				
		Q 1	Q 2	Q 3	Q 4	
Prior period (1997-98) (%)	Q 1	**50.00**	20.00	25.00	5.00	
	Q 2	35.00	45.00	5.00	15.00	
	Q 3	10.00	20.00	35.00	35.00	N =77
	Q 4	5.88	17.65	41.18	35.29	Chi-square = 24.96*
						Monte Carlo sig. = 0.0025*

* significant at the 0.05 level

In summary, the main issue addressed in this section (5.3.1) is to test whether Thai equity funds tend to remain in the same quartile through time. The test of sub-periods of varying length, by using quartile comparison table analysis, suggests quartile ranking performance persistence between two-year to five-year prior periods and the subsequent period. All four risk-adjusted measures (the Treynor, Sharpe, Jensen and M^2 measures) and non risk-adjusted measure (raw returns) provide consistent results of persistence in those periods (two-year to five-year prior periods). The four risk-adjusted measures show that the highest percentage of funds remaining in the same quartile over time are found in the fourth quartile of the two-year to five-year prior periods. However, raw return results reveal that the highest percentage values of funds remaining in the same quartile are variously distributed in the tables.

5.3.2 Top quartile performance persistence

This section presents the percentage of funds which were in the top quartile in both prior and subsequent periods. Independence in quartile performance would be evidenced by a quartile percentage figure of 25 per cent and a figure of 100 per cent indicates perfect prediction of future results (Dunn and Thiesen 1983; Hallahan 1999). This means that higher percentage figures would be a better guide for investors to implement more stringent fund selection criteria.

Table 5.9 reveals that six-year prior period (1993-98) would not be a good guide to subsequent period performance since four of five measures indicate quartile percentage figures of 25 per cent. In addition, there is no pattern of increasing percentage and no pattern of declining percentage as the length of prior period expands.

Table 5.9 **Percentage of funds in the top quartile in both prior and subsequent periods (subsequent period 1999-00)**

Prior period	Treynor (%)	Sharpe (%)	Jensen (%)	M^2 (%)	*raw returns* (%)	n	n[a] (Jensen)
7-year (92-98)	*	*	*	*	*	6	6
6-year (93-98)	50.00	25.00	25.00	25.00	25.00	14	14
5-year (94-98)	**54.55**	36.36	**54.55**	36.36	18.18	44	42
4-year (95-98)	29.41	29.41	35.29	29.41	23.53	67	65
3-year (96-98)	36.84	36.84	44.44	36.84	36.84	75	72
2-year (97-98)	40.00	**45.00**	47.37	**45.00**	**50.00**	77	74

(a) Number of funds as ranked by the Jensen Alpha differs from other measures. Funds that fall into the inconclusive region when tested for serial correlation (Durbin-Watson statistic) are excluded from the sample set.
* indicates that the relation between prior and subsequent period performance could not be calculated because of too few funds in the seven-year prior period sample set.

Using a 25 per cent benchmark rate, 19 out of 25 cases of top quartile ranking in Table 5.9 are found to be above the benchmark. The highest persistence figures in terms of Treynor and Jensen measures are 54.55 per cent for the five-year prior period (1994-98); while for the Sharpe and M^2 are 45 per cent and raw returns measure is 50 percent for the two-year prior period (1997-98). Since percentages of top quartile persistence inconsistently vary, the optimal length of past performance for forecasting top quartile persistence cannot be suggested.

5.3.3 Bottom quartile performance persistence

Again, independence in quartile performance would be evidenced by a quartile percentage figure of 25 per cent, and a figure of 100 per cent indicates perfect prediction of future results. This indicates that higher percentage figures would be a better indicator for investors to implement more stringent fund selection criteria.

Table 5.10 reveals that a six-year prior period would not be a good guide to subsequent period performance because all measures indicate bottom quartile percentage figures of zero. In addition, there is no pattern of increasing percentage and no pattern of declining percentage as the length of prior period expands. The lack of pattern in results is consistent with the results of the top quartile performance persistence in 5.3.2 above.

Table 5.10 **Percentage of funds in bottom quartile in both prior and subsequent periods (subsequent period 1999-00)**

Prior period	Treynor (%)	Sharpe (%)	Jensen (%)	M^2 (%)	*raw returns* (%)	n	n[(a)] (Jensen)
7-year (92-98)	*	*	*	*	*	6	6
6-year (93-98)	0	0	0	0	0	14	14
5-year (94-98)	54.55	**63.64**	55.56	**63.64**	36.36	44	42
4-year (95-98)	50.00	50.00	**64.92**	50.00	**37.50**	67	65
3-year (96-98)	50.00	50.00	55.56	50.00	33.33	75	72
2-year (97-98)	**58.82**	58.82	64.71	58.82	35.29	77	74

(a) Number of funds as ranked by the Jensen Alpha differs from other measures. Funds that fall into the inconclusive region when tested for serial correlation (Durbin-Watson statistic) are excluded from the sample set.
* indicates that the relation between prior and subsequent period performance could not be calculated because of too few funds in the seven-year prior period sample set.

Using a 25 per cent benchmark rate, 20 out of 25 cases of bottom quartile rankings in Table 5.10 are found to be above the benchmark. The highest persistence figure in terms of the Treynor measure found in the two-year prior period (1997-98); the Sharpe and M^2 measures found in the five-year prior period (1994-98) whilst the Jensen and raw returns measures found in the four-year prior period (1995-98). Since percentages of bottom quartile persistence vary inconsistently, the optimal length of past performance for forecasting bottom quartile persistence cannot be suggested.

It is noteworthy that, using the risk-adjusted measures, all cases of two-year to five-year prior period results reveal a persistence figure of at least 50 per cent. This means that, in most cases, half of funds in the bottom quartile in two-year to five-year prior periods remain in the bottom quartile in the subsequent period. This result suggests that using a prior period of two to five years would provide a guide for investors to avoid the bottom-performing funds.

5.3.4 Summary of findings: quartile comparison table results (including top and bottom quartile rankings)

In summary, to test whether Thai equity funds tend to remain in the same quartile through time, quartile comparison tables have been analysed. The test of sub-periods with varying lengths suggests quartile ranking performance persistence between two-year to five-year prior periods and the subsequent period. This means that funds tend to remain in the same quartile when comparing two-year to five-year prior periods and the subsequent period.

The highest percentages both in top and bottom quartile persistence vary inconsistently across the different measures. For that reason, the optimal length of past performance for forecasting for both top and bottom quartile persistence cannot be suggested.

In addition, the four major risk-adjusted ranking results reveal that at least half of the funds in the bottom quartile in two-year to five-year prior periods remain in the bottom quartile in subsequent period. This result suggests that using prior periods of two to five years provides a guide for investors to avoid bottom performing funds.

Finally, based on the top and bottom quartile ranking results, there is no pattern of declining percentage and no pattern of increasing percentage as the length of prior period expands.

5.4 CONTINGENCY TABLE ANALYSIS

This section presents results of testing to establish whether funds classified as winners (or losers) in a prior period tend to repeat performance as winners (or losers) in a subsequent period. Two x Two (2 x 2) contingency tables are constructed to test the null hypothesis ($H_{06.4}$) for independence in the winner-loser results from a prior period to subsequent period. This independence is summarized by the use of the Cross Product Ratio (CPR). However, conclusions about CPR are tentative when a small sample size is used (Hallahan 1999). Fisher's Exact Test, an alternative statistic is also employed to test independence on variables of a 2 x 2 contingency table (see 3.4.4).

Table 5.11(Panels A and C) show that the null hypothesis ($H_{06.4}$) is rejected at the 5 per cent level when testing for the relationship between subsequent period and four-year to five-year prior periods. Panel A and C indicate that winners (losers) as ranked by the Treynor measure (Panel A) and Jensen alpha (Panel C) in a subsequent period are related to winners (losers) in four-year and five-year prior periods. Rankings by the Sharpe ratio (Panel B) and M^2 (Panel D) reveal that winners (losers) in the subsequent period are related to winners (losers) only in the five-year prior period. And the raw return results reveal that winners (losers) in the subsequent period are related to winners (losers) in two-year to five-year prior periods. All of these results are significant at the 5 per cent level.

Table 5.11 **Cross Product Ratio and Fisher's Exact Test results of contingency table analysis (subsequent period 1999-00)**

Prior period	Cross Product Ratio (CPR)	95 % confidence interval of CPR lower	upper	Fisher's Exact Test Exact sig. (2-tail)	no. of funds	rej / not rej H_0
Panel A: Treynor						
7-year (92-98)	0.2500	0.0084	7.4519	1.0000	6	not rej
6-year (93-98)	1.7778	0.2140	14.7666	1.0000	14	not rej
5-yaer (94-98)	**11.5600***	2.8219	47.3563	0.0007*	44	rej
4-year (95-98)	4.1818*	1.5082	11.5952	0.0072*	67	rej
3-year (96-98)	2.2489	0.8926	5.6659	0.1077	75	not rej
2-year (97-98)	1.5986	0.6501	3.9308	0.3652	77	not rej
Panel B: Sharpe						
7-year (92-98)	0.2500	0.0084	7.4519	1.0000	6	not rej
6-year (93-98)	1.7778	0.2140	14.7666	1.0000	14	not rej
5-yaer (94-98)	**4.5918***	1.2911	16.3306	0.0337*	44	rej
4-year (95-98)	1.9388	0.7341	5.1200	0.2250	67	not rej
3-year (96-98)	1.8047	0.7226	4.5071	0.2512	75	not rej
2-year (97-98)	2.4533	0.9815	6.1323	0.0694	77	not rej
Panel C: Jensen						
7-year (92-98)	4.0000	0.1342	119.2297	1.0000	6	not rej
6-year (93-98)	1.7778	0.2140	14.7666	1.0000	14	not rej
5-yaer (94-98)	**10.2400***	2.4748	42.3696	0.0017*	42	rej
4-year (95-98)	5.0600*	1.7644	14.5108	0.0028*	65	rej
3-year (96-98)	2.4694	0.9573	6.3700	0.0983	72	not rej
2-year (97-98)	2.1511	0.8503	5.4418	0.1626	74	not rej
Panel D: M^2						
7-year (92-98)	0.2500	0.0084	7.4519	1.0000	6	not rej
6-year (93-98)	1.7778	0.2140	14.7666	1.0000	14	not rej
5-yaer (94-98)	**4.5918***	1.2911	16.3306	0.0337*	44	rej
4-year (95-98)	1.9388	0.7341	5.1200	0.2250	67	not rej
3-year (96-98)	1.8047	0.7226	4.5071	0.2512	75	not rej
2-year (97-98)	2.4533	0.9815	6.1323	0.0694	77	not rej
Panel E: raw returns						
7-year (92-98)	4.0000	0.1342	119.2297	1.0000	6	not rej
6-year (93-98)	1.7778	0.2140	14.7666	1.0000	14	not rej
5-yaer (94-98)	4.5918*	1.2911	16.3306	0.0337*	44	rej
4-year (95-98)	5.5200*	1.9382	15.7207	0.0014*	67	rej
3-year (96-98)	5.8017*	2.1467	15.6796	0.0005*	75	rej
2-year (97-98)	**10.7407***	3.7378	30.8639	0.0000*	77	rej

* significant at the 0.05 level

The highest values of the (statistically significant) Cross Product Ratio (CPR) for all risk-adjusted performance measures are found in the relationship between the subsequent period (1999-00) and the five-year prior period (1994-98), indicating that the five-year prior period appears to be a better guide to future performance than any other prior period. This finding is in accordance with the regression analysis findings and the Spearman rank correlation coefficient analysis. This is different to the results for the raw return data that the highest CPR value is found in the two-year prior period. The inconclusive finding between risk-adjusted performance measures and raw returns is consistent with the findings of Brown et al. (1992) and Hallahan (1999).

In addition, it should be noted that the findings by contingency table analysis are different from the findings by regression analysis, Spearman rank correlation coefficient, and quartile comparison table analysis. These three methodologies found similar results, that subsequent period performance is related to the two-year to five-year prior period performance, but the contingency table analysis reveals inconsistent results across the five ranking measures (Treynor, Sharpe, Jensen, M^2 and raw returns). These inconsistent results may be due to the resultant lower cell counts of the 2 x 2 contingency table. However, over the five ranking measures, the consistent result is the significant Cross Product Ratio (CPR) of the five-year prior period. It means that all ranking measures confirm that, using the five-year prior period performance, winners followed by winners occur much more often than a win followed by a loss. Similarly, losing in the initial period is more likely to be followed by losing in the subsequent period. This result supports the finding of the optimal past performance of the five-year prior period in 5.1.2.

In summary, all ranking measures indicate that funds that classified as winners (losers) in the subsequent period are related to winners (losers) of the five-year prior period. In addition, when funds are ranked by the Treynor and Jensen measures, a relationship between subsequent period and four-year to five-year prior periods is found. And when funds are ranked on the basis of raw returns, a relationship between subsequent period and two-year to five-year prior periods is found. The highest values of the (statistically significant) Cross Product Ratio (CPR) for the risk-adjusted performance measures are found in the five-year prior period, indicating that using the risk-adjusted measures, the five-year prior period appears to be a better guide to predict future performance than any other prior period. However, the highest CPR value of the non risk-adjusted measure (raw returns) is found in the two-year prior period, indicating that when using raw return ranking, the two-year prior period seems to be a better guide to predict future performance than any other prior period.

5.5 SUMMARY

In this chapter has been presented the empirical results from testing hypotheses in order to answer research questions six and seven: respectively, whether or not subsequent period performance is relative to prior period performance; and whether or not the information content of prior period performance varies with the length of period of prior performance. The data has been tested through the use of four methodologies: regression analysis, Spearman rank correlation coefficient, quartile comparison tables (including top and bottom quartile rankings), and contingency table analysis. Five measures of fund performance have been used: Treynor measure, Sharp ratio, Jensen alpha, M^2, and raw returns. The results can be summarised as follows.

All methodologies (except contingency table analysis) provide similar evidence that past performance using sub-periods of two to five years prior information are a guide to future performance. Based on the data of this study and risk-adjusted performance measures, the optimal past performance period to be used as a guide to future performance is the five-year prior period. Although there is evidence that subsequent period performance is related to two-year to five-year prior periods, there is no evidence that increasing the length of performance history from two to five years will lead to a monotonic increase in the predictive value of past-period information. Moreover, all methodologies reveal that there is no evidence of a relationship between prior and future performance when using a six-year or seven-year prior period.

Regression analysis of risk-adjusted returns provides strong evidence in support of performance persistence for the two-year to five-year prior periods. The period of greatest explanatory power is the five-year prior period (R^2 = 0.34). Although this implies that the five-year prior period is a better guide to future performance than that provided by other periods, the R^2 value (0.34) is low. In addition, there is no pattern of increasing explanatory power as the length of prior period expands.

Spearman rank correlation coefficients suggest performance persistence for the two-year to five-year prior periods. All risk-adjusted ranking measures reveal that the highest Spearman rank correlation coefficient is found in the case of the five-year prior period. This finding supports the regression analysis result, that the five-year prior period is a better guide to future performance than that provided by other periods. However, the non risk-adjusted measure in terms of raw returns reveals that the highest Spearman rank correlation coefficient is found in the case of the two-year prior period.

Quartile comparison tables reveal that quartile ranking in the subsequent period is related to quartile ranking in the two-year to five-year prior periods. The highest percentages in top and bottom quartile performance persistence vary inconsistently across the different performance measures. Hence, the optimal length of past performance for forecasting for both top and bottom quartile persistence cannot be suggested. In addition, the four major risk-adjusted ranking results reveal that at least half of the funds in the bottom quartile in two-year to five-year prior periods remain in the bottom quartile in subsequent period, indicating that using a prior period of two to five years would provide a guide for investors to avoid bottom-performing funds.

Contingency table analysis reveals inconsistent results across the different performance measures. That is, when funds are ranked by the Treynor and Jensen measures, funds classified as winners (losers) in the subsequent period are related to winners (losers) of the four-year to five-year prior period. When funds are ranked by the Sharpe and M^2 measures, the relationship between the subsequent period and five-year prior period is found. And when funds are ranked by the raw return, the relationship between the subsequent period and two-year to five-year prior period is found. It can be observed that all raking measures indicate that funds classified as winners (losers) in subsequent period are related to winners (losers) of the five-year prior period. In addition, the highest values of the Cross Product Ratio (CPR) for the risk adjusted performance measures indicate that using the risk-adjusted measures, the five-year prior period appears to be a better guide to predict future performance than any other prior period. However, the highest CPR value of the non risk-adjusted measure (raw returns) indicates that using raw return ranking, the two-year prior period seems to be a better guide to predict future performance than any other prior period.

Chapter 6

CONCLUSIONS, DISCUSSION, IMPLICATIONS, LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

The aim of this chapter is to draw conclusions from the results of the research. This chapter consists of four sections. The first section presents the conclusions and discussion; the second section presents the implications of the research; the third section identifies the limitations inherent in this study; and the chapter concludes with suggestions for future research.

6.1 CONCLUSIONS AND DISCUSSION

The purpose of this section is to present a summary of this study. An overview of the aims of this research is presented in 6.1.1. The development of evaluation measures, fund performance studies, and persistence of fund performance studies are presented in 6.1.2. The findings of Thai equity fund performance are presented in 6.1.3. The findings of fund performance persistence are presented in 6.1.4.

6.1.1 An overview of the two aims

The two main aims of this study are to examine the performance of Thai equity funds existing during period 1992-2000 and investigate the relationship between past and future performance. This study also examined the persistence of fund performance between a subsequent period and a series of prior periods of varying length. If the persistence in performance was verified, this would lead to the identification of an optimal past performance information set for equity funds in Thailand.

6.1.2 The development of evaluation measures, fund performance studies, and persistence of fund performance studies

Before the 1960s, the investment community evaluated portfolio performance almost entirely on the basis of the rate of return. Although researchers were aware of the concept of risk, no reliable measure had emerged (Reilly and Brown 2000). In the early 1960s, Markowitz demonstrated how investors could measure risk but investors still had to consider return and risk separately. Thereafter, the capital asset pricing model (CAPM) was developed, and Treynor (1965) proposed the Treynor measure, the first risk-adjusted performance measure that combined return and risk performance into a single value. Sharpe (1966) developed the Sharpe ratio and Jensen (1968) developed the Jensen alpha. Subsequent to these works, other researchers have developed alternative performance evaluation measures. Some studies attempted to eliminate the limitations of these three measures including Grinblatt and Titman (1989b), Modigliani and Modigliani (1997), Block and French (2002). Further studies added more testing factors that influence fund performance (Elton, Gruber and Blake 1996b; Carhart 1997). Other researchers have focused studies on components of investment performance (Fama 1972; Moses, Cheney and Veit 1978).

Potential bias in fund performance measures has been examined in many studies. These potential biases are benchmark error (Roll 1977, 1978, 1980 and 1981), survivorship bias (Grinblatt and Titman 1989a; Brown, Goetzmann, Ibbotson, and

Ross 1992; Malkiel 1995; Elton, Gruber and Blake 1996a) and the bias in relationship between risk-adjusted measures and the risk involved (Friend and Blume 1970; Klemkosky 1973; Leland 1999).

Empirical results of mutual fund performance in developed capital markets have been mixed depending upon time period of study (Carlson 1970; Bird, Chin and McCrae 1983; Robson 1986), fund objectives (Carlson 1970; McDonald 1974; Kim 1978; Brown and Goetzmann 1995), choice of market benchmark (Carlson 1970; Robson 1986; Lehmann and Modest 1987), and survivability (Malkeil 1995; Elton, Gruber, and Blake 1996a).

Empirical studies of persistence in fund performance in developed capital markets have also revealed inconsistent results. Several studies have examined and found evidence of performance persistence, such as those by Klemkosky (1977), Grinblatt and Titman (1992), Hendricks, Patel, and Zeckhauser (1993), Goetzmann and Ibbotson (1994), Malkiel (1995), Brown and Goetzmann (1995), Elton, Gruber, and Blake (1996b), Carhart (1997), Bers and Madura (2000). However, a number of studies both in the US and Australia found evidence that the past performance of a fund is an unreliable guide to future performance. Such findings are claimed by Carlson (1970), Dunn and Theisen (1983), Bird, Chin and McCrae (1983), Robson (1986), Phelps and Detzel (1997), and Hallahan (1999).

Empirical results of Thai fund performance studies during the early 1990s have shown that although studying a similar period, results were inconsistent. One found that Thai equity funds outperformed the market portfolio (Bhovichitra 1996) but another found that the funds underperformed the market (Mainkamnurd 1996). The persistence of fund performance was also investigated during the early 1990s and the evidence of performance persistence was found (Mainkamnurd 1996). However, each study is of limited reliability because of the shortness of the time period in each study (Kongcharoen 1992; Bhovichitra 1996; Mainkamnurd 1996; Pornchaiya 2000).

6.1.3 Thai equity fund performance results and discussion

The primary aim of this study is to examine Thai equity fund performance during 1992-2000. It was expected that the achievement of the primary aim would involve investigations of fund performance in sub-periods of expanding and contracting market environments, the relationship between investment performance and risk, and the correlation between the four risk-adjusted measures. Summaries and discussion on the findings of these investigations follow.

6.1.3.1 Fund performance results, 1992-2000

Thai equity fund performance in this study was examined utilising both risk-adjusted performance measures (Treynor, Sharpe, Jensen and M^2 measures) and non risk-adjusted performance measure in terms of rate of return per month. The four major risk-adjusted performance measures strongly indicate that the average performance of Thai equity funds existing during the period 1992-2000 was inferior to the market portfolio. In addition, the majority of Thai equity fund performance was inferior relative to the market benchmark. However, when funds were measured in terms of the rate of return, the performance of Thai equity funds on average was superior to that of the market and the majority of the funds also outperformed the return of the market benchmark. Furthermore, annual performance of Thai equity funds was also examined. The four risk-adjusted performance measures reveal that the average performance of Thai equity funds outperformed the market portfolio for 7 years, excepting the year 1998 and 1999. A possible explanation of the underperformance in the years 1998 and 1999 could be that the fund performances in these two years were significantly effected by a severe financial crisis during which the economy collapsed in 1997.

6.1.3.2 Fund performance in an expansionary market environment

During the expansionary market environment, January 1992-January 1996, the four major risk-adjusted performance measures and the non risk-adjusted performance measure in terms of rate of return strongly indicate that the average performance of Thai equity funds was superior to the market portfolio and the majority of the Thai funds outperformed the market benchmark. This finding confirms the study of Bhovichitra (1996) who used the CAMP to measure the Thai equity fund performance during the similar period and found that the majority of Thai equity funds outperformed the market. In contrast, this finding rejects the study of Mainkamnurd (1996) who found that the Thai funds underperformed the market portfolio during the similar period.

6.1.3.3 Fund performance in a contractionary market environment

During the contractionary market environment, February 1996 - December 2000, all four risk-adjusted measures indicate that the average performance of Thai equity funds was inferior to the market portfolio. In addition, the majority of Thai equity funds underperformed relative to the market benchmark. This finding is consistent with the finding by Pornchaiya (2000), who employed the CAPM to investigate abnormal returns reporting that Thai equity funds during a part of the economic recession period (1996-1999) underperformed the market portfolio.

However, when funds were measured in terms of the rate of return, the performance of Thai equity funds on average outperformed the market portfolio and the majority of the funds were also superior to the return of the market benchmark. The finding of different results from risk-adjusted and non risk-adjusted performance is not, however, surprising because they are different measures. The risk-adjusted performance measures express fund excess return per unit of risk while rate of return expresses only a rate of return (disregarding risk). Issues of whether the risk-adjusted performance measures or non risk-adjusted performance measure best reflects fund performance remains to be resolved by further studies.

It can be noticed that performance of Thai funds in terms of risk-adjusted performance measures also depended on the time period, that is during an expansionary market environment, funds outperformed the market but during a contractionary market environment, funds underperformed when compared to the market. This finding is in accordance with the evidence in the US claimed by Carlson (1970) and the findings in Australia claimed by Bird, Chin and McCrae (1983) and Robson (1986), reporting that the issue of whether funds outperform the market depends on the selection of the time period of the study. In Robson (1986), for example, Australian fund performance on average did not outperform a benchmark portfolio during ten-year period 1969-1978. However, when the ten-year period was divided into two sub-periods, 1969-

1973 and 1974-1978, results showed that the fund performance depended on the selection of time period of the study. That is, result of the first five-year period revealed that the average return of Australian funds was greater than the benchmark and result of the second five-year period reported that the average return of the funds was less than the benchmark index.

6.1.3.4 Investment performance and risk

The relationship between fund investment performance and risk varies inconsistently across the different fund measurement techniques. There appears to be no discernible relationship between the Treynor measure and beta (systematic risk), between the Jensen performance and beta, as well as between the M^2 performance and S.D. (total risk). However, there was a significant slight positive relationship between the Sharpe ratio investment performance and S.D.

The finding of no relationship between the Treynor performance and beta as well as Jensen performance and beta is in accordance with theory as noted by Friend and Blume (1970), that the risk-adjusted performance measures should be independent of the risk measure. However, a positive relationship between Sharpe performance and S.D. existed in this study, indicating a bias in a positive direction. This positive bias was also found in the study by Klemkosky (1973), however, he found the positive bias between Treynor as well as Jensen measures and relevant risk measures.

In addition, it was expected that rate of return and the risk measures would be significantly related. Based on the sample evidence, the relationship between the rate of return and both risk measures, beta and S.D., reveals a significant slight inverse relationship, indicating that rate of return was a decreasing function of risk. This means that during 1992-2000 lower risk funds as defined by both beta and S.D. appeared to get a higher rate of return than higher risk funds. This finding could be a function of the time period of this study. According to Robson (1986), an inverse relationship might be expected for risk and return when the market portfolio return was less than the risk free rate, the situation of Thai equity funds on average, during all of the period 1992-2000. This finding is in accordance with Robson's statement and is consistent with the finding by Kim (1978) who examined the performance of the US mutual funds during 1969-1975, a contractionary market period in the US, finding an inverse relationship between return and risk. Although this finding is in conflict with the findings in the US of McDonald (1974) who found that return of mutual funds was an increasing function of both systematic risk (beta) and total variability (S.D.) over the period of 1960-1969, McDonald stated that it was the period of market indices rising in the US (a positive risk-return relationship is expected). Carlson (1970) also reported that there was a positive correlation between return and total variability during 1948-1967. However, evidence in Australia claimed by Robson (1986) indicated that there was no relationship between risk and rate of return of Australian unit trusts and mutual funds during 1974-1978.

6.1.3.5 Correlation between the four risk-adjusted measures

High significant positive relationships between the Treynor, Sharpe, Jensen and M^2 measures in this study (all correlation values are higher than 0.82) indicate that any one measure is sufficient to examine Thai fund performance. This finding is consistent with the finding in the US claimed by Shawky (1982), reporting that very high correlation values were found among the Treynor, Sharpe and Jensen performance measures (all correlation values are higher than 0.90), and the findings in Australia by Bird, Chin and McCrae (1983) who also found very high correlation values between the Treynor, Sharpe and Jensen measures (all are above 0.95).

6.1.4 The persistence of Thai equity fund performance results and discussion

The secondary aim of this study is to examine the persistence of fund performance. It was expected that the achievement of the secondary aim would involve investigations of the relationship between past and future performance and an exploration of the optimal past performance information set for equity funds in Thailand.

The persistence of Thai equity fund performance in this study has been investigated through the use of four methodologies: (1) regression analysis; (2) Spearman rank correlation coefficient; (3) quartile comparison tables (including top and bottom quartile rankings); and (4) contingency tables. The time frame is split into a subsequent period of two years (1999-2000), and varying prior periods of two years (1997-98), three years (1996-98), four years (1995-98), five years (1994-98), six years (1993-98) and seven years (1992-98). This selection of the length enables a comparison of the relationship between current period performance and a series of past periods of varying length and enables an exploration of optimal past performance information (Hallahan 1999). The Treynor, Sharpe, Jensen, M^2 and raw returns measures have been used to measure and rank fund performance.

All methodologies (except the contingency table) reveal similar results, that using a two-year to five-year prior period information is a guide to future performance. Based on the sample evidence and the testing on explanatory power (R^2 value of the cross-sectional regression, equation 3-11), the optimal past performance period to be used as a guide to future performance is the five-year prior period. However, a low value of explanatory power (R^2) must be noted. Whereas there is evidence that subsequent period performance is related to two-year to five-year prior periods, there is no pattern of increasing predictive power nor any pattern of declining predictive power as the length of prior period expands (from two to five years). Although there is evidence that subsequent period performance is related to two-year to five-year prior periods, all methodologies reveal that there is no evidence of a relationship between subsequent period performance and a six-year or seven-year prior period.

The finding on relationship between past and future performance in this study is consistent with the finding by Mainkamnurd (1996) who used time series regression to examine the relationship between two sub-periods and found persistence of Thai fund performance during 1992-1995.

This is compared to the findings of Hallahan (1999), the first using Australian data to examine how extending performance history affects information content. He found that the persistence in Jensen alpha performance for Australian fixed interest funds existed when using regression analysis. He also found that the explanatory power is greater when longer periods of performance history of fixed interest funds were used. The finding of Thai fund performance persistence is consistent with Hallahan's finding in respect of the existence of persistence but in conflict with the results for explanatory power. That is, Hallahan found the pattern of increasing predictive power as the length of prior period expands but the finding of this Thai performance persistence study reported no pattern of increasing predictive power as the length of the prior period is expanded.

Moreover, Hallahan (1999) also found that prior period top-quartile (and bottom quartile) rankings showed strong persistence in respect of the risk-adjusted performance of fixed-interest funds. The findings of the persistence of Thai fund performance in this study are consistent with Hallahan's findings. At least half of Thai funds in respect of the risk-adjusted performance in the bottom quartile of two to five year prior periods remain in the bottom quartile in the subsequent period. This result provides a guide for investors to avoid bottom-performing funds. Although Hallahan found performance persistence for fixed interest funds, he did not find evidence of performance persistence for other types of fund.

6.2 IMPLICATIONS OF THE RESEARCH FINDINGS

The first implication of this study is that Thai fund performance as measured by risk-adjusted performance measures and as measured only on the basis of the rate of return provide different results. The four major risk-adjusted performance measures strongly documented that during 1992-2000 Thai equity funds industry underperformed the market portfolio. In contrast, when funds were measured in terms of the rate of return, the performance of Thai equity funds outperformed that of the market.

The inconsistent results of fund performance when using different measures, the risk-adjusted performance measures and non risk-adjusted performance measure (rate of return), suggest that it would be better for investors to consider fund performance information including not only the rate of return information but also the risk-adjusted performance information. At present most fund management companies provide fund performance information reporting only the rate of return. This study suggests that the risk-adjusted performance information should be made available to investors.

The second implication is that there appeared to be an inverse relationship between rate of return and both systematic risk (beta) and total risk (S.D.). Based on the sample evidence, during 1992-2000, lower risk funds appeared to get a higher rate of return than higher risk funds. However, this could be a function of the time period of this study.

The third implication is that any one of the four major risk-adjusted measures is sufficient to examine risk-adjusted performance of Thai equity funds. However, for the purpose of gaining insight into fund performance, all four measures should be considered by all participants in the Thai equity fund industry including regulators, fund managers, investors, analysts and researchers, and new market participants because of the differing insights they provide regarding the performance of funds. The Treynor measure provides result on fund's excess return per unit of systematic risk while the Sharpe ratio provides result on fund's excess return per unit of total risk. The Jensen Alpha's result reports how much of the rate of return of a mutual fund is attributable to the fund manager's ability to derive above average returns adjusted for systematic risk. For the investors who not intimately familiar with regression analysis and the modern theory of finance, the M^2 is intuitively clear and easier (than the first three measures) to identify the best portfolio, the portfolio that has the highest return for any level of risk. It is also applicable to any type of portfolios.

The fourth implication is the finding of the persistence in fund performance. Two to five-year performance history can be used as a guide to predict future performance. However, this persistence phenomenon must be used with caution. The findings are likely to be influenced by survivorship bias since persistence can only be tested with a sample that includes funds that have existed in both prior and subsequent periods, the sample characteristics must necessarily be influenced by survivorship.

The fifth implication is the finding of the optimal past performance. Based on the data of this study and the testing on explanatory power (R^2), information for a five-year prior period seems to be a better guide to future performance than any other period. Furthermore, increasing the length of performance history does not lead to a monotonic increase in the predictive power of past period information.

6.3 LIMITATIONS

Unlike fund performance studies in developed financial markets, research study in Thailand, a developing financial market, faces a number of limitations, including data collection, proxy for variables, selection of the risk-free rate, and the market index. The inherent limitations of this study are as follows.

The first limitation is incomplete fund data. Since fund management companies provided information voluntarily and the NAV data of several terminated funds was not available, fund data banks were subject to survivorship bias.

Second, there was no publicly available market index in Thailand that included dividend distributions. Therefore, the market benchmark in this study may be subject to potential bias. The only market index for which data is available over the study period, from January 1992 through December 2000, is the SET Index. This index consists of the population of equity securities in the Thai stock market but has the limitation of not including dividend distributions. Although the Stock Exchange of Thailand (SET) publishes an alternative index, the SET 50 Index which consists of the top 50 equity securities in the Thai stock market, this index was first published only in August 1995 and therefore not available for the full nine-year period 1992-2000 of this study.

Third, a proxy for the risk-free rate is different from the proxy that has been utilised in developed country studies. Since the Thai government stopped issuing the new Government Bonds during the period 1990-1998, there was no risk-free yield curve for Government Bonds during that period. Therefore, this study has employed the deposit rate of commercial banks to be used as a proxy for the risk-free rate. Since the deposit rate in Thailand gets a full guarantee from the Thai government, it is effectively risk free. In fact, the deposit rate of commercial banks is normally higher than rate of return on the Government Bonds. Therefore, the choice of the risk-free rate may influence the interpretation of the results of this study.

Fourth, most of the funds have been launched or have been operating significantly after 1992; therefore, the majority of the funds in the sample set have different holding horizons. This can be illustrated by the fact that only seven local equity funds[1]

---

[1] One of these seven funds, Ruam Pattana Fund (RPF), was terminated in November 1993 and the NAV data of this fund is not available. The sample set of this study remains only six funds at the beginning of the study period.

existed at the beginning of this study time period. Since most of the funds have a different commencement date, the ages of these funds, namely observations (months), are different. Ranking fund performance when funds are measured by the Treynor, Sharpe, M^2 and rate of return measures, may result in bias. For this reason, the results of fund performance ranking during 1992-2000 in terms of these four measures have not been reported in this study.

Fifth, the sample in this study consists of both closed-end funds and open-end funds. Most fund performance studies in developed financial markets examine closed-end fund performance separately from open-end fund performance. Two reasons why the sample in this study consists of both closed-end and open-end funds are: (1) changing fund type (i.e. from closed-end type to open-end type) has been a common occurrence in the Thai fund industry and the majority of closed-end funds have changed fund type to be open-end funds; and (2) in practice, although funds have changed type from closed-end to open-end, money that has been pooled in funds has continually been managed. Therefore, return of funds should be continually calculated as the funds have been continually operating. However, closed-end funds and open-end funds have their own characteristics. Combining closed-end fund and open-end funds into one sample may influence fund performance results and the conclusions inferred.

Sixth, a number of alternative evaluation measures have been developed in the US studies, such as those by Elton, Gruber and Blake (1996b), Carhart (1997). Data for the developing financial market, Thailand, is not complete. During the early 1990s, some important data including fund size, book-to-market equity, and management fee of many funds was not available as monthly data, or not available. Therefore, it is not possible yet to employ these measures in this study.

Seventh, the three major risk-adjusted measures, Treynor, Sharpe and Jensen measures, have been criticised following criticism of asset pricing models (Brailsford and Heaney 1998). The interpretations in this study warrant caution as a consequence of the criticism of Treynor, Sharpe and Jensen measures.

Eighth, finding persistence in fund performance in this study warrants caution due to the dependent nature of the data.

Ninth, the finding on positive relationship between the Sharpe performance and its risk measure (S.D.) indicates that the Sharpe measure is biased in a positive direction when employed to measure Thai equity fund performance.

6.4 SUGGESTIONS FOR FUTURE RESEARCH

The limitations presented in 6.3 provide opportunities for future studies of fund performance in Thailand as follows.

First, if the fund data bank in Thailand is more complete and proxy measures are more comprehensive than this current period, it will be worthwhile to consider other evaluation measures to examine fund performance because of the differing insights they provide regarding the performance of funds. In addition, financial characteristics that may influence a fund performance, such as fund's size, service fee, proportion of investment and other factors, are suggestions to be considered. Furthermore, if an appropriate market benchmark is to be compared with other types of Thai funds, (such as fixed income funds, flexible funds, specialist funds and balanced funds), is available, it is appropriate to examine the performance of other types of Thai funds.

Second, as stated in 6.3, this study has employed the deposit rate of commercial banks to be a proxy for risk-free rate because there was no risk-free yield curve of the Government Bonds and the Thai government gives a full guarantee for the deposit rate. Since the deposit rate of commercial banks is normally higher than rate of return on the Government Bonds, issues of the *true* risk-free rate and the effect of risk-free rate to risk-adjusted performance of Thai funds are of interest for future research.

Third, the finding on positive bias between the Sharpe performance and its risk measure (S.D.) when employed to measure Thai equity fund performance leads to the issue of how much the bias effects fund performance, and how to eliminate the bias. These questions require further future research.

Fourth, to gain insight into Thai fund performance history, different structures of sub-periods for testing fund performance persistence are suggested for further study. The examples of different structures of sub-periods are one year with both adjacent and cascading periods for testing short-term persistence, two years (or more) with both adjacent and cascading periods for testing longer-term persistence.

BIBLIOGRAPHY

Alexander, G.J. and Chervany, N.L., 1980, 'On the Estimation and Stability of Beta', *Journal of Financial and Quantitative Analysis'*, Vol. 15, No. 1, pp. 123-137.

Association of Investment Management Companies 1996, *An Overview of the Mutual Fund Industry in Thailand*, Bangkok.

Association of Investment Management Companies 1999, *AIMC Fact Book Year 1999*, Bangkok.

Bal, Y. and Leger, L.A. 1996, 'The Performance of UK Investment Trusts', *The Service Industrial Journal,* Vol. 16, No. 1, January, pp. 67-81.

Bauman, W.S., and Miller, R.E. 1994, 'Can Managed Portfolio Performance Be Predicted?' *Journal of Portfolio Management,* Vol. 20, No. 4, pp. 31-40.

Berenson, M.L. and Levine, D.M. 1996, *Basic Business Statistics: Concepts and Applications*, 6th ed., Prentice Hall, Englewood Cliffs.

Bers, M.K. and Madura, J. 2000, 'The Performance Persistence of Closed-End Funds', *The Financial Review*, Vol.35, No.3, pp.33-52.

Bernstein, P. 2000, 'Why I Shall Miss Merton Miller', *Journal of Portfolio Management*, Vol. 27, No.1, p.1.

Bierman, H. Jr., and Swamminathan, B. 2000, 'Managing a Closed-End Investment Fund', *The Journal of Portfolio Management*, Vol. 26, No. 4, Summer, pp. 49-52.

Bird, R., Chin, H. and McCrae, M. 1983, 'The Performance of Australian Supperannuation Funds', *Australian Journal of Management*, Vol. 8, No.1, pp. 49-69.

Bhovichitra, M. 1996, 'An Analysis of Return Rate and Risk of Mutual Funds in Thailand', unpublished Master of Science (Economics) Thesis, Kasetsat University.

Blake, D. and Timmerman, A. 1998, 'Mutual Fund Performance: Evidence for the UK', *European Finance Review,* Vol. 2, No. 1, pp. 57-77.

Blake, I.R., Elton, E.J. and Gruber, M.J. 1993, 'The Performance of Bond Mutual Funds', *Journal of Business*, Vol. 66, No. 3, pp. 371-403.

Block, S.B. and French, D.W. 2002, 'The Effect of Portfolio Weighting on Investment Performance Evaluation: The Case of Actively Managed Mutual Funds', *Journal of Economics and Finance,* Vol. 26, No. 1, Spring, pp. 16-30.

Blume, M. 1971, 'On the Assessment of Risk', *Journal of Finance,* Vol. 26, No. 1, March, pp. 1-10.

Bogle, J.C. 1992, 'Selecting Equity Mutual Fund', *Journal of Portfolio Management*, Vol. 18, No. 2, Winter, pp. 94-100.

Brailsford, T. and Heaney, R. 1998, *Investments: Concepts and Applications in Australia,* Harcourt Brace, Sydney.

Brown, S.J. and Goetzman, W.N. 1995, 'Performance Persistence', *Journal of Finance*, Vol. 50, No. 2, June, pp. 679-698.

Brown, S.J., Goetzmann, W.N., Ibbotson R.G., and Ross, S.A. 1992, 'Survivorship Bias in Performance Studies', *The Review of Financial Studies'*, Vol. 5, No. 4, pp. 553-582.

Cai, J., Chan, K.C. and Yamada, T. 1997, 'The Performance of Japanese Mutual Funds', *Review of Financial Studies*, Vol. 10, No. 2, pp. 237-274.

Carlson, R.S. 1970, 'Aggregate Performance of Mutual Funds, 1984-1967', *Journal of Financial and Quantitative Analysis*, Vol. 5, pp. 1-32.

Carhart, M. M. 1997, 'On Persistence in Mutual Fund Performance', *Journal of Finance,* Vol. 52, No. 1, March, pp. 57-82.

Chen, S. and Lee, C.F. 1981, 'The Sampling Relationship between Sharpe's Performance Measure and Its Risk Proxy: Sampling Size, Investment Horizon and Market Conditions', *Management Science,* Vol. 27, No. 6, June, pp. 607-618.

Chen, S. and Lee, C.F. 1986, 'The Effects of the Sample Size, Investment Horizon and Market Conditions on the Validity of Composite Performance Measure: A Generalization', *Management Science,* Vol. 32, No. 11, November, pp. 607-618.

Christensen, R.1997, *Log-Linear models and logistic Regression,* 2nd ed., Springer-Verlag, New York.

Copeland, T. and Weston, J.F. 1988, *Financial Theory and Corporate Policy,* 3rd ed., Addison-Wesley, New York.

Cornell, B. 1979, 'Asymmetric Information and Portfolio Performance Measurement', *Journal of Financial Economics,* Vol. 7, No. 4, December, pp. 381-390.

Cowles, A., 1933, 'Can Stock Market Forecasters Forecast?', *Econometrica*, Vol. 1, No.3, pp. 309-325.

Dahlquist, M., Engström, S. and Söderlind, P. 2000, 'Performance and Characteristics of Swedish Mutual Funds', *Journal of Financial and Quantitative Analysis,* Vol. 35, No. 3, September, pp. 409-423.

Daniel, K., Grinblatt, M., Titman, S. and Wermers, R. 1997, 'Measuring Mutual Fund Performance with Characteristic-Based Benchmarks', *Journal of Finance*, Vol. 52, No. 3, July, pp. 1035-1058.

Dermine, D. and Röller, L. 1992, 'Economies of Scale and Scope in French Mutual Funds', *Journal of Financial Intermediation,* Vol. 2, No. 1, pp. 83-93.

Detzel, F.L. and Weigand, R.A. 1998, 'Explaining Persistence in Mutual Fund Performance', *Financial Services Review,* Vol. 7, No. 1, pp. 45-55.

Dhrymers, P., Friend, I. and Gultekin, N.B. 1984, 'A Critical Reexamination of the Empirical Evidence on the Arbitrage Pricing Theory', *Journal of Finance*, Vol. 39, No. 2, June, pp.323-346.

Dhrymers, P., Friend, I., Gultekin, M.N. and Gultekin, N.B. 1985, 'New tests of the APT and their Implications', *Journal of Finance*, Vol. 40, No. 3, July, pp.659-674.

Dixon, C.1999, 'The Developmental Implications of the Pacific Asian Crises: The Thai Experience', *Third World Quarterly*, Vol. 20, No. 2, pp. 439-452.

Dunn, P.C. and Thiesen, R.D. 1983, 'How Consistently Do Active Managers Win?', *Journal of Portfolio Management*, Vol. 9, No. 4, Summer, pp. 47-53.

Dybvig, P.H. and Ross, S.A. 1985, 'Differential Information and Performance Measurement Using a Security Market Line', *Journal of Finance*, Vol. 40, No. 2, pp. 383-399.

Elton, E.J., Gruber, M.J., and Blake C. R. 1996a, 'Survivorship Bias and Mutual Fund Performance', *Review of Financial Studies'*, Vol. 9, No. 4, pp. 1097-1120. Reproduced in Elton, E.J. and Gruber, M.J. (eds.) 1999, *Investment Volume 2: Securities Prices and Performance,* The MIT Press: Cambridge, pp. 209-234.

Elton, E.J., Gruber, M.J. and Blake, C.R. 1996b, 'The Persistence of Risk-adjusted Mutual Fund Performance', *Journal of Business*, Vol. 69, No. 2, pp. 133-157.

Elton, E.J., and Gruber, M.J. 1997, 'Modern Portfolio Theory, 1950 to Date', *Journal of Banking and Finance,* Vol. 21, pp.1743-1759. Reproduced in Elton, E.J. and Gruber, M.J. (eds.) 1999, *Investment Volume 1: Portfolio Theory and Asset Pricing,* MIT Press: Cambridge, pp. 441-459.

Fama, E.F. 1972, 'Components of Investment Performance', *Journal of Finance*, Vol.27, No. 3, June, pp. 551-568.

Fama, E.F., and French, K.R. 1992, 'The Cross-Section of Expected Stock Returns', *Journal of Finance,* Vol. 47, No. 2, June, pp. 429-465.

Fama, E.F., and French, K.R. 1993, 'Common Risk Factors in the Return on Bonds and Stocks', *Journal of Financial Economics,* Vol. 33, No. 1, February, pp. 3-53.

Fama, E.F. and Macbeth, J. 1973, 'Risk, Return and Equilibrium: Empirical Tests', *Journal of Political Economy,* Vol. 81, No. 3, pp. 607-636.

Fabozzi, F.J. and Francis, J.C. 1979, 'Mutual Fund Systematic Risk for Bull and Bear Markets', *Journal of Finance*, Vol. 34, No. 5, December, pp. 1243-1250.

Fabozzi, F.J. 1999, *Investment Management*, 2nd ed., Prentice-Hall Upper Saddle River, New Jersey.

Ferson, E.E. and Schadt, R.W. 1996, 'Measuring Fund Strategy and Performance in Changing Economic Conditions', *The Journal of Finance*, Vol. 51, No. 2, pp. 425-461.

Fienberg, S.E. 1989, *The Analysis of Cross-Classified Categorical Data*, 2nd ed., MIT Press, Cambridge.

Fitzherbert, R. 2001, 'Volatility, Beta and Return: Was there ever a meaningful relationship? ', *Australian Actuarial Journal*, Vol. 7, No. 4, pp. 681-714.

Friend, I. and Blume, M. 1970, 'Measurement of Portfolio Performance under Uncertainty', *American Economic Review*, Vol. 60, No. 4, September, pp. 561-575.

Friend, I. Blume, M. and Crockett, J. 1970, *Mutual Funds and Other Institutional Investors*, McGraw Hill, New York.

Garcia, C.B. and Gould, F.J. 1993, 'Survivorship Bias', *Journal of Portfolio Management*, Vol. 19, No. 3, Spring, pp. 52-56.

Goetzmann, W.N. and Ibbotson, R.G. 1994, 'Do Winners Repeat?', *Journal of Portfolio Management*, Vol. 20, No. 2, Winter, pp. 9-18.

Goodwin, T.H. 1998, 'The Information Ratio', *Financial Analysts Journal*, Vol. 54, No. 4, July-August, pp.34-43.

Grinblatt, M. and Titman, S. 1989a, 'Mutual Fund Performance: An Analysis of Quarterly Portfolio Holdings', *Journal of Business*, Vol. 62, No. 3, pp. 393-416.

Grinblatt, M. and Titman, S. 1989b, 'Portfolio Performance Evaluation: Old Issues and New Insights', *The Review of Financial Studies*, Vol. 2, No. 3, pp. 939-421.

Grinblatt, M. and Titman, S. 1992, 'The Persistence of Mutual Fund Performance', *Journal of Finance*, Vol. 47, No. 5, December, pp. 1977-1984.

Grinblatt, M. and Titman, S. 1994, 'A Study of Monthly Mutual Fund Returns and Performance Evaluation Techniques', *Journal of Financial and Quantitative Analysis*, Vol. 29, No. 3, September, pp. 419-444.

Grinold, R. and Khan, R.N. 1995, *Active Portfolio Management*, Probus Publishing, Chicago.

Gruber, M.J. 1996, 'Presidential Address: Another Puzzle: The Growth in Actively Managed Mutual Funds', *Journal of Finance*, Vol. 51, No. 3, July, pp. 788-810.

Guy, J.R.F. 1978, 'The Performance of the British Investment Trust Industry', *Journal of Finance,* Vol. 33, No. 2, May, pp. 443-455.

Hallahan, T.A. 1999, 'The Information Content of Portfolio Performance History and Persistence in Fund Performance: An Examination of Rollover Funds', *Accounting and Finance*, Vol. 39, No. 3, November, pp. 255-274.

Hataiseree, R. 1998, 'Thai Economic Crisis: the Causes, Affects and Trends', *Chulalongkron Review,* Vol. 10, No. 38, pp. 19-57.

Hendricks, D. Patel, J. and Zeckhauser, R. 1993, 'Hot Hands in Mutual Funds: Short-Run Persistence of Relative Performance, 1974-1988', *Journal of Finance*, Vol. 48, No. 1, March, pp. 93-130.

Henriksson, R.D. and Merton, R.C. 1981, 'On Market Timing and Investment Performance II. Statistical Procedures for Evaluating Forecasting Skills' *Journal of Business*, Vol. 54, No. 4, pp. 513-533.

Henriksson, R.D. 1984, 'Market Timing and Mutual Fund Performance: An Empirical Investigation' *Journal of Business*, Vol. 57, No. 1, pp.73-96.

Ippolito, R.A. 1993, 'On Studies of Mutual Fund Performance, 1962-1991', *Financial Analysis Journal,* Vol. 49, January-February, pp. 42-50.

Jacob, B.I., and Levy, K. 1996, 'Residual Risk: How Much is too Much?', *Journal of Portfolio Management*, Vol. 21, No. 3, pp. 10-16.

Jegadeesh, N. and Titman, S. 1993, 'Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency' *Journal of Finance,* Vol. 48, No. 1, March, pp. 95-91.

Jarrow, R.A. 1988, *Finance Theory,* Prentice-Hall International Inc., Englewood Cliffs, New Jersey.

Jensen, M.C. 1968, 'The Performance of Mutual Funds in the Period 1945-1964', *Journal of Finance*, Vol. 23, No. 2, pp. 389-416.

Jensen, M.C. 1969, 'Risk, the Pricing of Capital Assets, and the Evaluation of Investment Portfolio', *Journal of Business,* Vol. 42, No. 2, April, pp. 167-247.

Jensen, M.C. 1972, 'Optimal Utilization of Market Forecasts and the Evaluation of Investment Portfolio Performance', in G. Szego and K. Shell (eds.), *Mathematical Methods in Investment and Finance*, Amsterdam: North Holland.

Jobson, J.D. and Korkie, B.M. 1981, 'Performance Hypothesis Testing with the Sharpe and Treynor Measures' *Journal of Finance*, Vol. 36, No. 4, September, pp. 889-908

Kahn, R.N. and Rudd, A. 1995, 'Does Historical Performance Predict Future Performance?', *Financial Analysts Journal*, Vol. 51, No. 6, November-December, pp. 43-52.

Keller, G. and Warrack, B. 2003, *Statistics for Management and Economics,* 6th ed., Duxbury Press, Pacific Grove.

Kim, T. 1978, 'An Assessment of the Performance of Mutual Fund Management: 1969-1975', *Journal of Financial and Quantitative Analysis*, Vol. 13, No. 3, September, pp. 385-406.

Klemkosky, R.C. 1973, 'The Bias in Composite Performance Measure', *Journal of Financial and Quantitative Analysis*, Vol. 8, No. 3, June, pp. 505-514.

Klemkosky, R.C. 1977, 'How Consistently Do Managers Manage?', *Journal of Portfolio Management,* Vol. 3, No. 2, pp. 11-15.

Kochman, L. and Badarinathi, R. 2001, 'Mutual Fund Performance in a Nonsymmetrical World: A Case for the Upside Deviation', *American Business Review,* Vol. 19, No. 1, January, pp. 46-50.

Kon, S.J. and Jen, F.C. 1979, 'The Investment Performance of Mutual Funds: An Empirical Investigation of Timing, Selectivity, and Market Efficiency', *Journal of Business*, Vol. 52, No. 2, April, pp. 263-289.

Kongcharoen, P. 1992, 'Unit Trusts in Thailand: Return, Risk & Investment Strategy', unpublished Master of Economics Thesis, Chulalongkron University.

Koutsoyiannis, A. 1987, *Theory of Econometrics: An Introductory Exposition of Econometric Methods,* 2nd ed., Macmillan , Hong Kong.

Kritzman, M. 1986, 'How to Detect Skill in Management Performance', *Journal of Portfolio Management,* Vol. 12, No. 2, Winter, pp. 16-20.

Krueger, T.M. and Callaway, R. E. 1995, 'The Persistence of Three-Year Mutual Fund Performance', *Journal of Financial Planing,* Vol. 8, No. 3, July, pp. 136-141.

Lee, C. and Rahman, S. 1990, 'Market Timing, Selectivity, and Mutual Fund Performance: An Empirical Investigation', *Journal of Business*, Vol. 63, No. 2, pp. 261-278.

Leland, H.E. 1999, 'Beyond Mean-Variance: Performance Measurement in a Nonsymmetrical World', *Financial Analysis Journal*, Vol. 55, No. 1, January-February, pp. 22-36.

Lehmann, B.N. and Modest, D.M. 1987, 'Mutual Fund Performance Evaluation: A Comparison of Benchmarks and Benchmark Comparison', *Journal of Finance*, Vol. 42, No. 2, June, pp. 233-265.

Leightner, J. E. 1999, 'Globalization and Thailand's Financial Crisis' *Journal of Economic Issues*, Vol.33, No. 2, pp.367-373.

Lehmann, B.N. and Modest, D.M. 1988, 'The Empirical Foundations of the Arbitrage Pricing Theory', *Journal of Financial Economics*, Vol. 21, No. 2, September, pp. 213-254.

Lintner, J. 1965, 'Security Price, Risk and Maximal Gains from Diversification', *Journal of Finance*, Vol. 20, No. 4, December, pp. 587-615.

Mains, N.E. 1977, 'Risk, the Pricing of Capital Assets and the Evaluation of Investing Portfolio: Comment', *Journal of Business*, Vol. 50, No. 3, July, pp. 371-384.

Mainkumnurd, S. 1996, 'The Evaluation and Persistence of Mutual Fund Performance: The Case of Thai Stock Market', unpublished working paper, Joint Doctoral Program in Business Administration (JDBA), Chulalongkorn University, Thammasat University and National Institute of Development Administration.

Malkiel, B.G. 1995, 'Returns from Investing in Equity Mutual Funds', *Journal of Finance*, Vol. 50, No. 2, June, pp. 549-572.

Markowitz, H. 1952, 'Portfolio Selection', *Journal of Finance*, Vol. 7, pp. 77-91, Reproduced in Ward, K. (ed.) 1994, *Strategic Issues in Finance*, Butterworth Heinemann.

Markowitz, H. 1959, *Portfolio Selection: Efficient Diversification of Investments*, Wiley, New York.

Mayers, D. and Rice, E.M. 1979, 'Measuring Portfolio Performance and the Empirical Content of Asset Pricing Models', *Journal of Financial Economics*, Vol. 7, No. 1, March, pp. 3-28.

McDonald, J. 1973, 'French Mutual Fund Performance: Evaluation of Internationally-Diversified Portfolios', *Journal of Finance*, Vol. 28, No. 5, December, pp. 1161-1180.

McDonald, J.G. 1974, 'Objectives and Performance of Mutual Funds, 1960-1969', *Journal of Financial and Quantitative Analysis*, Vol. 9, No. 3, June, pp. 311-333.

Merton, R.C. 1981, 'On the Market Timing and Investment Performance I. An Equilibrium Theory of Value for Market Forecasts', *Journal of Business*, Vol. 54, No. 3, pp. 363-406.

Miller, M.H. 1999, 'The History of Finance: An Eyewitness Account', *Journal of Portfolio Management*, Vol. 25, No. 4, Summer, pp. 95-101.

Modigliani, F. and Modigliani, L. 1997, 'Risk-Adjusted Performance', *Journal of Portfolio Management*, Vol. 23, No. 2, Winter, pp. 45-54.

Moses, E.A., Cheyney, J.M., and Veit, E.T. 1987, 'A New and More Complete Performance Measure', *Journal of Portfolio Management,* Vol. 13, No. 4, pp. 24-33.

Mossin, J. 1966, 'Equilibrium in a Capital Asset Market', *Econometrica*, Vol. 34, No. 4, pp. 768-783.

Otten, R. and Bams, D. 2002, 'European Mutual Fund Performance', *European Financial Management,* Vol. 8, No. 1, pp. 75-101.

Peterson, D. and Rice, M.L. 1980, 'A Note on Ambiguity in Portfolio Performance Measures', *Journal of Finance*, Vol. 35, No. 5, December, pp. 1251-1256.

Phelps, S. and Detzel, L. 1997, 'The Nonpersistence of Mutual Fund Performance', *Quarterly Journal of Business and Economics*, Vol. 36, pp. 55-69.

Pindyck, R.S. and Rubinfeld, D.L. 1998, *Econometric Models and Economic Forecasts,* 4th ed., McGraw-Hill, Singapore.

Pornchaiya, S. 2000, 'Evaluation of Mutual Fund Performance in Thailand, Case Study: Equity Fund during the Period of 1996-1999', unpublished Master of Economics, Thammasat University.

Praetz, P.D. 1976, 'The Measurement of Mutual Fund Performance in Australia', *The Securities Institute Journal* JASSA, Vol. 3, pp. 8-10.

Ramanathan, R. 1998, *Introductory Econometrics with Applications,* 4th ed., Dryden Press, Forth Worth.

Reilly, F.K. 1982, *Investment*, Dryden Press, New York.

Reilly, F.K. 1989, *Investment Analysis and Portfolio Management*, 3rd ed., Dryden Press, Chicago.

Reilly, F.K. and Norton, E.A. 1995, *Investment*, 4th ed., Dryden Press, Orlando.

Reilly, F.K. and Brown, K.C. 2000, *Investment Analysis and Portfolio Management*, 6th ed., Dryden Press, Fort Worth.

Robson, G.N. 1986, 'The Investment Performance of Unit Trusts and Mutual Funds in Australia for the Period 1969 to 1978', *Accounting and Finance*, Vol. 26, No. 1, pp. 55-79.

Roll, R. 1977, 'A Critique of the Asset Pricing Theory's Tests: Part 1: On past and Potential Test Ability of the Theory', *Journal of Economics*, Vol. 4, No. 4, pp. 129-176.

Roll, R. 1978, 'Ambiguity When Performance is Measured by the Securities Market Line', *Journal of Finance*, Vol. 33, No.4, September, pp. 1051-1069.

Roll, R. 1979, 'A Reply to Mayers and Rice (1979)', *Journal of Financial Economics*, Vol. 7, No. 4, December, pp. 391-400.

Roll, R. 1980, 'Performance Evaluation and Benchmark Error I', *Journal of Portfolio Management*, Vol. 6, No. 4, Summer, pp. 5-12.

Roll, R. 1981, 'Performance Evaluation and Benchmark Error II', *Journal of Portfolio Management*, Vol. 7, No. 2, Winter, pp. 17-22.

Ross, S. 1976, 'The Arbitrage Theory of Capital Asset Pricing', *Journal of Economic Theory*, Vol. 13, No. 2, December, pp. 341-360.

Securities and Exchange Commission 1993, *The Mutual Fund Annual Report 1993*, Bangkok.

Securities and Exchange Commission 1994, *The Mutual Fund Annual Report 1994*, Bangkok.

Securities and Exchange Commission 1995, *The Mutual Fund Annual Report 1995*, Bangkok.

Securities and Exchange Commission 1996, *The Mutual Fund Annual Report 1996*, Bangkok.

Securities and Exchange Commission 1997, *The Mutual Fund Annual Report 1997*, Bangkok.

Securities and Exchange Commission 1998, *The Mutual Fund Annual Report 1998*, Bangkok.

Securities and Exchange Commission 1999, *The Mutual Fund Annual Report 1999*, Bangkok.

Securities and Exchange Commission 2000, *The Mutual Fund Annual Report 2000*, Bangkok.

Shanken, J. 1982, 'The Arbitrage Pricing Theory: Is it Testable?', *Journal of Finance*, Vol. 37, No. 5, December, pp. 1129-1140.

Shanken, J. 1985, 'Multi-Beta CAPM or Equilibrium APT? : A Reply', *Journal of Finance*, Vol. 40, No. 4, September, pp. 1189-1196.

Sharpe, W.F. 1963, 'A Simplified Analysis and Portfolio Analysis', *Management Science*, Vol. 9, No. 2, January, pp. 277-293.

Sharpe, W.F. 1964, 'Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk', *Journal of Finance*, Vol. 19, No. 3, September, pp. 425-442.

Sharpe, W.F. 1966, 'Mutual Fund Performance', *Journal of Business*, Vol.39, No. 1, January, pp. 119-138.

Sharpe, W.F. 1994, 'The Sharpe Ratio', *Journal of Portfolio Management*, Vol. 21, No. 1, Fall, pp. 49-58.

Sharpe, W.F., Alexander, G.J., and Bailey, J.V. 1995, *'Investments'*, 5th ed., Prentice Hall International, Englewood Cliff.

Sharpe, W.F., Alexander, G.J., and Bailey, J.V. 1999, *'Investments'*, 6th ed., Prentice Hall International, Upper Saddle River.

Shawky, H. A. 1982, 'An Update on Mutual Funds: Better Grades', *Journal of Portfolio Management,* Vol. 8, No. 2, Winter, pp. 29-34.

Shukla, R. and Trzcinka, C. 1994, 'Persistent Performance in the Mutual Fund Market: Tests with Fund and Investment Advisers'. *Review of Quantitative Finance and Accounting,* Vol. 4, pp. 115-135.

Shukla, R. and Von Imwegen, G. 1995, 'Do Locals Perform Better than Foreigners? An Analysis of UK and US Mutual Fund Managers', *Journal of Economics and Business,* Vol. 47, pp. 241-254.

Siamwalla, A., Vajraguptu, Y., and Vichyanond, P. 1999, *Foreign Capital Flows to Thailand: Determinants and Impact*, Thailand Development Research Institute Foundation, Bangkok.

Siegel, S. and Castellan, N.J.(jnr) 1988, *Nonparametric Statistics for the Behavioral Sciences,* 2nd ed., McGraw-Hell, New York.

Storng, R.A. 2000, *Portfolio Construction, Management, and Protection*, 2nd ed., South-Western College Publishing, Cincinnati.

Studenmund, A.H. 1997, *Using Econometrics: A Practical Guide,* 3rd ed., Addison-Wesley, Reading.

SPSS 1999, *SPSS Base 10.0 Applications Guide*, SPSS Inc., Chicago.

SPSS 1999, *SPSS Base 10.0 User's Guide*, SPSS Inc., Chicago.

Ter Horst, J., Nigman, Th. and De Roon, F. 1998, 'Style Analysis and Performance Evaluation of Dutch Mutual Funds', *CentER discussion paper 9850.*

Treynor, J.L. 1965, 'How to Rate Management of Investment Funds', *Harvard Business Review*, Vol. 43, No. 1, January-February, pp. 63-75.

Treynor, J.L. and Black, F. 1972, 'Portfolio Selection Using Special Information, under the Assumptions of the Diagonal Model, with Mean-Varience Portfolio objective, and without Constraints', In Szego, G.P. and Shell, K. (eds.), *Mathematical Models in Investment and Finance,* Amsterdam: North-Holland, pp. 367-384.

Treynor, J.L. and Black, F. 1973, 'How to Use Security Analysis to Improve Security Selection', *Journal of Business*, Vol. 46, No. 1, January, pp. 66-86.

Treynor, J.L. and Mazuy, K.K. 1966, 'Can Mutual Fund Outguess the Market?', *Harvard Business Review*, Vol. 44, No. 4, pp. 131-136.

Vanichbancha, K. 2001, *Using SPSS for Windows for Data Analysis*, 4th ed., C K & S Photo Studio, Bangkok.

Veit, E.T. and Cheney, J.M. 1982, 'Are Mutual Funds Market Timers?', *Journal of Portfolio Management*, Vol. 8, No. 2, Winter, pp.35-42.

Volkman, D.A. and Wohar, M.E. 1995, 'Determinants of Persistence in Relative Performance of Mutual Funds', *Journal of Financial Research*, Vol. 18, No. 4, Winter, pp. 415-430.

Vos, E., Brown, P. and Christie, S. 1995, 'A Test of Persistence in the Performance of New Zealand and Australia Mutual Funds', *Accounting Research Journal*, Vol. 8, No. 1, pp. 19-34.

Ward, C. W. R. and Saunders, A. 1976, 'UK Unit Trust Performance 1964-1975', *Journal of Business Finance & Accounting*, Vol. 3, No. 4, pp. 83-99.

APPENDICES

Appendix A List of 86 Thai equity funds in the sample set

Listing code	Fund Name	Type	Inception Date Closed-end	Maturity Date Closed-end	(Changed to) Open-end	Management Company	Note (Former name; Terminated date)
AGF	Adkinson Growth Open-ended Fund	CE to OE	21-Jan-94	20-Jan-97	14-Feb-97	MFC Asset Management Public Co.,Ltd.	Adkinson Growth Fund
AJFSCAP	AJF Star Capital Fund	OE	-	-	16-Jul-97	Ayudhya Jardine Fleming Asset Management Co.,Ltd.	-
APF	Asia Panpol Fund	OE	-	-	02-Mar-95	BOA Asset Management Co.,Ltd.	-
BCAP	Bualuang Capital Open-ended Fund	OE	-	-	13-Dec-96	BBL Asset Management Co.,Ltd.	-
BKA	Buakaew Open-ended Fund	OE	-	-	03-Nov-93	BBL Asset Management Co.,Ltd.	-
BKA2	Buakaew 2 Open-ended Fund	OE	-	-	04-Mar-94	BBL Asset Management Co.,Ltd.	-
BKD	Buakaew Income Fund	OE	-	-	15-Jul-94	BBL Asset Management Co.,Ltd.	-
BMBF	Bangkok Metropolitan Open-ended Fund	CE to OE	27-Apr-95	26-Apr-00	19-May-00	MFC Asset Management Public Co.,Ltd.	Bangkok Metropolitan Fund
BMF	Bualuang mutual fund	CE	29-Jul-92	28-Jul-98	-	BBL Asset Management Co.,Ltd.	** (28 July 98)
B-SUB	Sub Bualuang Open-ended Fund	OE	-	-	17-Mar-95	BBL Asset Management Co.,Ltd.	-
BTP	Bualuang Top Ten Fund	OE	-	-	07-Oct-94	BBL Asset Management Co.,Ltd.	-
CMICRK	The CMIC Ruang Khao High Income	CE	22-Mar-94	21-Mar-01	-	Thai Farmers Asset Management Co.,Ltd.	-
DE-1	Dynamic Eastern One Open-ended Fund	CE to OE	25-Aug-94	24-Aug-99	17-Sep-99	MFC Asset Management Public Co.,Ltd.	Dynamic Eastern One Fund
INGTEF	ING Thai Equity Fund	OE	-	-	28-May-99	ING Mutual Funds Management (Thailand) Co.,Ltd.	ING Sawaddee Fund
KKF	Kiatnakin Fund	OE	-	-	06-Jul-94	BOA Asset Management Co.,Ltd.	-
KPLUS	Kamrai Permpoon Fund	CE to OE	29-Dec-93	28-Dec-98	13-Jan-99	BOA Asset Management Co.,Ltd.	-
KPLUS2	Kamrai Permpoon Fund 2	CE to OE	29-Dec-93	28-Dec-98	13-Jan-99	BOA Asset Management Co.,Ltd.	-
N_SAFETY	Npat Safety Fund	OE	-	-	20-Jan-95	ONE Asset Management Co.,Ltd.	** (12 Dec 97)
NPAT-PRO	Nithipat Progressive Fund	OE	-	-	01-Dec-93	ONE Asset Management Co.,Ltd.	-
NSG*	Nakornthon Schroder Growth Fund	OE	-	-	18-Jul-97	Nakornthon Schroder Asset Management Co.,Ltd.	*
ONE+1	One Plus One Fund	CE to OE	17-Dec-93	16-Dec-98	05-Jan-99	ONE Asset Management Co.,Ltd.	-
ONE-D	One High Yield Fund	CE to OE	31-Jul-92	30-Jul-97	04-Aug-97	ONE Asset Management Co.,Ltd.	-
ONE-FAS	One FAS Prosperity Fund	OE	-	-	04-Jan-94	ONE Asset Management Co.,Ltd.	-
ONE-FF	One Fundamental Fund	OE	-	-	23-Nov-92	ONE Asset Management Co.,Ltd.	** (16 Jun 00)
ONE-G	One Multiple Growth Fund	CE to OE	31-Jul-92	30-Jul-97	04-Aug-97	ONE Asset Management Co.,Ltd.	-
ONE-PF	One Prosperous Fund	OE	-	-	27-Jan-95	ONE Asset Management Co.,Ltd.	-
ONE-PR	One Prime Fund	CE to OE	20-Jan-94	19-Jan-99	29-Jan-99	ONE Asset Management Co.,Ltd.	-
ONE-PRO	One Progressive Fund	CE to OE	20-Oct-93	31-Dec-94	21-Oct-93	ONE Asset Management Co.,Ltd.	-
ONE-UB	ONE - UB Fund	CE to OE	20-Oct-93	19-Oct-98	30-Oct-98	ONE Asset Management Co.,Ltd.	-
ONE-UB2	ONE - UB 2 Fund	CE to OE	01-Nov-93	31-Oct-98	13-Nov-98	ONE Asset Management Co.,Ltd.	-
ONE-UB3	ONE - UB 3 Fund	CE to OE	21-Dec-93	20-Dec-98	08-Jan-99	ONE Asset Management Co.,Ltd.	-
ONE-UB4	ONE - UB 4 Fund	CE to OE	09-Mar-94	08-Mar-99	19-Mar-99	ONE Asset Management Co.,Ltd.	-
ONE-UB5	ONE - UB 5 Fund	CE	19-Sep-94	18-Sep-99	-	ONE Asset Management Co.,Ltd.	** (18 Sep 99)
ONEUB-G	ONE - UB Growth Fund	OE	-	-	22-Aug-95	ONE Asset Management Co.,Ltd.	** (30 Jun 00)
ONE-WE	One Wealth - Builder Fund	CE to OE	10-May-93	09-May-98	20-May-98	ONE Asset Management Co.,Ltd.	-
OSA	Om-Sin Amnuay Sub Fund	CE	26-Dec-94	25-Dec-00	-	National Asset Management Co.,Ltd.	-
PISD	Om-Sin Piboon Sub Dividend Fund	CE to OE	29-Sep-95	28-Sep-00	28-Sep-00	National Asset Management Co.,Ltd.	Om-Sin Piboon Sub Fund
PPSD	Perm Poon Sab-Dividend Fund	CE to OE	17-Aug-92	16-Aug-97	15-Sep-97	National Asset Management Co.,Ltd.	Om-Sin Perm Poon Sab Fund
RKEC	Ruang Khao equity Class	OE	-	-	20-Dec-94	Thai Farmers Asset Management Co.,Ltd.	-
RKEDC	Ruang Khao equity distribution Class	OE	-	-	31-Oct-96	Thai Farmers Asset Management Co.,Ltd.	-
RKF	Ruang Khao Fund	CE	11-Jun-92	10-Jan-02	-	Thai Farmers Asset Management Co.,Ltd.	-
RKF2	Ruang Khao 2 Fund	CE to OE	04-Aug-93	03-Aug-98	21-Aug-98	Thai Farmers Asset Management Co.,Ltd.	-
RKF3	Ruang Khao 3 Fund	CE to OE	19-Nov-93	18-Nov-98	17-Dec-98	Thai Farmers Asset Management Co.,Ltd.	-
RKF4	Ruang Khao 4 Fund	CE	27-Jul-94	26-Jul-01	-	Thai Farmers Asset Management Co.,Ltd.	-

Appendix A (continued)

Listing code	Fund Name	Type	Inception Date Closed-end	Maturity Date Closed-end	(Changed to) Open-end	Management Company	Note (Former name; Terminated date)
RKF-HI	Ruang Khao High Income Fund	CE	23-Dec-93	22-Dec-00	-	Thai Farmers Asset Management Co.,Ltd.	-
RPF2	Ruam Pattana Two Open-ended Fund	CE to OE	03-Sep-90	02-Sep-00	22-Sep-00	MFC Asset Management Public Co.,Ltd.	Ruam Pattana Two Fund
RRF1	Roongroj One Open-ended Fund	CE to OE	02-Feb-93	01-Feb-98	26-Feb-98	MFC Asset Management Public Co.,Ltd.	Roongroj One Fund
SAN	Sub-Anan Fund	CE	27-Mar-92	26-Mar-02	-	MFC Asset Management Public Co.,Ltd.	-
SCBDA	SCB Dhana Ananta Open-ended Fund	OE	-	-	26-Sep-94	SCB Asset Management Co.,Ltd.	-
SCBMF	SCB Munkhong Open-ended Fund	CE to OE	10-Aug-92	09-Aug-98	07-Sep-98	SCB Asset Management Co.,Ltd.	SCB Munkhong Fund
SCBMF2	SCB Munkhong 2 Open-ended Fund	CE to OE	02-Sep-93	01-Sep-99	23-Sep-99	SCB Asset Management Co.,Ltd.	SCB Munkhong 2 Fund
SCBMF3	SCB Munkhong 3 Open-ended Fund	CE to OE	06-Oct-93	05-Oct-99	28-Oct-99	SCB Asset Management Co.,Ltd.	SCB Munkhong 3 Fund
SCBMF4	SCB Munkhong 4 Open-ended Fund	CE to OE	15-Feb-94	14-Feb-00	10-Mar-00	SCB Asset Management Co.,Ltd.	SCB Munkhong 4 Fund
SCBMF5	SCB Munkhong 5 Open-ended Fund	CE to OE	22-Jul-94	21-Jul-00	17-Aug-00	SCB Asset Management Co.,Ltd.	SCB Munkhong 5 Fund
SCBPG	SCB Prime Growth Fund (EQ)	OE	19-Jan-94	18-Jan-01	-	SCB Asset Management Co.,Ltd.	-
SCBPMO	SCB Permpol Munkhong Open-ended Fund	CE to OE	04-May-95	03-May-98	27-May-98	SCB Asset Management Co.,Ltd.	SCB Permpol Munkhong Fund
SCBRT	SCB Ruamtun Open-ended Fund	OE	-	-	27-Jan-95	SCB Asset Management Co.,Ltd.	-
SCBTS	SCB Taweesub Open-ended Fund	CE to OE	24-Nov-93	23-Nov-98	18-Dec-98	SCB Asset Management Co.,Ltd.	SCB Taweesub Fund
SCBTS2	SCB Taweesub 2 Open-ended Fund	CE to OE	13-Dec-93	12-Dec-98	07-Jan-99	SCB Asset Management Co.,Ltd.	SCB Taweesub 2 Fund
SCBTS3	SCB Taweesub 3 Open-ended Fund	CE to OE	27-Jan-94	26-Jan-99	17-Feb-99	SCB Asset Management Co.,Ltd.	SCB Taweesub 3 Fund
SCDF	Sinchada Open-ended Fund	CE to OE	29-Jul-94	28-Jul-97	14-Aug-97	MFC Asset Management Public Co.,Ltd.	Sinchada Fund
SCIF	Siam City Fund	CE	18-Nov-93	17-Nov-03	-	MFC Asset Management Public Co.,Ltd.	-
SCIF2	Siam City Two Fund	CE	12-Jan-94	11-Jan-04	-	MFC Asset Management Public Co.,Ltd.	-
SF4	Sinpinyo Four Open-ended Fund	CE to OE	20-Mar-87	19-Mar-97	08-Apr-97	MFC Asset Management Public Co.,Ltd.	Sinpinyo Four Fund
SF5	Sinpinyo Five Open-ended Fund	CE to OE	14-Aug-87	13-Aug-97	02-Sep-97	MFC Asset Management Public Co.,Ltd.	Sinpinyo Five Fund
SF7	Sinpinyo Seven Open-ended Fund	CE to OE	08-Jun-94	07-Jun-99	05-Jul-99	MFC Asset Management Public Co.,Ltd.	Sinpinyo Seven Fund
SF8	Sinpinyo Eight Open-ended Fund	CE to OE	27-Apr-95	26-Apr-01	19-May-00	MFC Asset Management Public Co.,Ltd.	Sinpinyo Eight Fund
SPF	Sinpattana Open-ended Fund	CE to OE	01-Apr-94	31-Mar-97	18-Apr-97	MFC Asset Management Public Co.,Ltd.	Sinpattana Fund
SPT	Sin Paitoon Fund	OE	-	-	22-Sep-94	National Asset Management Co.,Ltd.	-
SRT	Siam City Ruam Thoon Open-ended Fund	OE	-	-	01-Feb-95	MFC Asset Management Public Co.,Ltd.	-
SSB	Sub Somboon Fund	OE	-	-	26-Sep-86	MFC Asset Management Public Co.,Ltd.	-
STD	Satang Daeng Open-ended Fund	CE to OE	11-Nov-93	10-Nov-98	08-Dec-98	MFC Asset Management Public Co.,Ltd.	Satang Daeng Fund
STD2	Satang Daeng Two Open-ended Fund	CE to OE	30-Dec-93	29-Dec-98	25-Jan-99	MFC Asset Management Public Co.,Ltd.	Satang Daeng Two Fund
SW2	Sub Thawee Two Open-ended Fund	CE to OE	27-Jun-88	26-Jun-98	21-Jul-98	MFC Asset Management Public Co.,Ltd.	Sub Thawee Two Fund
TDF	Thai Dragon Fund	OE	-	-	22-Mar-94	BOA Asset Management Co.,Ltd.	-
THANA1	Thana One Fund	CE to OE	26-Jan-94	25-Jan-99	05-Feb-99	ONE Asset Management Co.,Ltd.	-
THOR	TCM Equity Fund	CE to OE	30-Jul-92	29-Jul-97	16-Sep-97	TISCO Asset Management Co.,Ltd.	Thai Orchid Fund
THOR2	TISCO Equity Growth Fund	CE to OE	15-Dec-92	14-Dec-99	24-Jan-00	TISCO Asset Management Co.,Ltd.	Thai Orchid 2 Fund
THOR3	Thai Orchid 3 Fund	CE	26-Jan-94	25-Jan-99	-	TISCO Asset Management Co.,Ltd.	** (25 Jan 99)
THOR4	TCM Equity 2 Fund	CE to OE	21-Mar-94	23-Apr-99	28-Apr-99	TISCO Asset Management Co.,Ltd.	Thai Orchid 4 Fund
TNP	Thana Phum Open-ended Fund	CE to OE	25-Jul-89	24-Jul-99	11-Aug-99	MFC Asset Management Public Co.,Ltd.	Thana Phum Fund
TS	Theerasub Open-ended Fund	CE to OE	04-Apr-94	03-Apr-97	22-Apr-97	MFC Asset Management Public Co.,Ltd.	Wall Street-Thaimex Fund
TVF	Thunvivatana Fund	CE to OE	27-Jan-95	31-Jan-97	14-Feb-97	Thai Farmers Asset Management Co.,Ltd.	-
UNF	United Open-ended Fund	CE to OE	09-Mar-94	08-Mar-97	01-Apr-97	MFC Asset Management Public Co.,Ltd.	United Fund
USD	Udom Sab-Dividend Fund	CE to OE	28-Sep-93	27-Sep-98	27-Oct-98	National Asset Management Co.,Ltd.	Om-Sin Udom Sab Fund
USD2	Udom Sab-Dividend 2 Fund	CE to OE	20-Oct-93	19-Oct-98	17-Nov-98	National Asset Management Co.,Ltd.	Om-Sin Udom Sab 2 Fund

* Nakornthon Schroder Growth Fund (NSG) was changed name to Aberdeen growth fund and its management company was changed name to Aberdeen Asset Management Company limited in 2002.
** indicates terminated fund
CE indicates closed-end fund and OE indicates open-end fund.

Appendix B Fund performance during expansionary market environment, January 1992 - January 1996

Table B-1 Fund performance as measured by the Treynor Measure, expansionary market environment, January 1992 - January 1996 (sorted by name)

Name	R_p-R_f	Beta	Treynor funds		Treynor market	performance	months	name	R_p-R_f	Beta	Treynor funds		Treynor market	performance	months
AGF	-0.6805	0.9093	-0.7485	>	-1.5473	outperform	25	RRF1	0.2308	1.2851	0.1796	<	0.2411	underperform	36
APF	0.3710	0.5859	0.6332	>	-0.2968	outperform	11	SAN	1.3639	0.9230	1.4777	>	0.4815	outperform	47
BKA	0.5326	1.0062	0.5293	>	-0.5450	outperform	26	SCBDA	-0.9879	0.8336	-1.1851	<	-1.1210	underperform	17
BKA2	0.1847	0.8130	0.2272	>	-0.8963	outperform	23	SCBMF	1.7501	1.0348	1.6913	>	0.7435	outperform	42
BKD	-0.6734	0.9184	-0.7332	<	-0.4660	underperform	19	SCBMF2	1.3679	1.1053	1.2375	>	0.5065	outperform	29
BMBF	-0.4814	0.4648	-1.0358	<	0.3822	underperform	10	SCBMF3	1.0182	0.9983	1.0199	>	0.4863	outperform	28
BMF	1.3302	0.8573	1.5516	>	0.2600	outperform	39*	SCBMF4	-0.3106	0.7556	-0.4111	>	-1.1310	outperform	24
B-SUB	0.6125	0.6218	0.9850	>	-0.2968	outperform	11	SCBMF5	-0.7077	0.8528	-0.8298	<	-0.4660	underperform	19
BTP	0.0191	0.7918	0.0241	>	-1.2978	outperform	16	SCBPG	-0.5721	0.7462	-0.7666	>	-1.5473	outperform	25
CMICRK	0.3891	0.8351	0.4660	>	-0.8963	outperform	23	SCBPMO	-0.9176	0.5591	-1.6410	<	0.5960	underperform	9
DE-1	-0.8611	0.9770	-0.8814	<	-0.8057	underperform	18	SCBRT	-0.4676	0.2500	-1.8701	<	-0.7515	underperform	13
KKF	-0.2282	0.8467	-0.2695	>	-0.4660	outperform	19	SCBTS	-0.4106	0.6884	-0.5965	<	-0.4077	underperform	27
KPLUS	-0.7864	0.7108	-1.1064	>	-1.5473	outperform	25	SCBTS2	-0.4732	0.6599	-0.7171	<	-0.5450	underperform	26
KPLUS2	-0.8405	0.7431	-1.1311	>	-1.5473	outperform	25	SCBTS3	-0.3787	0.8661	-0.4372	>	-1.1310	outperform	24
N_SAFETY	0.4726	0.4415	1.0706	>	-0.7515	outperform	13*	SCDF	-0.4870	0.8872	-0.5489	<	-0.4660	underperform	19
NPAT-PRO	-0.1634	0.7990	-0.2045	>	-0.5450	outperform	26	SCIF	-0.6032	0.9899	-0.6093	<	-0.4077	underperform	27
ONE+1	-0.4126	0.6577	-0.6272	<	-0.5450	underperform	26	SCIF2	-0.4880	0.9044	-0.5396	>	-1.5473	outperform	25
ONE-D	1.0884	0.8123	1.3400	>	0.6756	outperform	43	SF4	1.0242	0.9710	1.0548	>	0.6492	outperform	49
ONE-FAS	-0.8832	0.7839	-1.1267	>	-1.5473	outperform	25	SF5	0.8950	1.0155	0.8814	>	0.6492	outperform	49
ONE-FF	1.0577	0.6439	1.6425	>	0.2600	outperform	39*	SF7	0.0080	1.0936	0.0073	>	-0.8135	outperform	20
ONE-G	0.9795	0.8584	1.1410	>	0.6756	outperform	43	SF8	-0.0944	0.4455	-0.2118	<	0.3822	underperform	10
ONE-PF	0.1042	0.3925	0.2656	>	-0.7515	outperform	13	SPF	0.1399	1.0719	0.1305	>	-0.4408	outperform	22
ONE-PR	-0.2728	0.7308	-0.3733	>	-1.5473	outperform	25	SPT	-0.1621	0.3632	-0.4464	<	0.5960	underperform	9
ONE-PRO	0.3886	0.7519	0.5168	>	0.4863	outperform	28	SRT	0.1713	0.5611	0.3053	>	0.1899	outperform	12
ONE-UB	0.6679	0.7631	0.8753	>	0.4863	outperform	28	SSB	1.1817	0.9737	1.2137	>	0.6492	outperform	49
ONE-UB2	0.2402	0.9255	0.2595	>	-0.4077	outperform	27	STD	-0.4971	1.1131	-0.4466	<	-0.4077	underperform	27
ONE-UB3	-0.4400	0.6759	-0.6510	<	-0.5450	underperform	26	STD2	-1.2360	0.6215	-1.9889	<	-0.5450	underperform	26
ONE-UB4	-0.1631	0.7787	-0.2095	>	-0.8963	outperform	23	SW2	1.3020	0.9995	1.3027	>	0.6492	outperform	49
ONE-UB5	-0.6674	0.8347	-0.7996	>	-1.1210	outperform	17*	TDF	-0.2073	0.6164	-0.3363	>	-0.8963	outperform	23
ONEUB-G	0.7434	0.6953	1.0692	>	-1.0782	outperform	6*	THANAI	-0.2207	0.7351	-0.3003	>	-1.5473	outperform	25
ONE-WE	0.9103	0.8815	1.0327	>	0.7560	outperform	33	THOR	0.5254	0.7994	0.6573	<	0.6756	underperform	43
OSA	0.2029	0.5029	0.4035	>	-0.6942	outperform	14	THOR2	0.4456	0.8289	0.5376	>	0.4925	outperform	38
PISD	1.0066	0.8478	1.1872	>	-0.4223	outperform	5	THOR3	-0.8884	0.8560	-1.0379	>	-1.5473	outperform	25*
PPSD	1.5302	0.6034	2.5360	>	0.4925	outperform	38	THOR4	-0.0850	0.9664	-0.0880	>	-0.4408	outperform	22
RKEC	0.2131	0.6750	0.3157	>	-0.6942	outperform	14	TNP	0.8979	1.0638	0.8441	>	0.6492	outperform	49
RKF	1.9449	0.9584	2.0294	>	0.8525	outperform	44	TS	0.3372	1.0472	0.3219	>	-0.4408	outperform	22
RKF2	2.0222	1.0431	1.9387	>	0.5880	outperform	30	TVF	0.2694	0.4814	0.5596	>	-0.7515	outperform	13
RKF3	0.2630	0.8719	0.3016	>	-0.4077	outperform	27	UNF	-0.2418	0.9915	-0.2438	>	-0.8963	outperform	23
RKF4	-0.3293	0.8173	-0.4029	>	-0.4660	outperform	19	USD	0.8098	1.0388	0.7796	>	-0.5450	outperform	26
RKF-III	-0.5002	0.6519	-0.7673	<	-0.5450	underperform	26	USD2	0.8065	1.0395	0.7758	>	-0.5450	outperform	26
RPF2	1.4437	1.0313	1.3999	>	0.6492	outperform	49	Mean	0.1783	0.8092	0.1531	-	-0.3421	-	-

* Funds terminated before December 2000

Note: 1. Interpretation of the mean values in this table warrants caution because funds do not have the same time horizon (numbers of observations (months) vary)

2. It should be noted that some funds have a short observation period which may influence fund performance results.

Table B-2 Fund performance as measured by the Sharpe ratio, expansionary market environment, January 1992 - January 1996 (sorted by name)

Name	R_p-R_f	Fund S.D.	R_m-R_f	Market S.D.	Sharpe ratio	> or <	Sharpe market	performance	months
AGF	-0.6805	7.1257	-1.5473	6.7708	-0.0955	>	-0.2285	outperform	25
APF	0.3710	4.0759	-0.2968	5.9986	0.0910	>	-0.0495	outperform	11
BKA	0.5326	8.7390	-0.5450	8.3526	0.0609	>	-0.0652	outperform	26
BKA2	0.1847	5.6667	-0.8963	6.6007	0.0326	>	-0.1358	outperform	23
BKD	-0.6734	6.2809	-0.4660	6.3473	-0.1072	<	-0.0734	underperform	19
BMBF	-0.4814	3.7015	0.3822	5.8666	-0.1300	<	0.0651	underperform	10
BMF	1.3302	8.4999	0.2600	8.3730	0.1565	>	0.0311	outperform	39*
B-SUB	0.6125	4.2527	-0.2968	5.9986	0.1440	>	-0.0495	outperform	11
BTP	0.0191	5.4888	-1.2978	6.5873	0.0035	>	-0.1970	outperform	16
CMICRK	0.3891	5.9714	-0.8963	6.6007	0.0652	>	-0.1358	outperform	23
DE-1	-0.8611	6.4616	-0.8057	6.3589	-0.1333	<	-0.1267	underperform	18
KKF	-0.2282	5.4923	-0.4660	6.3473	-0.0415	>	-0.0734	outperform	19
KPLUS	-0.7864	5.0234	-1.5473	6.7708	-0.1565	>	-0.2285	outperform	25
KPLUS2	-0.8405	5.2423	-1.5473	6.7708	-0.1603	>	-0.2285	outperform	25
N_SAFETY	0.4726	3.5751	-0.7515	6.6524	0.1322	>	-0.1130	outperform	13*
NPAT-PRO	-0.1634	6.8178	-0.5450	8.3526	-0.0240	>	-0.0652	outperform	26
ONE+1	-0.4126	6.1409	-0.5450	8.3526	-0.0672	<	-0.0652	underperform	26
ONE-D	1.0884	7.5123	0.6756	8.2741	0.1449	>	0.0817	outperform	43
ONE-FAS	-0.8832	5.5857	-1.5473	6.7708	-0.1581	>	-0.2285	outperform	25
ONE-FF	1.0577	5.7128	0.2600	8.3730	0.1851	>	0.0311	outperform	39*
ONE-G	0.9795	7.4199	0.6756	8.2741	0.1320	>	0.0817	outperform	43
ONE-PF	0.1042	3.6398	-0.7515	6.6524	0.0286	>	-0.1130	outperform	13
ONE-PR	-0.2728	5.5963	-1.5473	6.7708	-0.0487	>	-0.2285	outperform	25
ONE-PRO	0.3886	8.1395	0.4863	9.3398	0.0477	<	0.0521	underperform	28
ONE-UB	0.6679	8.0537	0.4863	9.3398	0.0829	>	0.0521	outperform	28
ONE-UB2	0.2402	7.8384	-0.4077	8.2195	0.0306	>	-0.0496	outperform	27
ONE-UB3	-0.4400	6.2011	-0.5450	8.3526	-0.0710	<	-0.0652	underperform	26
ONE-UB4	-0.1631	5.5621	-0.8963	6.6007	-0.0293	>	-0.1358	outperform	23
ONE-UB5	-0.6674	5.5609	-1.1210	6.4155	-0.1200	>	-0.1747	outperform	17*
ONEUB-G	0.7434	3.7186	-1.0782	5.0838	0.1999	>	-0.2121	outperform	6*
ONE-WE	0.9103	7.8189	0.7560	8.6654	0.1164	>	0.0872	outperform	33
OSA	0.2029	4.0188	-0.6942	6.3941	0.0505	>	-0.1086	outperform	14
PISD	1.0066	4.7925	-0.4223	5.3983	0.2100	>	-0.0782	outperform	5
PPSD	1.5302	8.1478	0.4925	8.3575	0.1878	>	0.0589	outperform	38
RKEC	0.2131	4.5200	-0.6942	6.3941	0.0471	>	-0.1086	outperform	14
RKF	1.9449	8.2708	0.8525	8.2609	0.2352	>	0.1032	outperform	44
RKF2	2.0222	9.7072	0.5880	9.0231	0.2083	>	0.0652	outperform	30
RKF3	0.2630	7.4481	-0.4077	8.2195	0.0353	>	-0.0496	outperform	27
RKF4	-0.3293	5.5161	-0.4660	6.3473	-0.0597	>	-0.0734	outperform	19
RKF-HI	-0.5002	6.4183	-0.5450	8.3526	-0.0779	<	-0.0652	underperform	26
RPF2	1.4437	8.7084	0.6492	8.2661	0.1658	>	0.0785	outperform	49

Name	R_p-R_f	Fund S.D.	R_m-R_f	Market S.D.	Sharpe ratio	> or <	Sharpe market	performance	months
RRF1	0.2308	12.6902	0.2411	8.4920	0.0182	<	0.0284	underperform	36
SAN	1.3639	8.9464	0.4815	8.3783	0.1525	>	0.0575	outperform	47
SCBDA	-0.9879	5.5971	-1.1210	6.4155	-0.1765	<	-0.1747	underperform	17
SCBMF	1.7501	8.9105	0.7435	8.3625	0.1964	>	0.0889	outperform	42
SCBMF2	1.3679	10.3177	0.5065	9.1721	0.1326	>	0.0552	outperform	29
SCBMF3	1.0182	9.5243	0.4863	9.3398	0.1069	>	0.0521	outperform	28
SCBMF4	-0.3106	5.4536	-1.1310	6.5660	-0.0570	>	-0.1723	outperform	24
SCBMF5	-0.7077	5.6162	-0.4660	6.3473	-0.1260	<	-0.0734	underperform	19
SCBPG	-0.5721	5.6945	-1.5473	6.7708	-0.1005	>	-0.2285	outperform	25
SCBPMO	-0.9176	3.8820	0.5960	6.1818	-0.2364	<	0.0964	underperform	9
SCBRT	-0.4676	2.8168	-0.7515	6.6524	-0.1660	<	-0.1130	underperform	13
SCBTS	-0.4106	6.2419	-0.4077	8.2195	-0.0658	<	-0.0496	underperform	27
SCBTS2	-0.4732	6.2764	-0.5450	8.3526	-0.0754	<	-0.0652	underperform	26
SCBTS3	-0.3787	5.9798	-1.1310	6.5660	-0.0633	>	-0.1723	outperform	24
SCDF	-0.4870	6.1015	-0.4660	6.3473	-0.0798	<	-0.0734	underperform	19
SCIF	-0.6032	8.2867	-0.4077	8.2195	-0.0728	<	-0.0496	underperform	27
SCIF2	-0.4880	6.6592	-1.5473	6.7708	-0.0733	>	-0.2285	outperform	25
SF4	1.0242	8.6212	0.6492	8.2661	0.1188	>	0.0785	outperform	49
SF5	0.8950	8.6156	0.6492	8.2661	0.1039	>	0.0785	outperform	49
SF7	0.0080	7.1099	-0.8135	6.3798	0.0011	>	-0.1275	outperform	20
SF8	-0.0944	3.9347	0.3822	5.8666	-0.0240	<	0.0651	underperform	10
SPF	0.1399	6.9581	-0.4408	6.3673	0.0201	>	-0.0692	outperform	22
SPT	-0.1621	4.3563	0.5960	6.1818	-0.0372	<	0.0964	underperform	9
SRT	0.1713	3.8322	0.1899	5.9563	0.0447	>	0.0319	outperform	12
SSB	1.1817	8.3741	0.6492	8.2661	0.1411	>	0.0785	outperform	49
STD	-0.4971	9.3426	-0.4077	8.2195	-0.0532	<	-0.0496	underperform	27
STD2	-1.2360	6.6699	-0.5450	8.3526	-0.1853	<	-0.0652	underperform	26
SW2	1.3020	8.6037	0.6492	8.2661	0.1513	>	0.0785	outperform	49
TDF	-0.2073	4.6417	-0.8963	6.6007	-0.0447	>	-0.1358	outperform	23
THANA1	-0.2207	5.5206	-1.5473	6.7708	-0.0400	>	-0.2285	outperform	25
THOR	0.5254	6.8876	0.6756	8.2741	0.0763	<	0.0817	underperform	43
THOR2	0.4456	7.2031	0.4925	8.3575	0.0619	>	0.0589	outperform	38
THOR3	-0.8884	6.2363	-1.5473	6.7708	-0.1425	>	-0.2285	outperform	25*
THOR4	-0.0850	6.2578	-0.4408	6.3601	-0.0136	>	-0.0693	outperform	22
TNP	0.8979	9.1205	0.6492	8.2661	0.0985	>	0.0785	outperform	49
TS	0.3372	6.7788	-0.4408	6.3601	0.0497	>	-0.0693	outperform	22
TVF	0.2694	3.9802	-0.7515	6.6524	0.0677	>	-0.1130	outperform	13
UNF	-0.2418	6.9264	-0.8963	6.6007	-0.0349	>	-0.1358	outperform	23
USD	0.8098	10.1015	-0.5450	8.3526	0.0802	>	-0.0652	outperform	26
USD2	0.8065	10.1160	-0.5450	8.3526	0.0797	>	-0.0652	outperform	26
Mean	0.1783	6.5882	-0.3421	7.3396	0.0142	-	-0.0550	-	-

* Funds terminated before December 2000

Note: 1. Interpretation of the mean values in this table warrants caution because funds do not have the same time horizon (numbers of observations (months) vary)

2. It should be noted that some funds have a short observation period which may influence fund performance results.

Table B-3 Fund performance as measured by the Jensen Alpha, expansionary market environment, January 1992 - January 1996 (sorted by rank)

rank	name	Jensen Alpha	t-stat	Sig. of t-stat	performance	months	Serial correlation[b]	rank	name	Jensen Alpha	t-stat	Sig. of t-stat	performance	months	Serial correlation
1	RKF2	1.4082	3.1849	0.0035*	outperform	30		39	ONE-G	0.3988	1.1971	0.2382	outperform	43	
2	USD	1.3767	1.3271	0.1970	outperform	26		40	SF4	0.3938	0.864	0.3920	outperform	49	
3	USD2	1.3737	1.3193	0.1995	outperform	26		41	TDF	0.3458	0.7159	0.4819	outperform	23	
4	PISD	1.3647	1.8519	0.1611	outperform	5		42	THOR4	0.3413	1.323	0.2008	outperform	22	
5	PPSD	1.2327	1.1690	0.2501	outperform	38		43	ONE-FAS	0.3309	0.9009	0.3770	outperform	25	
6	RKF	1.2237	2.6637	0.0106*	outperform	44	first order	44	KPLUS	0.3139	1.0287	0.3143	outperform	25	
7	BMF	1.1072	1.4981	0.1426	outperform	39		45	KPLUS2	0.3100	0.9946	0.3303	outperform	25	
8	BKA	1.0815	2.2515	0.0338*	outperform	26		46	ONE-UB	0.2968	0.4103	0.6849	outperform	28	
9	BTP	1.0481	2.3089	0.0367*	outperform	16		47	NPAT-PRO	0.2723	0.9724	0.3406	outperform	26	
10	SCBMF	0.9799	2.9409	0.0054*	outperform	42		48	ONE-UB5	0.2684	0.7027	0.4930	outperform	17**	
11	SAN	0.9192	1.3830	0.1735	outperform	47		49	ONE-WE	0.2433	0.8185	0.4193	outperform	33	
12	ONE-FF	0.8900	2.8951	0.0063*	outperform	39**		50	SF5	0.2357	0.8379	0.4063	outperform	49	
13	SCBMF2	0.8076	2.2304	0.0342*	outperform	29		51	TNP	0.2070	0.5906	0.5576	outperform	49	
14	N_SAFETY	0.8045	1.3464	0.2053	outperform	13**		52	UNF	0.2014	0.7031	0.4901	outperform	23	first order
15	TS	0.7991	2.8949	0.0090*	outperform	22		53	AGF	0.1674	0.7479	0.4628	outperform	25	second order
16	RPF2	0.7739	3.0064	0.0042*	outperform	49		54	KKF	0.1663	0.6212	0.5427	outperform	19	
17	RKF-HI	0.6915	2.0046	0.0569*	outperform	26	first order	55	THOR3	0.1382	0.5461	0.5905	outperform	25**	first order
18	RKEC	0.6816	1.8127	0.0950*	outperform	14		56	SRT	0.0648	0.1145	0.9111	outperform	12	
19	SW2	0.6530	1.8769	0.0668*	outperform	49		57	THOR2	0.0373	0.1148	0.9092	outperform	38	
20	TVF	0.6310	0.9133	0.3807	outperform	13		58	ONE-PRO	0.0227	0.0287	0.9774	outperform	28	
21	RKF3	0.6185	1.5514	0.1334	outperform	27		59	SCIF	0.0107	0.0394	0.9689	outperform	27	first order
22	ONE-UB2	0.6178	1.6631	0.1088	outperform	27		60	THOR	-0.0147	-0.0494	0.9609	underperform	43	
23	SPF	0.6125	2.0095	0.0582*	outperform	22		61	STD	-0.0434	-0.1167	0.9080	underperform	27	
24	SCBTS3	0.6027	1.5324	0.1397	outperform	24		62	SCBDA	-0.0529	-0.1256	0.9017	underperform	17	
25	SCBPG	0.5864	1.0576	0.3012	outperform	25		63	ONE+1	-0.0544	-0.099	0.9220	underperform	26	
26	THANA1	0.5841	1.7371	0.0963*	outperform	25	first order	64	ONE-UB3	-0.0722	-0.1409	0.8892	underperform	26	
27	SCIF2	0.5788	2.2212	0.0369*	outperform	25	first order	65	DE-1	-0.0747	-0.1715	0.8660	underperform	18	
28	OSA	0.5519	0.8169	0.4299	outperform	14		66	SCDF	-0.0747	-0.1346	0.8945	underperform	19	
29	SSB	0.5493	1.6397	0.1077	outperform	49		67	RRF1	-0.0787	-0.0718	0.9431	underperform	36	
30	SCBMF4	0.5461	1.1325	0.2696	outperform	24		68	SCBTS2	-0.1138	-0.1892	0.8515	underperform	26	
31	CMICRK	0.5397	1.8017	0.0867*	outperform	23	first order	69	SCBTS	-0.1301	-0.2515	0.8035	underperform	27	
32	ONE-D	0.5391	1.0363	0.3061	outperform	43		70	BKD	-0.2446	-0.4415	0.6644	underperform	19	
33	ONE-UB4	0.5371	1.1659	0.2567	outperform	23		71	SF8	-0.2648	-0.2673	0.7960	underperform	10	
34	SCBMF3	0.5324	1.4210	0.1672	outperform	28		72	SCBRT	-0.2802	-0.4221	0.6811	underperform	13	
35	ONE-PR	0.5157	1.5509	0.1352	outperform	25	first order	73	SCBMF5	-0.3103	-0.8768	0.3928	underperform	19	
36	APF	0.4536	1.1938	0.2776	outperform	11	third order	74	BMBF	-0.6591	-0.7819	0.4568	underperform	10	
37	SF7	0.4422	2.0626	0.0548*	outperform	20	first order	75	STD2	-0.8987	-1.0735	0.2937	underperform	26	
38	ONE-PF	0.3990	0.5383	0.6011	outperform	13			Mean[a]	0.4141	1.0143	0.3860	-	-	-

(a) Interpretation of the mean values in this table warrants caution because funds do not have the same time horizon (numbers of observations (months) vary).
(b) indicates iterative level of the Cochrane-Orcutt iterative method when tested for positive serial correlation.
Number of funds is 75 funds (6 funds are excluded because they fall into inconclusive region when tested for serial correlation (Durbin-Watson statistic).
* significant at the 0.10 level
** Funds terminated before December 2000
It should be noted that some funds have a short observation period which may influence fund performance results.

Table B-4 Fund performance as measured by the M^2, expansionary market environment, January 1992 - January 1996 (sorted by name)

name	R_p	R_f	S.D. fund	S.D. market	M^2	> or <	Market return	perfromance	months
AGF	0.0678	0.7484	7.1257	6.7708	0.1017	>	-0.7990	outperform	25
APF	1.2393	0.8683	4.0759	5.9986	1.4143	>	0.5714	outperform	11
BKA	1.2739	0.7413	8.7390	8.3526	1.2504	>	0.1963	outperform	26
BKA2	0.9523	0.7677	5.6667	6.6007	0.9828	>	-0.1287	outperform	23
BKD	0.1302	0.8036	6.2809	6.3473	0.1231	<	0.3375	underperform	19
BMBF	0.3826	0.8640	3.7015	5.8666	0.1010	<	1.2462	underperform	10
BMF	2.0503	0.7201	8.4999	8.3730	2.0304	>	0.9801	outperform	39*
B-SUB	1.4808	0.8683	4.2527	5.9986	1.7322	>	0.5714	outperform	11
BTP	0.8472	0.8282	5.4888	6.5873	0.8510	>	-0.4697	outperform	16
CMICRK	1.1568	0.7677	5.9714	6.6007	1.1978	>	-0.1287	outperform	23
DE-1	-0.0502	0.8109	6.4616	6.3589	-0.0365	<	0.0051	underperform	18
KKF	0.5754	0.8036	5.4923	6.3473	0.5399	>	0.3375	outperform	19
KPLUS	-0.0380	0.7484	5.0234	6.7708	-0.3116	>	-0.7990	outperform	25
KPLUS2	-0.0921	0.7484	5.2423	6.7708	-0.3372	>	-0.7990	outperform	25
N_SAFETY	1.3256	0.8530	3.5751	6.6524	1.7324	>	0.1015	outperform	13*
NPAT-PRO	0.5779	0.7413	6.8178	8.3526	0.5412	>	0.1963	outperform	26
ONE+1	0.3288	0.7413	6.1409	8.3526	0.1802	<	0.1963	underperform	26
ONE-D	1.8121	0.7237	7.5123	8.2741	1.9225	>	1.3994	outperform	43
ONE-FAS	-0.1348	0.7484	5.5857	6.7708	-0.3222	>	-0.7990	outperform	25
ONE-FF	1.7778	0.7201	5.7128	8.3730	2.2703	>	0.9801	outperform	39*
ONE-G	1.7032	0.7237	7.4199	8.2741	1.8159	>	1.3994	outperform	43
ONE-PF	0.9572	0.8530	3.6398	6.6524	1.0435	>	0.1015	outperform	13
ONE-PR	0.4755	0.7484	5.5963	6.7708	0.4183	>	-0.7990	outperform	25
ONE-PRO	1.1215	0.7329	8.1395	9.3398	1.1788	<	1.2192	underperform	28
ONE-UB	1.4008	0.7329	8.0537	9.3398	1.5075	>	1.2192	outperform	28
ONE-UB2	0.9771	0.7370	7.8384	8.2195	0.9888	>	0.3293	outperform	27
ONE-UB3	0.3013	0.7413	6.2011	8.3526	0.1486	<	0.1963	underperform	26
ONE-UB4	0.6045	0.7677	5.5621	6.6007	0.5741	>	-0.1287	outperform	23
ONE-UB5	0.1516	0.8190	5.5609	6.4155	0.0490	>	-0.3020	outperform	17*
ONEUB-G	1.5947	0.8513	3.7186	5.0838	1.8676	>	-0.2269	outperform	6*
ONE-WE	1.6355	0.7252	7.8189	8.6654	1.7341	>	1.4813	outperform	33
OSA	1.0478	0.8449	4.0188	6.3941	1.1678	>	0.1506	outperform	14
PISD	1.8516	0.8450	4.7925	5.3983	1.9788	>	0.4227	outperform	5
PPSD	2.2498	0.7196	8.1478	8.3575	2.2892	>	1.2121	outperform	38
RKEC	1.0580	0.8449	4.5200	6.3941	1.1463	>	0.1506	outperform	14
RKF	2.6686	0.7237	8.2708	8.2609	2.6663	>	1.5761	outperform	44
RKF2	2.7518	0.7295	9.7072	9.0231	2.6093	>	1.3175	outperform	30
RKF3	1.0000	0.7370	7.4481	8.2195	1.0272	>	0.3293	outperform	27
RKF4	0.4743	0.8036	5.5161	6.3473	0.4247	>	0.3375	outperform	19
RKF-HI	0.2411	0.7413	6.4183	8.3526	0.0904	<	0.1963	underperform	26
RPF2	2.1694	0.7257	8.7084	8.2661	2.0961	>	1.3749	outperform	49

name	R_p	R_f	S.D. fund	S.D. market	M^2	> or <	Market return	perfromance	months
RRF1	0.9524	0.7216	12.6902	8.4920	0.8761	<	0.9628	underperform	36
SAN	2.0857	0.7218	8.9464	8.3783	1.9991	>	1.2033	outperform	47
SCBDA	-0.1689	0.8190	5.5971	6.4155	-0.3134	<	-0.3020	underperform	17
SCBMF	2.4730	0.7229	8.9105	8.3625	2.3653	>	1.4664	outperform	42
SCBMF2	2.0991	0.7312	10.3177	9.1721	1.9472	>	1.2377	outperform	29
SCBMF3	1.7511	0.7329	9.5243	9.3398	1.7314	>	1.2192	outperform	28
SCBMF4	0.4470	0.7576	5.4536	6.5660	0.3836	>	-0.3734	outperform	24
SCBMF5	0.0959	0.8036	5.6162	6.3473	0.0038	<	0.3375	underperform	19
SCBPG	0.1763	0.7484	5.6945	6.7708	0.0682	>	-0.7990	outperform	25
SCBPMO	-0.0557	0.8619	3.8820	6.1818	-0.5993	<	1.4578	underperform	9
SCBRT	0.3854	0.8530	2.8168	6.6524	-0.2512	<	0.1015	underperform	13
SCBTS	0.3263	0.7370	6.2419	8.2195	0.1962	<	0.3293	underperform	27
SCBTS2	0.2681	0.7413	6.2764	8.3526	0.1116	<	0.1963	underperform	26
SCBTS3	0.3789	0.7576	5.9798	6.5660	0.3418	>	-0.3734	outperform	24
SCDF	0.3166	0.8036	6.1015	6.3473	0.2970	<	0.3375	underperform	19
SCIF	0.1338	0.7370	8.2867	8.2195	0.1387	<	0.3293	underperform	27
SCIF2	0.2604	0.7484	6.6592	6.7708	0.2522	>	-0.7990	outperform	25
SF4	1.7499	0.7257	8.6212	8.2661	1.7077	>	1.3749	outperform	49
SF5	1.6207	0.7257	8.6156	8.2661	1.5844	>	1.3749	outperform	49
SF7	0.8031	0.7951	7.1099	6.3798	0.8022	>	-0.0184	outperform	20
SF8	0.7696	0.8640	3.9347	5.8666	0.7233	<	1.2462	underperform	10
SPF	0.9163	0.7764	6.9581	6.3673	0.9045	>	0.3356	outperform	22
SPT	0.6997	0.8619	4.3563	6.1818	0.6318	<	1.4578	underperform	9
SRT	1.0328	0.8616	3.8322	5.9563	1.1278	>	1.0515	outperform	12
SSB	1.9074	0.7257	8.3741	8.2661	1.8922	>	1.3749	outperform	49
STD	0.2399	0.7370	9.3426	8.2195	0.2996	<	0.3293	underperform	27
STD2	-0.4947	0.7413	6.6699	8.3526	-0.8065	<	0.1963	underperform	26
SW2	2.0276	0.7257	8.6037	8.2661	1.9766	>	1.3749	outperform	49
TDF	0.5604	0.7677	4.6417	6.6007	0.4729	>	-0.1287	outperform	23
THANA1	0.5276	0.7484	5.5206	6.7708	0.4776	>	-0.7990	outperform	25
THOR	1.2491	0.7237	6.8876	8.2741	1.3549	<	1.3994	underperform	43
THOR 3	-0.1401	0.7484	6.2363	6.7708	-0.2162	>	-0.7990	outperform	25*
THOR 4	0.6914	0.7764	6.2578	6.3601	0.6900	>	0.3356	outperform	22
THOR2	1.1652	0.7196	7.2031	8.3575	1.2366	>	1.2121	outperform	38
TNP	1.6236	0.7257	9.1205	8.2661	1.5395	>	1.3749	outperform	49
TS	1.1136	0.7764	6.7788	6.3601	1.0927	>	0.3356	outperform	22
TVF	1.1223	0.8530	3.9802	6.6524	1.3031	>	0.1015	outperform	13
UNF	0.5259	0.7677	6.9264	6.6007	0.5373	>	-0.1287	outperform	23
USD	1.5512	0.7413	10.1015	8.3526	1.4110	>	0.1963	outperform	26
USD2	1.5478	0.7413	10.1160	8.3526	1.4072	>	0.1963	outperform	26
Mean	0.9486	0.7703	6.5882	7.3396	0.9196		0.4281	-	-

* Funds terminated before December 2000

Note: 1. Interpretation of the mean values in this table warrants caution because funds do not have the same time horizon (numbers of observations (months) vary)

2. It should be noted that some funds have a short observation period which may influence fund performance results.

Table B-5 Rate of return of Thai equity funds (per cent per month), expansionary market environment, January 1992 - January 1996 (sorted by name)

Name	fund return (%)	> or <	market return (%)	performance	months		name	fund return (%)	> or <	market return (%)	performance	months
AGF	-0.1747	>	-1.0203	outperform	25		RRF1	0.1669	<	0.6321	underperformed	36
APF	1.1659	>	0.4147	outperform	11		SAN	1.7138	>	0.8739	outperform	47
BKA	0.9338	>	-0.1253	outperform	26		SCBDA	-0.3143	>	-0.4954	outperform	17
BKA2	0.7986	>	-0.3376	outperform	23		SCBMF	2.1198	>	1.1424	outperform	42
BKD	-0.0611	<	0.1465	underperformed	19		SCBMF2	1.6369	>	0.8557	outperform	29
BMBF	0.3219	<	1.0987	underperformed	10		SCBMF3	1.3457	>	0.8237	outperform	28
BMF	1.7206	>	0.6568	outperform	39*		SCBMF4	0.3036	>	-0.5803	outperform	24
B-SUB	1.4019	>	0.4147	outperform	11		SCBMF5	-0.0545	<	0.1465	underperformed	19
BTP	0.7075	>	-0.6725	outperform	16		SCBPG	0.0216	>	-1.0203	outperform	25
CMICRK	0.9857	>	-0.3376	outperform	23		SCBPMO	-0.1222	<	1.2959	underperformed	9
DE-1	-0.2476	<	-0.1859	underperformed	18		SCBRT	0.3491	>	-0.0998	outperform	13
KKF	0.4324	>	0.1465	outperform	19		SCBTS	0.1393	>	0.0169	outperform	27
KPLUS	-0.1598	>	-1.0203	outperform	25		SCBTS2	0.0787	>	-0.1253	outperform	26
KPLUS2	-0.2249	>	-1.0203	outperform	25		SCBTS3	0.2077	>	-0.5803	outperform	24
NPAT SAFTY	1.2682	>	-0.0998	outperform	13		SCDF	0.1431	<	0.1465	underperformed	19
NPAT-PRO	0.3601	>	-0.1253	outperform	26		SCIF	-0.1897	<	0.0169	underperformed	27
ONE+1	0.1475	>	-0.1253	outperform	26		SCIF2	0.0480	>	-1.0203	outperform	25
ONE-D	1.5480	>	1.0821	outperform	43		SF4	1.4061	>	1.0535	outperform	49
ONE-FAS	-0.2852	>	-1.0203	outperform	25		SF5	1.2757	>	1.0535	outperform	49
ONE-FF	1.6296	>	0.6568	outperform	39*		SF7	0.5632	>	-0.2118	outperform	20
ONE-G	1.4485	>	1.0821	outperform	43		SF8	0.7023	<	1.0987	underperformed	10
ONE-PF	0.8978	>	-0.0998	outperform	13		SPF	0.6842	>	0.1427	outperform	22
ONE-PR	0.3249	>	-1.0203	outperform	25		SPT	0.6187	<	1.2959	underperformed	9
ONE-PRO	0.8299	>	0.8237	outperform	28		SRT	0.9674	>	0.8950	outperform	12
ONE-UB	1.1081	>	0.8237	outperform	28		SSB	1.5855	>	1.0535	outperform	49
ONE-UB2	0.7006	>	0.0169	outperform	27		STD	-0.1511	<	0.0169	underperformed	27
ONE-UB3	0.1157	>	-0.1253	outperform	26		STD2	-0.7073	<	-0.1253	underperformed	26
ONE-UB4	0.4558	>	-0.3376	outperform	23		SW2	1.6849	>	1.0535	outperform	49
ONE-UB5	0.0062	>	-0.4954	outperform	17*		TDF	0.4570	>	-0.3376	outperform	23
ONEUB-G	1.5388	>	-0.3327	outperform	6*		THANA1	0.3811	>	-1.0203	outperform	25
ONE-WE	1.3574	>	1.1378	outperform	33		THOR	1.0242	<	1.0821	underperformed	43
OSA	0.9755	>	-0.0365	outperform	14		THOR 3	-0.3288	>	-1.0203	outperform	25*
PISD	1.7625	>	0.3079	outperform	5		THOR 4	0.5027	>	0.1427	outperform	22
PPSD	1.9446	>	0.8905	outperform	38		THOR2	0.9225	>	0.8905	outperform	38
RKEC	0.9661	>	-0.0365	outperform	14		TNP	1.2393	>	1.0535	outperform	49
RKF	2.3593	>	1.2592	outperform	44		TS	0.8941	>	0.1427	outperform	22
RKF2	2.3356	>	0.9470	outperform	30		TVF	1.0517	>	-0.0998	outperform	13
RKF3	0.7404	>	0.0169	outperform	27		UNF	0.2956	>	-0.3376	outperform	23
RKF4	0.3295	>	0.1465	outperform	19		USD	1.1181	>	-0.1253	outperform	26
RKF-III	0.0419	>	-0.1253	outperform	26		USD2	1.1147	>	-0.1253	outperform	26
RPF2	1.8224	>	1.0535	outperform	49		Mean	0.7312	-	0.1731	-	-

* Funds terminated before December 2000

Note: 1. Interpretation of the mean values in this table warrants caution because funds do not have the same time horizon (numbers of observations (months) vary)

2. It should be noted that some funds have a short observation period which may influence fund performance results.

Appendix C Fund performance during contractionary market environment, February 1996 - December 2000

Table C-1 Fund performance as measured by the Treynor Measure, contractionary market environment, February 1996 - December 2000 (sorted by name)

Name	R_p-R_f	Beta	Treynor funds	> or <	Treynor market	performance	months	Name	R_p-R_f	Beta	Treynor funds	> or <	Treynor market	performance	months
AGF	-3.5193	0.7748	-4.5424	<	-3.3661	underperform	59	RKF4	-2.9084	0.5983	-4.8612	<	-3.3661	underperform	59
AJFSCAP	-0.7360	0.5232	-1.4068	>	-2.1471	outperform	42	RKF-HI	-2.9041	0.5998	-4.8422	<	-3.3661	underperform	59
APF	-2.4085	0.7289	-3.3041	>	-3.3661	outperform	59	RPF2	-3.2126	0.8000	-4.0158	<	-3.3661	underperform	59
BCAP	-2.5199	0.7392	-3.4092	<	-3.0858	underperform	49	RRF1	-3.8829	0.7754	-5.0075	<	-3.3661	underperform	59
BKA	-3.2801	0.7435	-4.4119	<	-3.3661	underperform	59	SAN	-3.1234	0.8451	-3.6959	<	-3.3661	underperform	59
BKA2	-3.3049	0.7471	-4.4236	<	-3.3661	underperform	59	SCBDA	-4.1331	0.7788	-5.3071	<	-3.3661	underperform	59
BKD	-3.2034	0.7450	-4.2997	<	-3.3661	underperform	59	SCBMF	-3.6406	0.5129	-7.0981	<	-3.3661	underperform	59
BMBF	-3.5996	0.7381	-4.8772	<	-3.3661	underperform	59	SCBMF2	-3.9003	0.6309	-6.1824	<	-3.3661	underperform	59
BMF	-3.6400	0.3069	-11.8616	<	-6.4765	underperform	29*	SCBMF3	-4.0753	0.6427	-6.3407	<	-3.3661	underperform	59
B-SUB	-3.3433	0.7542	-4.4328	<	-3.3661	underperform	59	SCBMF4	-3.9460	0.7144	-5.5238	<	-3.3661	underperform	59
BTP	-3.0858	0.7084	-4.3563	<	-3.3661	underperform	59	SCBMF5	-3.9858	0.7061	-5.6451	<	-3.3661	underperform	59
CMICRK	-2.8704	0.6135	-4.6790	<	-3.3661	underperform	59	SCBPG	-3.4668	0.5442	-6.3699	<	-3.3661	underperform	59
DE-1	-3.4837	0.8358	-4.1679	<	-3.3661	underperform	59	SCBPMO	-3.4212	0.5845	-5.8531	<	-3.3661	underperform	59
INGTEF	-4.1215	0.8464	-4.8696	<	-3.0078	underperform	20	SCBRT	-3.3089	0.6824	-4.8487	<	-3.3661	underperform	59
KKF	-2.4642	0.7417	-3.3221	>	-3.3661	outperform	59	SCBTS	-3.4908	0.5028	-6.9427	<	-3.3661	underperform	59
KPLUS	-2.6448	0.6987	-3.7851	<	-3.3661	underperform	59	SCBTS2	-3.3836	0.4703	-7.1946	<	-3.3661	underperform	59
KPLUS2	-2.6370	0.6951	-3.7936	<	-3.3661	underperform	59	SCBTS3	-3.2178	0.5368	-5.9940	<	-3.3661	underperform	59
N_SAFETY	-4.1039	0.7219	-5.6851	>	-6.4375	outperform	22*	SCDF	-3.3162	0.7793	-4.2555	<	-3.3661	underperform	59
NPAT-PRO	-2.7439	0.6895	-3.9795	<	-3.3661	underperform	59	SCIF	-3.6439	0.7225	-5.0435	<	-3.3661	underperform	59
NSG	-1.1867	0.7834	-1.5147	>	-2.1471	outperform	42	SCIF2	-3.5167	0.7226	-4.8671	<	-3.3661	underperform	59
ONE+1	-2.6379	0.6876	-3.8365	<	-3.3661	underperform	59	SF4	-3.4781	0.6889	-5.0490	<	-3.3661	underperform	59
ONE-D	-2.3693	0.6503	-3.6437	<	-3.3661	underperform	59	SF5	-3.5021	0.7101	-4.9320	<	-3.3661	underperform	59
ONE-FAS	-2.7307	0.7192	-3.7968	<	-3.3661	underperform	59	SF7	-3.8898	0.8536	-4.5567	<	-3.3661	underperform	59
ONE-FF	-2.6995	0.6155	-4.3856	<	-3.4887	underperform	52*	SF8	-3.7995	0.8333	-4.5594	<	-3.3661	underperform	59
ONE-G	-2.5756	0.6751	-3.8152	<	-3.3661	underperform	59	SPF	-3.3919	0.7243	-4.6828	<	-3.3661	underperform	59
ONE-PF	-2.6919	0.6674	-4.0335	<	-3.3661	underperform	59	SPT	-3.2997	0.6919	-4.7690	<	-3.3661	underperform	59
ONE-PR	-2.6537	0.6975	-3.8044	<	-3.3661	underperform	59	SRT	-2.8980	0.7009	-4.1348	<	-3.3661	underperform	59
ONE-PRO	-2.7048	0.7195	-3.7595	<	-3.3661	underperform	59	SSB	-3.5387	0.7285	-4.8578	<	-3.3661	underperform	59
ONE-UB	-2.8345	0.6921	-4.0956	<	-3.3661	underperform	59	STD	-3.7278	0.7221	-5.1626	<	-3.3661	underperform	59
ONE-UB2	-2.7471	0.6935	-3.9612	<	-3.3661	underperform	59	STD2	-3.7678	0.7257	-5.1922	<	-3.3661	underperform	59
ONE-UB3	-2.7901	0.6846	-4.0755	<	-3.3661	underperform	59	SW2	-3.2379	0.7100	-4.5602	<	-3.3661	underperform	59
ONE-UB4	-2.7015	0.6772	-3.9890	<	-3.3661	underperform	59	TDF	-2.7945	0.7264	-3.8468	<	-3.3661	underperform	59
ONE-UB5	-2.3256	0.6191	-3.7566	<	-3.2664	underperform	43*	THANA1	-2.6845	0.6922	-3.8783	<	-3.3661	underperform	59
ONEUB-G	-1.9971	0.6523	-3.0616	>	-3.3544	outperform	53*	THOR	-2.6864	0.5286	-5.0823	<	-3.3661	underperform	59
ONE-WE	-2.6299	0.6514	-4.0373	<	-3.3661	underperform	59	THOR2	-2.3995	0.5843	-4.1064	<	-3.3661	underperform	59
OSA	-3.1245	0.6930	-4.5085	<	-3.3661	underperform	59	THOR3	-3.1479	0.4655	-6.7622	<	-4.6339	underperform	35*
PISD	-3.3999	0.7977	-4.2622	<	-3.3661	underperform	59	THOR4	-2.6432	0.5572	-4.7435	<	-3.3661	underperform	59
PPSD	-2.6050	0.4878	-5.3404	<	-3.3661	underperform	59	TNP	-3.1545	0.8432	-3.7413	<	-3.3661	underperform	59
RKEC	-2.8396	0.6276	-4.5244	<	-3.3661	underperform	59	TS	-3.5240	0.7964	-4.4248	<	-3.3661	underperform	59
RKEDC	-2.8295	0.6295	-4.4946	<	-3.0651	underperform	50	TVF	-2.7605	0.6048	-4.5642	<	-3.3661	underperform	59
RKF	-2.8795	0.6074	-4.7403	<	-3.3661	underperform	59	UNF	-3.6230	0.8344	-4.3418	<	-3.3661	underperform	59
RKF2	-2.7945	0.5733	-4.8745	<	-3.3661	underperform	59	USD	-2.9595	0.5915	-5.0035	<	-3.3661	underperform	59
RKF3	-2.8437	0.5608	-5.0710	<	-3.3661	underperform	59	USD2	-2.8820	0.5997	-4.8057	<	-3.3661	underperform	59
								Mean[(a)]	-3.0880	0.6776	-4.6586	-	-3.4136	-	-

(a) Interpretation of the mean values in this table warrants caution because funds do not have the same time horizon (numbers of observations (months) vary).

* Funds terminated before December 2000

Table C-2 Fund performance as measured by the Sharpe Ratio, contractionary market environment, February 1996 - December 2000 (sorted by name)

Name	R_p-R_f	Fund S.D.	R_m-R_f	Market S.D.	Sharpe ratio	> or <	Sharpe market	performance	months
AGF	-3.5193	11.0833	-3.3661	13.2868	-0.3175	<	-0.2533	underperform	59
AJFSCAP	-0.7360	10.8353	-2.1471	15.3177	-0.0679	>	-0.1402	outperform	42
APF	-2.4085	10.5680	-3.3661	13.2868	-0.2279	>	-0.2533	outperform	59
BCAP	-2.5199	12.0395	-3.0858	14.4658	-0.2093	>	-0.2133	outperform	49
BKA	-3.2801	10.7506	-3.3661	13.2868	-0.3051	<	-0.2533	underperform	59
BKA2	-3.3049	10.8179	-3.3661	13.2868	-0.3055	<	-0.2533	underperform	59
BKD	-3.2034	10.7698	-3.3661	13.2868	-0.2974	<	-0.2533	underperform	59
BMBF	-3.5996	10.5586	-3.3661	13.2868	-0.3409	<	-0.2533	underperform	59
BMF	-3.6400	6.2973	-6.4765	12.5516	-0.5780	<	-0.5160	underperform	29•
B-SUB	-3.3433	10.9141	-3.3661	13.2868	-0.3063	<	-0.2533	underperform	59
BTP	-3.0858	10.3335	-3.3661	13.2868	-0.2986	<	-0.2533	underperform	59
CMICRK	-2.8704	9.2676	-3.3661	13.2868	-0.3097	<	-0.2533	underperform	59
DE-I	-3.4837	11.7221	-3.3661	13.2868	-0.2972	<	-0.2533	underperform	59
INGTEF	-4.1215	9.5720	-3.0078	10.6589	-0.4306	<	-0.2822	underperform	20
KKF	-2.4642	12.0694	-3.3661	13.2868	-0.2042	>	-0.2533	outperform	59
KPLUS	-2.6448	10.4066	-3.3661	13.2868	-0.2541	<	-0.2533	underperform	59
KPLUS2	-2.6370	10.3302	-3.3661	13.2868	-0.2553	<	-0.2533	underperform	59
N_SAFETY	-4.1039	7.7535	-6.4375	9.8901	-0.5293	>	-0.6509	outperform	22•
NPAT-PRO	-2.7439	9.9978	-3.3661	13.2868	-0.2745	<	-0.2533	underperform	59
NSG	-1.1867	13.1763	-2.1471	15.3177	-0.0901	>	-0.1402	outperform	42
ONE+1	-2.6379	9.9385	-3.3661	13.2868	-0.2654	<	-0.2533	underperform	59
ONE-D	-2.3693	9.5584	-3.3661	13.2868	-0.2479	>	-0.2533	outperform	59
ONE-FAS	-2.7307	10.3936	-3.3661	13.2868	-0.2627	<	-0.2533	underperform	59
ONE-FF	-2.6995	9.7651	-3.4887	13.9688	-0.2764	<	-0.2498	underperform	52•
ONE-G	-2.5756	9.9146	-3.3661	13.2868	-0.2598	<	-0.2533	underperform	59
ONE-PF	-2.6919	9.8342	-3.3661	13.2868	-0.2737	<	-0.2533	underperform	59
ONE-PR	-2.6537	10.1364	-3.3661	13.2868	-0.2618	<	-0.2533	underperform	59
ONE-PRO	-2.7048	10.6240	-3.3661	13.2868	-0.2546	<	-0.2533	underperform	59
ONE-UB	-2.8345	10.0721	-3.3661	13.2868	-0.2814	<	-0.2533	underperform	59
ONE-UB2	-2.7471	10.0619	-3.3661	13.2868	-0.2730	<	-0.2533	underperform	59
ONE-UB3	-2.7901	9.9803	-3.3661	13.2868	-0.2796	<	-0.2533	underperform	59
ONE-UB4	-2.7015	9.8276	-3.3661	13.2868	-0.2749	<	-0.2533	underperform	59
ONE-UB5	-2.3256	9.7411	-3.2664	14.4273	-0.2387	<	-0.2264	underperform	43•
ONEUB-G	-1.9971	10.0465	-3.3544	13.8653	-0.1988	>	-0.2419	outperform	53•
ONE-WE	-2.6299	9.6217	-3.3661	13.2868	-0.2733	<	-0.2533	underperform	59
OSA	-3.1245	10.0086	-3.3661	13.2868	-0.3122	<	-0.2533	underperform	59
PISD	-3.3999	12.1209	-3.3661	13.2868	-0.2805	<	-0.2533	underperform	59
PPSD	-2.6050	8.4099	-3.3661	13.2868	-0.3098	<	-0.2533	underperform	59
RKEC	-2.8396	9.5694	-3.3661	13.2868	-0.2967	<	-0.2533	underperform	59
RKEDC	-2.8295	10.3632	-3.0651	14.3185	-0.2730	<	-0.2141	underperform	50
RKF	-2.8795	9.2279	-3.3661	13.2868	-0.3120	<	-0.2533	underperform	59
RKF2	-2.7945	8.8884	-3.3661	13.2868	-0.3144	<	-0.2533	underperform	59
RKF3	-2.8437	8.6501	-3.3661	13.2868	-0.3287	<	-0.2533	underperform	59

Name	R_p-R_f	Fund S.D.	R_m-R_f	Market S.D.	Sharpe ratio	> or <	Sharpe market	performance	months
RKF4	-2.9084	9.0554	-3.3661	13.2868	-0.3212	<	-0.2533	underperform	59
RKF-III	-2.9041	9.0990	-3.3661	13.2868	-0.3192	<	-0.2533	underperform	59
RPF2	-3.2126	11.2516	-3.3661	13.2868	-0.2855	<	-0.2533	underperform	59
RRF1	-3.8829	11.1330	-3.3661	13.2868	-0.3488	<	-0.2533	underperform	59
SAN	-3.1234	11.7264	-3.3661	13.2868	-0.2664	<	-0.2533	underperform	59
SCBDA	-4.1331	11.6205	-3.3661	13.2868	-0.3557	<	-0.2533	underperform	59
SCBMF	-3.6406	9.0926	-3.3661	13.2868	-0.4004	<	-0.2533	underperform	59
SCBMF2	-3.9003	9.5490	-3.3661	13.2868	-0.4085	<	-0.2533	underperform	59
SCBMF3	-4.0753	9.6527	-3.3661	13.2868	-0.4222	<	-0.2533	underperform	59
SCBMF4	-3.9460	10.7158	-3.3661	13.2868	-0.3682	<	-0.2533	underperform	59
SCBMF5	-3.9858	10.5820	-3.3661	13.2868	-0.3767	<	-0.2533	underperform	59
SCBPG	-3.4668	8.2393	-3.3661	13.2868	-0.4208	<	-0.2533	underperform	59
SCBPMO	-3.4212	8.7871	-3.3661	13.2868	-0.3893	<	-0.2533	underperform	59
SCBRT	-3.3089	9.8702	-3.3661	13.2868	-0.3352	<	-0.2533	underperform	59
SCBTS	-3.4908	7.9270	-3.3661	13.2868	-0.4404	<	-0.2533	underperform	59
SCBTS2	-3.3836	7.6019	-3.3661	13.2868	-0.4451	<	-0.2533	underperform	59
SCBTS3	-3.2178	8.2973	-3.3661	13.2868	-0.3878	<	-0.2533	underperform	59
SCDF	-3.3162	11.0218	-3.3661	13.2868	-0.3009	<	-0.2533	underperform	59
SCIF	-3.6439	10.3029	-3.3661	13.2868	-0.3537	<	-0.2533	underperform	59
SCIF2	-3.5167	10.3180	-3.3661	13.2868	-0.3408	<	-0.2533	underperform	59
SF4	-3.4781	10.0003	-3.3661	13.2868	-0.3478	<	-0.2533	underperform	59
SF5	-3.5021	10.3229	-3.3661	13.2868	-0.3393	<	-0.2533	underperform	59
SF7	-3.8898	12.0905	-3.3661	13.2868	-0.3217	<	-0.2533	underperform	59
SF8	-3.7995	11.8112	-3.3661	13.2868	-0.3217	<	-0.2533	underperform	59
SPF	-3.3919	10.4429	-3.3661	13.3224	-0.3248	<	-0.2527	underperform	59
SPT	-3.2997	10.1004	-3.3661	13.2868	-0.3267	<	-0.2533	underperform	59
SRT	-2.8980	10.0905	-3.3661	13.2868	-0.2872	<	-0.2533	underperform	59
SSB	-3.5387	12.1478	-3.3661	13.2868	-0.2913	<	-0.2533	underperform	59
STD	-3.7278	10.5056	-3.3661	13.2868	-0.3548	<	-0.2533	underperform	59
STD2	-3.7678	10.5119	-3.3661	13.2868	-0.3584	<	-0.2533	underperform	59
SW2	-3.2379	10.2467	-3.3661	13.2868	-0.3160	<	-0.2533	underperform	59
TDF	-2.7945	10.7316	-3.3661	13.2868	-0.2604	<	-0.2533	underperform	59
THANAI	-2.6845	10.0629	-3.3661	13.2868	-0.2668	<	-0.2533	underperform	59
THOR	-2.6864	8.9471	-3.3661	13.2868	-0.3003	<	-0.2533	underperform	59
THOR2	-2.3995	9.1993	-3.3661	13.2868	-0.2608	<	-0.2533	underperform	59
THOR3	-3.1479	8.6924	-4.6339	14.6178	-0.3621	<	-0.3170	underperform	35•
THOR4	-2.6432	8.7374	-3.3661	13.2868	-0.3025	<	-0.2533	underperform	59
TNP	-3.1545	11.8045	-3.3661	13.2868	-0.2672	<	-0.2533	underperform	59
TS	-3.5240	11.3948	-3.3661	13.2868	-0.3093	<	-0.2533	underperform	59
TVF	-2.7605	9.2979	-3.3661	13.2868	-0.2969	<	-0.2533	underperform	59
UNF	-3.6230	11.8186	-3.3661	13.2868	-0.3065	<	-0.2533	underperform	59
USD	-2.9595	9.0515	-3.3661	13.2868	-0.3270	<	-0.2533	underperform	59
USD2	-2.8820	9.0814	-3.3661	13.2868	-0.3174	<	-0.2533	underperform	59
Mean[(a)]	-3.0880	10.1041	-3.4136	13.3250	-0.3105	-	**-0.2580**		

(a) Interpretation of the mean values in this table warrants caution because funds do not have the same time horizon (numbers of observations (months) vary).

• Funds terminated before December 2000

Table C-3 Fund performance as measured by the Jensen Alpha, contractionary market environment, February 1996 - December 2000 (sorted by rank)

rank	name	Jensen Alpha	t-stat	Sig. of t-stat	performance	months	Serial correlation[b]
1	N_SAFETY	0.6052	1.0547	0.3048	outperform	22••	first order
2	NSG	0.4941	0.5765	0.5675	outperform	42	
3	AJFSCAP	0.3880	0.3377	0.7373	outperform	42	
4	ONEUB-G	0.1931	0.3096	0.7581	outperform	53••	
5	APF	0.0464	0.0810	0.9357	outperform	59	
6	KKF	0.0337	0.0357	0.9717	outperform	59	
7	ONE-D	-0.1803	-0.3264	0.7453	underperform	59	
8	BCAP	-0.2386	-0.2923	0.7714	underperform	49	
9	SAN	-0.2768	-0.6041	0.5482	underperform	59	
10	ONE-PRO	-0.2827	-0.4506	0.6540	underperform	59	
11	KPLUS	-0.2914	-0.4578	0.6489	underperform	59	
12	KPLUS2	-0.2957	-0.4719	0.6388	underperform	59	
13	ONE-UB5	-0.2992	-0.4861	0.6295	underperform	43••	
14	ONE-G	-0.3024	-0.5293	0.5986	underperform	59	
15	ONE-PR	-0.3050	-0.5493	0.5849	underperform	59	
16	ONE-FAS	-0.3096	-0.5601	0.5776	underperform	59	
17	TNP	-0.3140	-0.6226	0.5360	underperform	59	
18	ONE+1	-0.3222	-0.6086	0.5452	underperform	59	
19	TDF	-0.3466	-0.5452	0.5877	underperform	59	
20	THANA1	-0.3535	-0.6397	0.5249	underperform	59	
21	ONE-UB2	-0.4118	-0.7531	0.4545	underperform	59	
22	ONE-UB4	-0.4213	-0.7887	0.4335	underperform	59	
23	NPAT-PRO	-0.4224	-0.7804	0.4384	underperform	59	
24	THOR2	-0.4337	-0.6513	0.5175	underperform	59	
25	ONE-WE	-0.4366	-0.7686	0.4453	underperform	59	
26	ONE-PF	-0.4450	-0.7740	0.4421	underperform	59	
27	ONE-UB3	-0.4852	-0.8737	0.3859	underperform	59	
28	ONE-UB	-0.5037	-0.9057	0.3689	underperform	59	
29	RPF2	-0.5185	-1.0373	0.3040	underperform	59	
30	SRT	-0.5391	-1.0270	0.3088	underperform	59	
31	ONE-FF	-0.5494	-0.8227	0.4146	underperform	52••	
32	DE-1	-0.6685	-1.3145	0.1939	underperform	59	
33	SCDF	-0.6921	-1.3529	0.1814	underperform	59	
34	BKD	-0.6948	-1.2099	0.2313	underperform	59	
35	BTP	-0.7005	-1.2135	0.2300	underperform	59	
36	PISD	-0.7163	-0.8997	0.3721	underperform	59	
37	TVF	-0.7237	-1.1446	0.2572	underperform	59	
38	RKEC	-0.7260	-1.1435	0.2576	underperform	59	
39	THOR4	-0.7666	-1.2233	0.2262	underperform	59	
40	BKA	-0.7767	-1.3526	0.1815	underperform	59	
41	BKA2	-0.7891	-1.3552	0.1807	underperform	59	
42	OSA	-0.7919	-1.4942	0.1406	underperform	59	
43	B-SUB	-0.8035	-1.3724	0.1753	underperform	59	

rank	name	Jensen Alpha	t-stat	Sig. of t-stat	performance	months	Serial correlation
44	CMICRK	-0.8039	-1.3477	0.1831	underperform	59	
45	UNF	-0.8139	-1.4679	0.1476	underperform	59	
46	RKF	-0.8330	-1.3765	0.1740	underperform	59	
47	TS	-0.8431	-1.4736	0.1461	underperform	59	
48	SW2	-0.8460	-1.5620	0.1238	underperform	59	
49	USD2	-0.8634	-1.4685	0.1475	underperform	59	
50	RKF2	-0.8635	-1.3950	0.1684	underperform	59	
51	RKF-HI	-0.8832	-1.4863	0.1427	underperform	59	
52	RKF4	-0.8930	-1.5228	0.1333	underperform	59	
53	RKEDC	-0.8991	-1.2053	0.2340	underperform	50	
54	THOR	-0.9042	-1.2048	0.2333	underperform	59	
55	AGF	-0.9091	-1.6329	0.1080	underperform	59	
56	SPF	-0.9527	-1.7365	0.0879•	underperform	59	
57	RKF3	-0.9548	-1.6083	0.1133	underperform	59	
58	PPSD	-0.9600	-1.3236	0.1909	underperform	59	
59	USD	-0.9685	-1.5977	0.1156	underperform	59	
60	SPT	-0.9713	-1.7188	0.0911•	underperform	59	
61	THOR3	-0.9898	-1.0187	0.3158	underperform	35••	
62	SF8	-0.9933	-1.7828	0.0799•	underperform	59	
63	SCBRT	-1.0094	-1.9110	0.0610•	underperform	59	
64	SF7	-1.0155	-1.7897	0.0788•	underperform	59	
65	SCIF2	-1.0828	-2.1148	0.0388•	underperform	59	
66	SSB	-1.0848	-1.0906	0.2800	underperform	59	
67	SF5	-1.1112	-1.9606	0.0548•	underperform	59	
68	BMBF	-1.1122	-2.0956	0.0406•	underperform	59	
69	SF4	-1.1575	-2.1220	0.0382•	underperform	59	
70	SCIF	-1.2097	-2.3869	0.0203•	underperform	59	
71	RRF1	-1.2693	-2.2183	0.0305•	underperform	59	
72	STD	-1.2958	-2.2356	0.0293•	underperform	59	
73	STD2	-1.3233	-2.3329	0.0232•	underperform	59	
74	INGTEF	-1.3912	-2.4174	0.0265•	underperform	20	
75	SCBTS3	-1.4098	-2.4649	0.0167•	underperform	59	
76	SCBPMO	-1.4517	-2.6117	0.0115•	underperform	59	
77	SCBDA	-1.5109	-2.1093	0.0393•	underperform	59	
78	SCBMF4	-1.5391	-2.2836	0.0261•	underperform	59	
79	SCBMF5	-1.6071	-2.4229	0.0186•	underperform	59	
80	SCBPG	-1.6340	-3.0683	0.0033•	underperform	59	
81	SCBMF2	-1.7742	-2.8642	0.0058•	underperform	59	
82	SCBTS	-1.7958	-3.1146	0.0029•	underperform	59	
83	SCBTS2	-1.7986	-3.0785	0.0032•	underperform	59	
84	SCBMF3	-1.9090	-3.1317	0.0027•	underperform	59	
85	SCBMF	-1.9115	-2.3459	0.0225•	underperform	59	
	Mean[a]	-0.7756	-1.3072	0.2802	-	-	-

(a) Interpretation of the mean values in this table warrants caution because funds do not have the same time horizon (numbers of observations (months) vary).
(b) indicates iterative level of the Cochrane-Orcutt iterative method when tested for serial correlation.
Number of funds is 85 funds (1 funds are excluded because they fall into inconclusive region when tested for serial correlation (Durbin-Watson statistic).
• significant at the 0.10 level
•• Funds terminated before December 2000

Table C-4 Fund performance as measured by the M^2, contractionary market environment, February 1996 - December 2000 (sorted by name)

Name	R_p	S.D. fund	S.D. market	R_f	M^2		market return	performance	months	Name	R_p	S.D. fund	S.D. market	R_f	M^2		market return	performance	months
AGF	-2.9211	11.0833	13.2868	0.5981	-3.6208	<	-2.7679	underperform	59	RKF4	-2.3102	9.0554	13.2868	0.5981	-3.6693	<	-2.7679	underperform	59
AJFSCAP	-0.1937	10.8353	15.3177	0.5424	-0.4982	>	-1.6047	outperform	42	RKF-HI	-2.3060	9.0990	13.2868	0.5981	-3.6427	<	-2.7679	underperform	59
APF	-1.8103	10.5680	13.2868	0.5981	-2.4300	>	-2.7679	outperform	59	RPF2	-2.6144	11.2516	13.2868	0.5981	-3.1955	<	-2.7679	underperform	59
BCAP	-1.9554	12.0395	14.4658	0.5645	-2.4632	>	-2.5213	outperform	49	RRF1	-3.2848	11.1330	13.2868	0.5981	-4.0360	<	-2.7679	underperform	59
BKA	-2.6820	10.7506	13.2868	0.5981	-3.4558	<	-2.7679	underperform	59	SAN	-2.5252	11.7264	13.2868	0.5981	-2.9408	<	-2.7679	underperform	59
BKA2	-2.7067	10.8179	13.2868	0.5981	-3.4610	<	-2.7679	underperform	59	SCBDA	-3.5350	11.6205	13.2868	0.5981	-4.1277	<	-2.7679	underperform	59
BKD	-2.6053	10.7698	13.2868	0.5981	-3.3539	<	-2.7679	underperform	59	SCBMF	-3.0425	9.0926	13.2868	0.5981	-4.7218	<	-2.7679	underperform	59
BMBF	-3.0015	10.5586	13.2868	0.5981	-3.9316	<	-2.7679	underperform	59	SCBMF2	-3.3022	9.5490	13.2868	0.5981	-4.8289	<	-2.7679	underperform	59
BMF	-2.8492	6.2973	12.5516	0.7909	-6.4643	<	-5.6857	underperform	29•	SCBMF3	-3.4772	9.6527	13.2868	0.5981	-5.0115	<	-2.7679	underperform	59
B-SUB	-2.7452	10.9141	13.2868	0.5981	-3.4720	<	-2.7679	underperform	59	SCBMF4	-3.3479	10.7158	13.2868	0.5981	-4.2946	<	-2.7679	underperform	59
BTP	-2.4877	10.3335	13.2868	0.5981	-3.3696	<	-2.7679	underperform	59	SCBMF5	-3.3877	10.5820	13.2868	0.5981	-4.4065	<	-2.7679	underperform	59
CMICRK	-2.2722	9.2676	13.2868	0.5981	-3.5171	<	-2.7679	underperform	59	SCBPG	-2.8686	8.2393	13.2868	0.5981	-4.9924	<	-2.7679	underperform	59
DE-1	-2.8855	11.7221	13.2868	0.5981	-3.3506	<	-2.7679	underperform	59	SCBPMO	-2.8231	8.7871	13.2868	0.5981	-4.5750	<	-2.7679	underperform	59
INGTEF	-3.6063	9.3527	10.6589	0.3358	-4.1569	<	-2.6720	underperform	20	SCBRT	-2.7107	9.8702	13.2868	0.5981	-3.8561	<	-2.7679	underperform	59
KKF	-1.8660	12.0694	13.2868	0.5981	-2.1146	>	-2.7679	outperform	59	SCBTS	-2.8927	7.9270	13.2868	0.5981	-5.2530	<	-2.7679	underperform	59
KPLUS	-2.0466	10.4066	13.2868	0.5981	-2.7786	<	-2.7679	underperform	59	SCBTS2	-2.7855	7.6019	13.2868	0.5981	-5.3158	<	-2.7679	underperform	59
KPLUS2	-2.0388	10.3302	13.2868	0.5981	-2.7936	<	-2.7679	underperform	59	SCBTS3	-2.6197	8.2973	13.2868	0.5981	-4.5548	<	-2.7679	underperform	59
N_SAFETY	-3.3410	7.7535	9.8901	0.7629	-4.4718	>	-5.6746	outperform	22•	SCDF	-2.7181	11.0218	13.2868	0.5981	-3.3996	<	-2.7679	underperform	59
NPAT-PRO	-2.1458	9.9978	13.2868	0.5981	-3.0484	<	-2.7679	underperform	59	SCIF	-3.0458	10.3029	13.2868	0.5981	-4.1012	<	-2.7679	underperform	59
NSG	-0.6443	13.1763	15.3177	0.5424	-0.8371	>	-1.6047	outperform	42	SCIF2	-2.9186	10.3180	13.2868	0.5981	-3.9305	<	-2.7679	underperform	59
ONE+1	-2.0398	9.9385	13.2868	0.5981	-2.9285	<	-2.7679	underperform	59	SF4	-2.8799	10.0003	13.2868	0.5981	-4.0230	<	-2.7679	underperform	59
ONE-D	-1.7712	9.5584	13.2868	0.5981	-2.6954	>	-2.7679	outperform	59	SF5	-2.9040	10.3229	13.2868	0.5981	-3.9095	<	-2.7679	underperform	59
ONE-FAS	-2.1325	10.3936	13.2868	0.5981	-2.8927	<	-2.7679	underperform	59	SF7	-3.2916	12.0905	13.2868	0.5981	-3.6765	<	-2.7679	underperform	59
ONE-FF	-2.0609	9.7651	13.9688	0.6387	-3.2229	<	-2.8501	underperform	52•	SF8	-3.2014	11.8112	13.2868	0.5981	-3.6761	<	-2.7679	underperform	59
ONE-G	-1.9775	9.9146	13.2868	0.5981	-2.8536	<	-2.7679	underperform	59	SPF	-2.7938	10.4429	13.3224	0.5981	-3.7291	<	-2.7679	underperform	59
ONE-PF	-2.0937	9.8342	13.2868	0.5981	-3.0388	<	-2.7679	underperform	59	SPT	-2.7016	10.1004	13.2868	0.5981	-3.7426	<	-2.7679	underperform	59
ONE-PR	-2.0555	10.1364	13.2868	0.5981	-2.8803	<	-2.7679	underperform	59	SRT	-2.2998	10.0905	13.2868	0.5981	-3.2178	<	-2.7679	underperform	59
ONE-PRO	-2.1067	10.6240	13.2868	0.5981	-2.7846	<	-2.7679	underperform	59	SSB	-2.9406	12.1478	13.2868	0.5981	-3.2724	<	-2.7679	underperform	59
ONE-UB	-2.2363	10.0721	13.2868	0.5981	-3.1410	<	-2.7679	underperform	59	STD	-3.1297	10.5056	13.2868	0.5981	-4.1165	<	-2.7679	underperform	59
ONE-UB2	-2.1489	10.0619	13.2868	0.5981	-3.0294	<	-2.7679	underperform	59	STD2	-3.1696	10.5119	13.2868	0.5981	-4.1643	<	-2.7679	underperform	59
ONE-UB3	-2.1920	9.9803	13.2868	0.5981	-3.1164	<	-2.7679	underperform	59	SW2	-2.6398	10.2467	13.2868	0.5981	-3.6004	<	-2.7679	underperform	59
ONE-UB4	-2.1033	9.8276	13.2868	0.5981	-3.0542	<	-2.7679	underperform	59	TDF	-2.1963	10.7316	13.2868	0.5981	-2.8617	<	-2.7679	underperform	59
ONE-UB5	-1.6234	9.7411	14.4273	0.7022	-2.7422	<	-2.5643	underperform	43•	THANA1	-2.0863	10.0629	13.2868	0.5981	-2.9463	<	-2.7679	underperform	59
ONEUB-G	-1.3645	10.0465	13.8653	0.6326	-2.1236	>	-2.7218	outperform	53•	THOR	-2.0883	8.9471	13.2868	0.5981	-3.3913	<	-2.7679	underperform	59
ONE-WE	-2.0318	9.6217	13.2868	0.5981	-3.0336	<	-2.7679	underperform	59	THOR 3	-2.3801	8.6924	14.6178	0.7678	-4.5259	<	-3.8660	underperform	35•
OSA	-2.5264	10.0086	13.2868	0.5981	-3.5498	<	-2.7679	underperform	59	THOR 4	-2.0451	8.7374	13.2868	0.5981	-3.4214	<	-2.7679	underperform	59
PISD	-2.8018	12.1209	13.2868	0.5981	-3.1288	<	-2.7679	underperform	59	THOR2	-1.8014	9.1993	13.2868	0.5981	-2.8676	<	-2.7679	underperform	59
PPSD	-2.0069	8.4099	13.2868	0.5981	-3.5176	<	-2.7679	underperform	59	TNP	-2.5564	11.8045	13.2868	0.5981	-2.9525	<	-2.7679	underperform	59
RKEC	-2.2414	9.5694	13.2868	0.5981	-3.3445	<	-2.7679	underperform	59	TS	-2.9258	11.3948	13.2868	0.5981	-3.5110	<	-2.7679	underperform	59
RKEDC	-2.2617	10.3632	14.3185	0.5678	-3.3416	<	-2.4973	underperform	50	TVF	-2.1624	9.2979	13.2868	0.5981	-3.3467	<	-2.7679	underperform	59
RKF	-2.2813	9.2279	13.2868	0.5981	-3.5478	<	-2.7679	underperform	59	UNF	-3.0248	11.8186	13.2868	0.5981	-3.4749	<	-2.7679	underperform	59
RKF2	-2.1963	8.8884	13.2868	0.5981	-3.5792	<	-2.7679	underperform	59	USD	-2.3614	9.0515	13.2868	0.5981	-3.7461	<	-2.7679	underperform	59
RKF3	-2.2455	8.6501	13.2868	0.5981	-3.7698	<	-2.7679	underperform	59	USD2	-2.2839	9.0814	13.2868	0.5981	-3.6185	<	-2.7679	underperform	59
										Mean[(a)]	-2.4847	10.1015	13.3250	0.6013	-3.5064		-2.8123	-	-

(a) Interpretation of the mean values in this table warrants caution because funds do not have the same time horizon (numbers of observations (months) vary).

• Funds terminated before December 2000

Tabel C-5 Rate of return of Thai equity funds (per cent per month), contractionary market environment, February 1996 - December 2000 (sorted by name)

name	fund return (%)	> or <	market return (%)	performance	months	name	fund return (%)	> or <	market return (%)	performance	months
AGF	-3.5464	>	-3.6129	outperform	59	RKF4	-2.7192	>	-3.6129	outperform	59
AJFSCAP	-0.7717	>	-2.7223	outperform	42	RKF-HI	-2.7214	>	-3.6129	outperform	59
APF	-2.3485	>	-3.6129	outperform	59	RPF2	-3.2466	>	-3.6129	outperform	59
BCAP	-2.6860	>	-3.5192	outperform	49	RRF1	-3.9137	<	-3.6129	underperform	59
BKA	-3.2692	>	-3.6129	outperform	59	SAN	-3.2151	>	-3.6129	outperform	59
BKA2	-3.3015	>	-3.6129	outperform	59	SCBDA	-4.2161	<	-3.6129	underperform	59
BKD	-3.1915	>	-3.6129	outperform	59	SCBMF	-3.4723	>	-3.6129	outperform	59
BMBF	-3.5631	>	-3.6129	outperform	59	SCBMF2	-3.7682	<	-3.6129	underperform	59
BMF	-3.0465	>	-6.4481	outperform	29*	SCBMF3	-3.9542	<	-3.6129	underperform	59
B-SUB	-3.3520	>	-3.6129	outperform	59	SCBMF4	-3.9449	<	-3.6129	underperform	59
BTP	-3.0304	>	-3.6129	outperform	59	SCBMF5	-3.9701	<	-3.6129	underperform	59
CMICRK	-2.7003	>	-3.6129	outperform	59	SCBPG	-3.2142	>	-3.6129	outperform	59
DE-1	-3.5801	>	-3.6129	outperform	59	SCBPMO	-3.2171	>	-3.6129	outperform	59
INGTEF	-4.0534	<	-3.2342	underperform	20	SCBRT	-3.2031	>	-3.6129	outperform	59
KKF	-2.5701	>	-3.6129	outperform	59	SCBTS	-3.2139	>	-3.6129	outperform	59
KPLUS	-2.5736	>	-3.6129	outperform	59	SCBTS2	-3.0833	>	-3.6129	outperform	59
KPLUS2	-2.5575	>	-3.6129	outperform	59	SCBTS3	-2.9707	>	-3.6129	outperform	59
NPAT SAFTY	-3.6322	>	-6.1656	outperform	22*	SCDF	-3.3337	>	-3.6129	outperform	59
NPAT-PRO	-2.6440	>	-3.6129	outperform	59	SCIF	-3.5831	>	-3.6129	outperform	59
NSG	-1.4745	>	-2.7223	outperform	42	SCIF2	-3.4552	>	-3.6129	outperform	59
ONE+1	-2.5300	>	-3.6129	outperform	59	SF4	-3.3807	>	-3.6129	outperform	59
ONE-D	-2.2250	>	-3.6129	outperform	59	SF5	-3.4316	>	-3.6129	outperform	59
ONE-FAS	-2.6680	>	-3.6129	outperform	59	SF7	-4.0290	<	-3.6129	underperform	59
ONE-FF	-2.5391	>	-3.7792	outperform	52*	SF8	-3.9050	<	-3.6129	underperform	59
ONE-G	-2.4705	>	-3.6129	outperform	59	SPF	-3.3442	>	-3.6129	outperform	59
ONE-PF	-2.5754	>	-3.6129	outperform	59	SPT	-3.2150	>	-3.6129	outperform	59
ONE-PR	-2.5642	>	-3.6129	outperform	59	SRT	-2.8101	>	-3.6129	outperform	59
ONE-PRO	-2.6671	>	-3.6129	outperform	59	SSB	-3.6821	<	-3.6129	underperform	59
ONE-UB	-2.7401	>	-3.6129	outperform	59	STD	-3.6876	<	-3.6129	underperform	59
ONE-UB2	-2.6517	>	-3.6129	outperform	59	STD2	-3.7303	<	-3.6129	underperform	59
ONE-UB3	-2.6855	>	-3.6129	outperform	59	SW2	-3.1680	>	-3.6129	outperform	59
ONE-UB4	-2.5832	>	-3.6129	outperform	59	TDF	-2.7623	>	-3.6129	outperform	59
ONE-UB5	-2.0802	>	-3.5394	outperform	43*	THANA1	-2.5882	>	-3.6129	outperform	59
ONEUB-G	-1.8625	>	-3.6389	outperform	53*	THOR	-2.4845	>	-3.6129	outperform	59
ONE-WE	-2.4936	>	-3.6129	outperform	59	THOR 3	-2.7333	>	-4.8531	outperform	35*
OSA	-3.0287	>	-3.6129	outperform	59	THOR 4	-2.4184	>	-3.6129	outperform	59
PISD	-3.5550	>	-3.6129	outperform	59	THOR2	-2.2073	>	-3.6129	outperform	59
PPSD	-2.3761	>	-3.6129	outperform	59	TNP	-3.2561	>	-3.6129	outperform	59
RKEC	-2.6953	>	-3.6129	outperform	59	TS	-3.5845	>	-3.6129	outperform	59
RKEDC	-2.7946	>	-3.4757	outperform	50	TVF	-2.5871	>	-3.6129	outperform	59
RKF	-2.7088	>	-3.6129	outperform	59	UNF	-3.7283	<	-3.6129	underperform	59
RKF2	-2.5916	>	-3.6129	outperform	59	USD	-2.7790	>	-3.6129	outperform	59
RKF3	-2.6218	>	-3.6129	outperform	59	USD2	-2.7043	>	-3.6129	outperform	59
						Mean	-3.0027		-3.6635	-	-

* Funds terminated before December 2000

Note: 1. Interpretation of the mean values in this table warrants caution because funds do not have the same time horizon (numbers of observations (months) vary)

2. It should be noted that some funds have a short observation period which may influence fund performance results.

Appendix D Performance rankings between a series of prior periods of varying length and a subsequent period

Table D-1 Fund performance as ranked by the Treynor measure, prior periods of varying length and subsequent period (1999-2000)

1992-1998

rank	name	(Rp-Rf)	Beta	Treynor Index	n
1	RPF2	-0.8880	0.8682	-1.0228	84
2	SW2	-0.9594	0.7836	-1.2243	84
3	SSB	-1.0275	0.8016	-1.2817	84
4	TNP	-1.3286	0.9108	-1.4587	84
5	SF5	-1.2369	0.7826	-1.5806	84
6	SF4	-1.2380	0.7534	-1.6432	84

1999-2000

rank	name	(Rp-Rf)	Beta	Treynor Index	n
1	TNP	-1.2716	0.8601	-1.4785	24
2	RPF2	-1.8420	0.8547	-2.1552	24
3	SW2	-1.9438	0.8200	-2.3704	24
4	SF4	-2.1262	0.8278	-2.5686	24
5	SF5	-2.4530	0.8366	-2.9320	24
6	SSB	-2.6905	0.7921	-3.3969	24

1993-1998

rank	name	(Rp-Rf)	Beta	Treynor Index	n
1	RKF	-0.8024	0.6748	-1.1892	72
2	RPF2	-1.3059	0.8705	-1.5001	72
3	SAN	-1.3307	0.8636	-1.5409	72
4	ONE-D	-0.9923	0.6267	-1.5834	72
5	SSB	-1.3366	0.8054	-1.6596	72
6	THOR2	-1.0309	0.6059	-1.7014	72
7	SW2	-1.3751	0.7839	-1.7542	72
8	SCBMF	-1.1902	0.6598	-1.8037	72
9	TNP	-1.6928	0.9164	-1.8473	72
10	ONE-G	-1.2197	0.6602	-1.8475	72
11	PPSD	-0.8474	0.4291	-1.9749	72
12	SF5	-1.6824	0.7725	-2.1779	72
13	SF4	-1.7018	0.7524	-2.2617	72
14	THOR	-1.5192	0.5445	-2.7900	72

1999-2000

rank	name	(Rp-Rf)	Beta	Treynor Index	n
1	TNP	-1.2716	0.8601	-1.4785	24
2	SAN	-1.4894	0.9298	-1.6018	24
3	ONE-G	-1.6351	0.9314	-1.7555	24
4	ONE-D	-1.6215	0.9203	-1.7619	24
5	THOR	-1.5017	0.7644	-1.9647	24
6	RPF2	-1.8420	0.8547	-2.1552	24
7	RKF	-1.8197	0.8101	-2.2464	24
8	SW2	-1.9438	0.8200	-2.3704	24
9	PPSD	-2.1038	0.8572	-2.4541	24
10	SF4	-2.1262	0.8278	-2.5686	24
11	THOR2	-1.9626	0.7547	-2.6006	24
12	SF5	-2.4530	0.8366	-2.9320	24
13	SSB	-2.6905	0.7921	-3.3969	24
14	SCBMF	-2.9568	0.6037	-4.8980	24

1994-1998

rank	name	(Rp-Rf)	Beta	Treynor Index	n
1	BKA	-2.5507	0.7701	-3.3121	60
2	ONE-PR	-2.1429	0.6205	-3.4536	60
3	RPF2	-2.8245	0.8158	-3.4621	60
4	THANA1	-2.1520	0.6162	-3.4923	60
5	SAN	-2.9177	0.8205	-3.5561	60
6	THOR2	-2.0523	0.5751	-3.5682	60
7	TNP	-3.1363	0.8737	-3.5897	60
8	ONE-FAS	-2.4083	0.6592	-3.6534	60
9	ONE+1	-2.3479	0.6345	-3.7002	60
10	RKF2	-2.0578	0.5534	-3.7186	60
11	ONE-D	-2.1474	0.5772	-3.7207	60
12	ONE-PRO	-2.4811	0.6587	-3.7666	60
13	RKF	-2.2517	0.5929	-3.7981	60
14	NPAT-PRO	-2.4142	0.6352	-3.8007	60
15	SW2	-2.7601	0.7228	-3.8188	60
16	ONE-UB3	-2.3948	0.6259	-3.8262	60
17	SSB	-2.8674	0.7447	-3.8506	60
18	AGF	-3.0081	0.7789	-3.8622	60
19	ONE-UB2	-2.4573	0.6324	-3.8858	60
20	SCIF2	-2.8326	0.7277	-3.8926	60
21	ONE-UB	-2.5027	0.6376	-3.9252	60
22	ONE-G	-2.4332	0.6141	-3.9625	60
23	RKF-HJ	-2.3919	0.5831	-4.1018	60
24	ONE-WE	-2.3912	0.5810	-4.1154	60
25	USD2	-2.2641	0.5372	-4.2147	60
26	RKF3	-2.2340	0.5292	-4.2217	60
27	KPLUS	-2.5815	0.6112	-4.2238	60
28	KPLUS2	-2.6291	0.6128	-4.2904	60
29	SF5	-3.1042	0.7134	-4.3515	60
30	USD	-2.3141	0.5279	-4.3833	60
31	SCBTS3	-2.2794	0.5099	-4.4699	60
32	SCIF	-3.3449	0.7462	-4.4826	60
33	STD2	-3.2949	0.7192	-4.5814	60
34	SF4	-3.1989	0.6969	-4.5901	60
35	SCBPG	-2.4315	0.5215	-4.6625	60
36	STD	-3.4254	0.7219	-4.7453	60
37	THOR	-2.5253	0.5072	-4.9792	60
38	SCBMF2	-3.1796	0.6288	-5.0564	60
39	SCBMF	-2.8396	0.5482	-5.1799	60
40	SCBMF3	-3.3448	0.6450	-5.1857	60
41	RRF1	-4.2529	0.8077	-5.2652	60
42	SCBTS	-2.7175	0.4894	-5.5527	60
43	SCBTS2	-2.5227	0.4479	-5.6328	60
44	PPSD	-2.0601	0.3624	-5.6848	60

1999-2000

rank	name	(Rp-Rf)	Beta	Treynor Index	n
1	KPLUS2	-0.7852	0.9605	-0.8175	24
2	KPLUS	-0.8670	0.9677	-0.8960	24
3	TNP	-1.2716	0.8601	-1.4785	24
4	ONE+1	-1.3821	0.9213	-1.5001	24
5	ONE-PR	-1.4505	0.9584	-1.5134	24
6	THANA1	-1.4493	0.9546	-1.5182	24
7	ONE-UB2	-1.4692	0.9439	-1.5565	24
8	ONE-UB	-1.4760	0.9367	-1.5758	24
9	SAN	-1.4894	0.9298	-1.6018	24
10	ONE-PRO	-1.5905	0.9344	-1.7022	24
11	ONE-FAS	-1.6122	0.9342	-1.7258	24
12	ONE-G	-1.6351	0.9314	-1.7555	24
13	ONE-D	-1.6215	0.9203	-1.7619	24
14	ONE-WE	-1.6644	0.9435	-1.7641	24
15	ONE-UB3	-1.6843	0.9473	-1.7779	24
16	NPAT-PRO	-1.6712	0.9148	-1.8268	24
17	THOR	-1.5017	0.7644	-1.9647	24
18	RPF2	-1.8420	0.8547	-2.1552	24
19	AGF	-1.8401	0.8347	-2.2045	24
20	RKF	-1.8197	0.8101	-2.2464	24
21	RKF-HJ	-1.8692	0.7966	-2.3465	24
22	SW2	-1.9438	0.8200	-2.3704	24
23	RKF3	-1.9464	0.8146	-2.3893	24
24	RKF2	-1.9428	0.8099	-2.3987	24
25	PPSD	-2.1038	0.8572	-2.4541	24
26	RRF1	-2.0637	0.8223	-2.5095	24
27	SF4	-2.1262	0.8278	-2.5686	24
28	SCIF2	-2.0721	0.8039	-2.5776	24
29	USD2	-2.2253	0.8567	-2.5975	24
30	THOR2	-1.9626	0.7547	-2.6006	24
31	SCIF	-2.1109	0.8080	-2.6125	24
32	USD	-2.2732	0.8585	-2.6479	24
33	STD	-2.3142	0.8583	-2.6962	24
34	STD2	-2.3449	0.8578	-2.7335	24
35	SF5	-2.4530	0.8366	-2.9320	24
36	BKA	-2.4019	0.7444	-3.2266	24
37	SSB	-2.6905	0.7921	-3.3969	24
38	SCBTS3	-2.6857	0.7654	-3.5089	24
39	SCBTS	-2.6087	0.7164	-3.6412	24
40	SCBMF2	-2.8552	0.7791	-3.6647	24
41	SCBMF3	-2.9541	0.7789	-3.7928	24
42	SCBTS2	-2.8018	0.7285	-3.8461	24
43	SCBPG	-3.0398	0.7280	-4.1753	24
44	SCBMF	-2.9568	0.6037	-4.8980	24

1995-1998

rank	name	(Rp-Rf)	Beta	Treynor Index	n
1	BTP	-2.5714	0.7281	-3.5316	48
2	SAN	-3.0208	0.8189	-3.6887	48
3	THOR2	-2.0537	0.5513	-3.7252	48
4	RPF2	-3.0621	0.8009	-3.8234	48
5	BKA	-2.9109	0.7562	-3.8496	48
6	BKA2	-2.9899	0.7590	-3.9394	48
7	TNP	-3.3791	0.8529	-3.9617	48
8	ONE-D	-2.2713	0.5695	-3.9884	48
9	OSA	-2.5631	0.6354	-4.0337	48
10	BKD	-3.1026	0.7624	-4.0694	48
11	SCDF	-3.0921	0.7572	-4.0838	48
12	TS	-3.2504	0.7894	-4.1175	48
13	SF7	-3.5588	0.8643	-4.1176	48
14	ONE-PRO	-2.6411	0.6410	-4.1200	48
15	UNF	-3.4671	0.8357	-4.1486	48
16	SSB	-3.0464	0.7293	-4.1769	48
17	KKF	-2.7953	0.6623	-4.2209	48
18	RKEC	-2.4502	0.5777	-4.2413	48
19	DE-1	-3.5320	0.8258	-4.2771	48
20	ONE-FAS	-2.7665	0.6429	-4.3030	48
21	SW2	-3.0235	0.6961	-4.3436	48
22	NPAT-PRO	-2.6706	0.6141	-4.3486	48

1999-2000

rank	name	(Rp-Rf)	Beta	Treynor Index	n
1	KKF	-0.6489	0.9839	-0.6595	24
2	TDF	-0.7675	0.9577	-0.8014	24
3	KPLUS2	-0.7852	0.9605	-0.8175	24
4	KPLUS	-0.8670	0.9677	-0.8960	24
5	TNP	-1.2716	0.8601	-1.4785	24
6	ONE+1	-1.3821	0.9213	-1.5001	24
7	ONE-PR	-1.4505	0.9584	-1.5134	24
8	THANA1	-1.4493	0.9546	-1.5182	24
9	ONE-UB2	-1.4692	0.9439	-1.5565	24
10	ONE-UB	-1.4760	0.9367	-1.5758	24
11	SAN	-1.4894	0.9298	-1.6018	24
12	ONE-PRO	-1.5905	0.9344	-1.7022	24
13	ONE-FAS	-1.6122	0.9342	-1.7258	24
14	ONE-PF	-1.6104	0.9197	-1.7510	24
15	ONE-UB4	-1.6294	0.9284	-1.7551	24
16	ONE-G	-1.6351	0.9314	-1.7555	24
17	ONE-D	-1.6215	0.9203	-1.7619	24
18	ONE-WE	-1.6644	0.9435	-1.7641	24
19	ONE-UB3	-1.6843	0.9473	-1.7779	24
20	NPAT-PRO	-1.6712	0.9148	-1.8268	24
21	THOR	-1.5017	0.7644	-1.9647	24
22	DE-1	-1.8728	0.9086	-2.0611	24

Table D-1 (continued)

1995-1998

rank	name	(Rp-Rf)	Beta	Trevnor Index	n
23	ONE+1	-2.6916	0.6154	-4.3737	48
24	ONE-PF	-2.4753	0.5644	-4.3859	48
25	ONE-PR	-2.7055	0.6145	-4.4024	48
26	ONE-UB2	-2.7255	0.6176	-4.4133	48
27	ONE-UB3	-2.6725	0.6053	-4.4153	48
28	ONE-UB	-2.7477	0.6196	-4.4347	48
29	ONE-G	-2.6483	0.5954	-4.4481	48
30	THANA1	-2.7185	0.6095	-4.4605	48
31	AGF	-3.5000	0.7831	-4.4695	48
32	TVF	-2.4257	0.5410	-4.4841	48
33	ONE-UB4	-2.6997	0.5982	-4.5132	48
34	SPF	-3.1633	0.6935	-4.5615	48
35	SF5	-3.1861	0.6952	-4.5828	48
36	ONE-WE	-2.5830	0.5611	-4.6036	48
37	SCIF2	-3.3526	0.7216	-4.6459	48
38	CMICRK	-2.6628	0.5717	-4.6577	48
39	USD2	-2.4981	0.5352	-4.6674	48
40	THOR 4	-2.4727	0.5173	-4.7804	48
41	RKF	-2.6781	0.5597	-4.7850	48
42	RKF4	-2.6809	0.5550	-4.8302	48
43	SCIF	-3.4998	0.7242	-4.8326	48
44	RKF2	-2.4990	0.5169	-4.8348	48
45	USD	-2.5605	0.5242	-4.8843	48
46	RKF-HI	-2.7103	0.5543	-4.8895	48
47	SCBDA	-3.8772	0.7922	-4.8944	48
48	KPLUS	-3.0011	0.6093	-4.9258	48
49	SF4	-3.3152	0.6718	-4.9350	48
50	TDF	-3.1843	0.6413	-4.9652	48
51	SCBMF4	-3.6288	0.7278	-4.9863	48
52	KPLUS2	-3.0497	0.6081	-5.0151	48
53	STD2	-3.5691	0.7079	-5.0417	48
54	STD	-3.5932	0.7016	-5.1212	48
55	SCBMF5	-3.6624	0.7080	-5.1727	48
56	RKF3	-2.5778	0.4982	-5.1746	48
57	SCBRT	-3.2346	0.59777	-5.4110	48
58	THOR	-2.6248	0.4777	-5.4943	48
59	RRF1	-4.2237	0.7625	-5.5389	48
60	SCBTS3	-2.8031	0.4962	-5.6494	48
61	SCBPG	-3.0138	0.5157	-5.8446	48
62	SCBMF2	-3.5724	0.6072	-5.8838	48
63	SCBMF3	-3.7464	0.6242	-6.0023	48
64	SCBMF	-3.1847	0.5206	-6.1168	48
65	SCBTS	-3.1748	0.4697	-6.7586	48
66	PPSD	-2.2475	0.3281	-6.8504	48
67	SCBTS2	-2.9478	0.4249	-6.9376	48

1999-2000

rank	name	(Rp-Rf)	Beta	Trevnor Index	n
23	RPF2	-1.8420	0.8547	-2.1552	24
24	AGF	-1.8401	0.8347	-2.2045	24
25	SCDF	-2.0441	0.9116	-2.2423	24
26	RKF	-1.8197	0.8101	-2.2464	24
27	SCBRT	-1.9184	0.8509	-2.2544	24
28	TVF	-1.7891	0.7824	-2.2867	24
29	RKF-HI	-1.8692	0.7966	-2.3465	24
30	CMICRK	-1.8781	0.7974	-2.3553	24
31	SW2	-1.9438	0.8200	-2.3704	24
32	SPF	-2.1505	0.9008	-2.3875	24
33	THOR 4	-1.8120	0.7584	-2.3891	24
34	RKF3	-1.9464	0.8146	-2.3893	24
35	RKF2	-1.9428	0.8099	-2.3987	24
36	RKEC	-1.9239	0.8002	-2.4042	24
37	RKF4	-1.9201	0.7857	-2.4437	24
38	PPSD	-2.1038	0.8572	-2.4541	24
39	RRF1	-2.0637	0.8223	-2.5095	24
40	TS	-2.2649	0.8866	-2.5547	24
41	SF4	-2.1262	0.8278	-2.5686	24
42	SCIF2	-2.0721	0.8039	-2.5776	24
43	USD2	-2.2253	0.8567	-2.5975	24
44	THOR2	-1.9626	0.7547	-2.6006	24
45	SCIF	-2.1109	0.8080	-2.6125	24
46	USD	-2.2732	0.8585	-2.6479	24
47	STD	-2.3142	0.8583	-2.6962	24
48	UNF	-2.3988	0.8888	-2.6989	24
49	STD2	-2.3449	0.8578	-2.7335	24
50	SF7	-2.4999	0.8961	-2.7897	24
51	OSA	-2.4057	0.8481	-2.8365	24
52	SF5	-2.4530	0.8366	-2.9320	24
53	BKA2	-2.3497	0.7471	-3.1451	24
54	BKD	-2.3716	0.7442	-3.1867	24
55	BKA	-2.4019	0.7444	-3.2266	24
56	SSB	-2.6905	0.7921	-3.3969	24
57	BTP	-2.4062	0.6944	-3.4653	24
58	SCBTS3	-2.6857	0.7654	-3.5089	24
59	SCBTS	-2.6087	0.7164	-3.6412	24
60	SCBMF2	-2.8552	0.7791	-3.6647	24
61	SCBDA	-2.9310	0.7886	-3.7165	24
62	SCBMF3	-2.9541	0.7789	-3.7928	24
63	SCBTS2	-2.8018	0.7285	-3.8461	24
64	SCBMF4	-2.8626	0.7387	-3.8752	24
65	SCBMF5	-2.9626	0.7574	-3.9116	24
66	SCBPG	-3.0398	0.7280	-4.1753	24
67	SCBMF	-2.9568	0.6037	-4.8980	24

1996-1998

rank	name	(Rp-Rf)	Beta	Trevnor Index	n
1	BTP	-3.2409	0.7249	-4.4711	36
2	THOR2	-2.4210	0.5299	-4.5686	36
3	ONE-D	-2.5730	0.5558	-4.6290	36
4	BKD	-3.5132	0.7523	-4.6698	36
5	SAN	-3.9048	0.8161	-4.7849	36
6	B-SUB	-3.6781	0.7679	-4.7898	36
7	SRT	-3.0623	0.6377	-4.8020	36
8	BKA	-3.6131	0.7501	-4.8166	36
9	RPF2	-3.8179	0.7848	-4.8649	36
10	ONE-PRO	-3.1512	0.6435	-4.8967	36
11	BKA2	-3.6939	0.7533	-4.9037	36
12	TNP	-4.1152	0.8379	-4.9116	36
13	ONE-FAS	-3.1855	0.6430	-4.9544	36
14	ONE-G	-2.9041	0.5847	-4.9668	36
15	APF	-3.2216	0.6447	-4.9969	36
16	UNF	-4.1727	0.8182	-5.0999	36
17	OSA	-3.2896	0.6444	-5.1045	36
18	NPAT-PRO	-3.1752	0.6093	-5.2114	36
19	TS	-4.0262	0.7698	-5.2299	36
20	SPT	-3.3370	0.6377	-5.2330	36
21	KKF	-3.3966	0.6487	-5.2356	36
22	SF7	-4.4449	0.8462	-5.2525	36
23	ONE-PR	-3.1704	0.6025	-5.2617	36
24	SCDF	-3.8668	0.7341	-5.2670	36
25	ONE+1	-3.1849	0.6030	-5.2818	36
26	SSB	-3.7852	0.7146	-5.2971	36
27	DE-1	-4.2959	0.8092	-5.3090	36
28	SF8	-4.4137	0.8263	-5.3413	36
29	ONE-UB4	-3.1383	0.5867	-5.3493	36
30	ONE-PF	-3.1059	0.5779	-5.3747	36
31	THANA1	-3.2225	0.5964	-5.4037	36
32	ONE-UB3	-3.2313	0.5902	-5.4746	36
33	ONE-WE	-2.9933	0.5460	-5.4824	36
34	ONE-UB2	-3.3062	0.6024	-5.4883	36
35	PISD	-3.6556	0.6644	-5.5022	36
36	RKEC	-3.1744	0.5688	-5.5809	36
37	SW2	-3.7837	0.6746	-5.6088	36
38	AGF	-4.3128	0.7561	-5.7040	36
39	ONE-UB	-3.4440	0.6028	-5.7132	36
40	TVF	-3.1327	0.5437	-5.7618	36
41	SPF	-3.8917	0.6640	-5.8606	36
42	USD2	-3.0029	0.5124	-5.8607	36
43	SF5	-3.9266	0.6679	-5.8790	36
44	CMICRK	-3.2522	0.5499	-5.9142	36
45	THOR 4	-2.8957	0.4895	-5.9153	36
46	SCIF2	-4.1696	0.6967	-5.9848	36
47	KPLUS	-3.5679	0.5949	-5.9972	36
48	SCBDA	-4.6962	0.7787	-6.0311	36
49	KPLUS2	-3.6130	0.5919	-6.1040	36
50	TDF	-3.8806	0.6354	-6.1073	36
51	RKF	-3.2961	0.5366	-6.1421	36
52	SCBMF4	-4.3801	0.7123	-6.1491	36
53	RKF4	-3.2963	0.5330	-6.1849	36

1999-2000

rank	name	(Rp-Rf)	Beta	Trevnor Index	n
1	KKF	-0.6489	0.9839	-0.6595	24
2	TDF	-0.7675	0.9577	-0.8014	24
3	KPLUS2	-0.7852	0.9605	-0.8175	24
4	APF	-0.7912	0.9508	-0.8321	24
5	KPLUS	-0.8670	0.9677	-0.8960	24
6	TNP	-1.2716	0.8601	-1.4785	24
7	ONE+1	-1.3821	0.9213	-1.5001	24
8	ONE-PR	-1.4505	0.9584	-1.5134	24
9	THANA1	-1.4493	0.9546	-1.5182	24
10	ONE-UB2	-1.4692	0.9439	-1.5565	24
11	ONE-UB	-1.4760	0.9367	-1.5758	24
12	SAN	-1.4894	0.9298	-1.6018	24
13	ONE-PRO	-1.5905	0.9344	-1.7022	24
14	ONE-FAS	-1.6122	0.9342	-1.7258	24
15	ONE-PF	-1.6104	0.9197	-1.7510	24
16	ONE-UB4	-1.6294	0.9284	-1.7551	24
17	ONE-G	-1.6351	0.9314	-1.7555	24
18	ONE-D	-1.6215	0.9203	-1.7619	24
19	ONE-WE	-1.6644	0.9435	-1.7641	24
20	ONE-UB3	-1.6843	0.9473	-1.7779	24
21	NPAT-PRO	-1.6712	0.9148	-1.8268	24
22	THOR	-1.5017	0.7644	-1.9647	24
23	DE-1	-1.8728	0.9086	-2.0611	24
24	BMBF	-1.8256	0.8678	-2.1037	24
25	RPF2	-1.8420	0.8547	-2.1552	24
26	PISD	-2.5491	1.1671	-2.1842	24
27	AGF	-1.8401	0.8347	-2.2045	24
28	SCDF	-2.0441	0.9116	-2.2423	24
29	RKF	-1.8197	0.8101	-2.2464	24
30	SCBRT	-1.9184	0.8509	-2.2544	24
31	TVF	-1.7891	0.7824	-2.2867	24
32	RKF-HI	-1.8692	0.7966	-2.3465	24
33	CMICRK	-1.8781	0.7974	-2.3553	24
34	SW2	-1.9438	0.8200	-2.3704	24
35	SPF	-2.1505	0.9008	-2.3875	24
36	THOR 4	-1.8120	0.7584	-2.3891	24
37	RKF3	-1.9464	0.8146	-2.3893	24
38	RKF2	-1.9428	0.8099	-2.3987	24
39	RKEC	-1.9239	0.8002	-2.4042	24
40	RKF4	-1.9201	0.7857	-2.4437	24
41	PPSD	-2.1038	0.8572	-2.4541	24
42	RRF1	-2.0637	0.8223	-2.5095	24
43	TS	-2.2649	0.8866	-2.5547	24
44	SRT	-2.2770	0.8866	-2.5683	24
45	SF4	-2.1262	0.8278	-2.5686	24
46	SCIF2	-2.0721	0.8039	-2.5776	24
47	USD2	-2.2253	0.8567	-2.5975	24
48	THOR2	-1.9626	0.7547	-2.6006	24
49	SCIF	-2.1109	0.8080	-2.6125	24
50	USD	-2.2732	0.8585	-2.6479	24
51	STD	-2.3142	0.8583	-2.6962	24
52	UNF	-2.3988	0.8888	-2.6989	24
53	SF8	-2.3587	0.8704	-2.7099	24

Table D-1 (continued)

1996-1998

rank	name	(Rp-Rf)	Beta	Treynor Index	n
54	RRF1	-4.7228	0.7632	-6.1879	36
55	USD	-3.0979	0.5002	-6.1939	36
56	RKF-HI	-3.3152	0.5308	-6.2453	36
57	RKF2	-3.0765	0.4907	-6.2691	36
58	SCIF	-4.3580	0.6942	-6.2775	36
59	SCBMF5	-4.4018	0.6928	-6.3532	36
60	SF4	-4.1089	0.6393	-6.4267	36
61	SCBRT	-3.9986	0.6193	-6.4563	36
62	STD	-4.3912	0.6735	-6.5201	36
63	BMBF	-4.4977	0.6895	-6.5235	36
64	STD2	-4.4310	0.6789	-6.5267	36
65	RKF3	-3.1603	0.4710	-6.7098	36
66	SCBPMO	-3.7282	0.5264	-7.0824	36
67	SCBTS3	-3.2668	0.4611	-7.0848	36
68	THOR	-3.1930	0.4438	-7.1949	36
69	SCBPG	-3.5091	0.4833	-7.2605	36
70	PPSD	-2.6373	0.3574	-7.3784	36
71	SCBMF2	-4.3043	0.5814	-7.4029	36
72	SCBMF3	-4.5190	0.5979	-7.5576	36
73	SCBMF	-3.8006	0.4890	-7.7716	36
74	SCBTS	-3.7616	0.4308	-8.7314	36
75	SCBTS2	-3.4551	0.3834	-9.0125	36

1999-2000

rank	name	(Rp-Rf)	Beta	Treynor Index	n
54	STD2	-2.3449	0.8578	-2.7335	24
55	SF7	-2.4999	0.8961	-2.7897	24
56	OSA	-2.4057	0.8481	-2.8365	24
57	SF5	-2.4530	0.8366	-2.9320	24
58	SPT	-2.7090	0.8698	-3.1143	24
59	BKA2	-2.3497	0.7471	-3.1451	24
60	BKD	-2.3716	0.7442	-3.1867	24
61	BKA	-2.4019	0.7444	-3.2266	24
62	B-SUB	-2.4780	0.7358	-3.3676	24
63	SSB	-2.6905	0.7921	-3.3969	24
64	SCBPMO	-2.6031	0.7524	-3.4595	24
65	BTP	-2.4062	0.6944	-3.4653	24
66	SCBTS3	-2.6857	0.7654	-3.5089	24
67	SCBTS	-2.6087	0.7164	-3.6412	24
68	SCBMF2	-2.8552	0.7791	-3.6647	24
69	SCBDA	-2.9310	0.7886	-3.7165	24
70	SCBMF3	-2.9541	0.7789	-3.7928	24
71	SCBTS2	-2.8018	0.7285	-3.8461	24
72	SCBMF4	-2.8626	0.7387	-3.8752	24
73	SCBMF5	-2.9626	0.7574	-3.9116	24
74	SCBPG	-3.0398	0.7280	-4.1753	24
75	SCBMF	-2.9568	0.6037	-4.8980	24

1997-1998

rank	name	(Rp-Rf)	Beta	Treynor Index	n
1	ONE-D	-2.1508	0.5333	-4.0329	24
2	THOR2	-2.0569	0.5085	-4.0448	24
3	BCAP	-3.1149	0.7566	-4.1172	24
4	APF	-2.7632	0.6253	-4.4189	24
5	SRT	-2.7626	0.6220	-4.4415	24
6	BKD	-3.5296	0.7476	-4.7211	24
7	ONE-G	-2.6720	0.5640	-4.7374	24
8	SAN	-3.8094	0.8037	-4.7399	24
9	OSA	-2.9681	0.6257	-4.7433	24
10	KKF	-3.0124	0.6288	-4.7905	24
11	TNP	-4.0046	0.8294	-4.8286	24
12	ONE-PRO	-3.0536	0.6320	-4.8316	24
13	B-SUB	-3.6995	0.7644	-4.8398	24
14	SPT	-3.0434	0.6168	-4.9345	24
15	BKA	-3.6893	0.7446	-4.9548	24
16	SCDF	-3.5661	0.7193	-4.9578	24
17	UNF	-4.0331	0.8130	-4.9610	24
18	ONE-FAS	-3.1412	0.6261	-5.0170	24
19	BTP	-3.6430	0.7233	-5.0368	24
20	RPF2	-3.9000	0.7732	-5.0440	24
21	BKA2	-3.7830	0.7480	-5.0575	24
22	TS	-3.8349	0.7541	-5.0855	24
23	ONE-WE	-2.6751	0.5236	-5.1094	24
24	DE-1	-4.0893	0.7994	-5.1156	24
25	ONE-UB3	-2.9472	0.5716	-5.1560	24
26	ONE-PR	-3.0080	0.5823	-5.1654	24
27	ONE-UB4	-2.9440	0.5665	-5.1967	24
28	ONE+1	-3.0489	0.5832	-5.2280	24
29	THANA1	-3.0160	0.5764	-5.2325	24
30	NPAT-PRO	-3.1098	0.5914	-5.2587	24
31	SSB	-3.6893	0.6993	-5.2757	24
32	ONE-UB	-3.1031	0.5869	-5.2869	24
33	SF7	-4.3835	0.8289	-5.2886	24
34	ONE-UB2	-3.0946	0.5842	-5.2968	24
35	PISD	-3.4319	0.6470	-5.3041	24
36	USD2	-2.5746	0.4852	-5.3065	24
37	ONE-PF	-2.9758	0.5568	-5.3447	24
38	SF8	-4.3842	0.8109	-5.4064	24
39	SF5	-3.5714	0.6501	-5.4935	24
40	AGF	-4.1948	0.7412	-5.6594	24
41	SW2	-3.7501	0.6566	-5.7116	24
42	KPLUS	-3.3063	0.5753	-5.7468	24
43	USD	-2.7171	0.4724	-5.7521	24
44	THOR 4	-2.6885	0.4637	-5.7981	24
45	RKEC	-3.1932	0.5476	-5.8309	24
46	TVF	-3.0757	0.5226	-5.8856	24
47	KPLUS2	-3.3695	0.5723	-5.8881	24
48	SCBRT	-3.5717	0.6014	-5.9386	24
49	SCIF2	-4.0802	0.6822	-5.9805	24
50	SPF	-3.8759	0.6462	-5.9976	24
51	CMICRK	-3.1779	0.5287	-6.0103	24
52	SCBDA	-4.6186	0.7679	-6.0145	24
53	SF4	-3.7629	0.6198	-6.0715	24
54	RKEDC	-3.3995	0.5545	-6.1303	24
55	TDF	-3.7850	0.6168	-6.1366	24
56	RRF1	-4.5895	0.7432	-6.1755	24
57	SCIF	-4.2729	0.6796	-6.2870	24
58	RKF2	-2.9495	0.4657	-6.3327	24
59	RKF4	-3.2790	0.5120	-6.4047	24
60	STD2	-4.2717	0.6658	-6.4162	24
61	RKF	-3.3035	0.5140	-6.4266	24
62	RKF-HI	-3.2916	0.5093	-6.4634	24
63	STD	-4.3112	0.6594	-6.5376	24
64	BMBF	-4.3820	0.6645	-6.5940	24
65	RKF3	-3.0996	0.4463	-6.9448	24
66	SCBMF4	-4.9779	0.7035	-7.0763	24
67	PPSD	-2.3325	0.3245	-7.1886	24
68	SCBMF5	-4.9360	0.6846	-7.2098	24
69	SCBTS3	-3.2407	0.4390	-7.3829	24
70	SCBPMO	-3.8336	0.5117	-7.4912	24
71	SCBPG	-3.4962	0.4657	-7.5067	24
72	SCBMF	-3.5279	0.4612	-7.6495	24
73	THOR	-3.2152	0.4181	-7.6909	24
74	SCBMF2	-4.3280	0.5605	-7.7221	24
75	SCBMF3	-4.5319	0.5760	-7.8676	24
76	SCBTS	-3.3772	0.3980	-8.4849	24
77	SCBTS2	-3.2876	0.3543	-9.2804	24

1999-2000

rank	name	(Rp-Rf)	Beta	Treynor Index	n
1	KKF	-0.6489	0.9839	-0.6595	24
2	TDF	-0.7675	0.9577	-0.8014	24
3	KPLUS2	-0.7852	0.9605	-0.8175	24
4	APF	-0.7912	0.9508	-0.8321	24
5	KPLUS	-0.8670	0.9677	-0.8960	24
6	TNP	-1.2716	0.8601	-1.4785	24
7	ONE+1	-1.3821	0.9213	-1.5001	24
8	ONE-PR	-1.4505	0.9584	-1.5134	24
9	THANA1	-1.4493	0.9546	-1.5182	24
10	ONE-UB2	-1.4692	0.9439	-1.5565	24
11	ONE-UB	-1.4760	0.9367	-1.5758	24
12	SAN	-1.4894	0.9298	-1.6018	24
13	ONE-PRO	-1.5905	0.9344	-1.7022	24
14	ONE-FAS	-1.6122	0.9342	-1.7258	24
15	ONE-PF	-1.6104	0.9197	-1.7510	24
16	ONE-UB4	-1.6294	0.9284	-1.7551	24
17	ONE-G	-1.6351	0.9314	-1.7555	24
18	ONE-D	-1.6215	0.9203	-1.7619	24
19	ONE-WE	-1.6644	0.9435	-1.7641	24
20	ONE-UB3	-1.6843	0.9473	-1.7779	24
21	NPAT-PRO	-1.6712	0.9148	-1.8268	24
22	THOR	-1.5017	0.7644	-1.9647	24
23	DE-1	-1.8728	0.9086	-2.0611	24
24	BMBF	-1.8256	0.8678	-2.1037	24
25	RPF2	-1.8420	0.8547	-2.1552	24
26	PISD	-2.5491	1.1671	-2.1842	24
27	AGF	-1.8401	0.8347	-2.2045	24
28	SCDF	-2.0441	0.9116	-2.2423	24
29	RKF	-1.8197	0.8101	-2.2464	24
30	SCBRT	-1.9184	0.8509	-2.2544	24
31	TVF	-1.7891	0.7824	-2.2867	24
32	RKF-HI	-1.8692	0.7966	-2.3465	24
33	CMICRK	-1.8781	0.7974	-2.3553	24
34	SW2	-1.9438	0.8200	-2.3704	24
35	SPF	-2.1505	0.9008	-2.3875	24
36	THOR 4	-1.8120	0.7584	-2.3891	24
37	RKF3	-1.9464	0.8146	-2.3893	24
38	RKF2	-1.9428	0.8099	-2.3987	24
39	RKEC	-1.9239	0.8002	-2.4042	24
40	RKF4	-1.9201	0.7857	-2.4437	24
41	PPSD	-2.1038	0.8572	-2.4541	24
42	RRF1	-2.0637	0.8223	-2.5095	24
43	RKEDC	-2.0614	0.8178	-2.5207	24
44	TS	-2.2649	0.8866	-2.5547	24
45	SRT	-2.2770	0.8866	-2.5683	24
46	SF4	-2.1262	0.8278	-2.5686	24
47	SCIF2	-2.0721	0.8039	-2.5776	24
48	USD2	-2.2253	0.8567	-2.5975	24
49	THOR2	-1.9626	0.7547	-2.6006	24
50	SCIF	-2.1109	0.8080	-2.6125	24
51	USD	-2.2732	0.8585	-2.6479	24
52	STD	-2.3142	0.8583	-2.6962	24
53	UNF	-2.3988	0.8888	-2.6989	24
54	SF8	-2.3587	0.8704	-2.7099	24
55	STD2	-2.3449	0.8578	-2.7335	24
56	BCAP	-2.0237	0.7300	-2.7721	24
57	SF7	-2.4999	0.8961	-2.7897	24
58	OSA	-2.4057	0.8481	-2.8365	24
59	SF5	-2.4530	0.8366	-2.9320	24
60	SPT	-2.7090	0.8698	-3.1143	24
61	BKA2	-2.3497	0.7471	-3.1451	24
62	BKD	-2.3716	0.7442	-3.1867	24
63	BKA	-2.4019	0.7444	-3.2266	24
64	B-SUB	-2.4780	0.7358	-3.3676	24
65	SSB	-2.6905	0.7921	-3.3969	24
66	SCBPMO	-2.6031	0.7524	-3.4595	24
67	BTP	-2.4062	0.6944	-3.4653	24
68	SCBTS3	-2.6857	0.7654	-3.5089	24
69	SCBTS	-2.6087	0.7164	-3.6412	24
70	SCBMF2	-2.8552	0.7791	-3.6647	24
71	SCBDA	-2.9310	0.7886	-3.7165	24
72	SCBMF3	-2.9541	0.7789	-3.7928	24
73	SCBTS2	-2.8018	0.7285	-3.8461	24
74	SCBMF4	-2.8626	0.7387	-3.8752	24
75	SCBMF5	-2.9626	0.7574	-3.9116	24
76	SCBPG	-3.0398	0.7280	-4.1753	24
77	SCBMF	-2.9568	0.6037	-4.8980	24

Table D-2 Fund performance as ranked by the Sharpe Ratio, prior periods of varying length and subsequent period (1999-2000)

1992-1998

rank	name	(Rp-Rf)	S.D.	Sharpe ratio	n
1	RPF2	-0.8880	10.5760	-0.0840	84
2	SSB	-1.0275	11.2386	-0.0914	84
3	SW2	-0.9594	9.8243	-0.0977	84
4	TNP	-1.3286	11.1263	-0.1194	84
5	SF5	-1.2369	9.8213	-0.1259	84
6	SF4	-1.2380	9.6960	-0.1277	84

1999-2000

rank	name	(Rp-Rf)	S.D.	Sharpe ratio	n
1	TNP	-1.2716	9.9248	-0.1281	24
2	RPF2	-1.8420	9.9519	-0.1851	24
3	SW2	-1.9438	9.7350	-0.1997	24
4	SF4	-2.1262	9.5735	-0.2221	24
5	SF5	-2.4530	9.8628	-0.2487	24
6	SSB	-2.6905	9.3064	-0.2891	24

1993-1998

rank	name	(Rp-Rf)	S.D.	Sharpe ratio	n
1	RKF	-0.8024	9.3496	-0.0858	72
2	PPSD	-0.8474	7.9040	-0.1072	72
3	SSB	-1.3366	11.8395	-0.1129	72
4	ONE-D	-0.9923	8.5612	-0.1159	72
5	SAN	-1.3307	11.3381	-0.1174	72
6	RPF2	-1.3059	11.0661	-0.1180	72
7	THOR2	-1.0309	8.5170	-0.1210	72
8	SCBMF	-1.1902	9.3097	-0.1278	72
9	SW2	-1.3751	10.2407	-0.1343	72
10	ONE-G	-1.2197	8.7809	-0.1389	72
11	TNP	-1.6928	11.5958	-0.1460	72
12	SF5	-1.6824	10.0824	-0.1669	72
14	THOR	-1.5192	8.2484	-0.1842	72

1999-2000

rank	name	(Rp-Rf)	S.D.	Sharpe ratio	n
1	TNP	-1.2716	9.9248	-0.1281	24
2	SAN	-1.4894	10.6352	-0.1400	24
3	ONE-G	-1.6351	10.6872	-0.1530	24
4	ONE-D	-1.6215	10.5457	-0.1538	24
5	THOR	-1.5017	9.0523	-0.1659	24
6	RPF2	-1.8420	9.9519	-0.1851	24
7	RKF	-1.8197	9.3382	-0.1949	24
8	SW2	-1.9438	9.7350	-0.1997	24
9	PPSD	-2.1038	9.7835	-0.2150	24
10	THOR2	-1.9626	8.9578	-0.2191	24
11	SF4	-2.1262	9.5735	-0.2221	24
12	SF5	-2.4530	9.8628	-0.2487	24
14	SCBMF	-2.9568	10.1200	-0.2922	24

1994-1998

rank	name	(Rp-Rf)	S.D.	Sharpe ratio	n
1	THOR2	-2.0523	8.2950	-0.2474	60
2	SSB	-2.8674	11.4505	-0.2504	60
3	RKF2	-2.0578	8.0803	-0.2547	60
4	BKA	-2.5507	10.0110	-0.2548	60
5	ONE-PR	-2.1429	8.2626	-0.2594	60
6	THANA1	-2.1520	8.1911	-0.2627	60
7	ONE-D	-2.1474	8.0300	-0.2674	60
8	SAN	-2.9177	10.8559	-0.2688	60
9	RKF	-2.2517	8.3659	-0.2692	60
10	RPF2	-2.8245	10.3803	-0.2721	60
11	ONE-FAS	-2.4083	8.6662	-0.2779	60
12	ONE-PRO	-2.4811	8.9065	-0.2786	60
13	ONE+1	-2.3479	8.3322	-0.2818	60
14	PPSD	-2.0601	7.2928	-0.2825	60
15	TNP	-3.1363	11.0872	-0.2829	60
16	USD2	-2.2641	7.8483	-0.2885	60
17	NPAT-PRO	-2.4142	8.3570	-0.2889	60
18	SW2	-2.7601	9.5223	-0.2899	60
19	AGF	-3.0081	10.3764	-0.2899	60
20	ONE-UB3	-2.3948	8.2309	-0.2910	60
21	RKF-HI	-2.3919	8.1987	-0.2917	60
22	RKF3	-2.2340	7.6252	-0.2930	60
23	ONE-G	-2.4332	8.2488	-0.2950	60
24	USD	-2.3141	7.8293	-0.2956	60
25	ONE-UB2	-2.4573	8.3136	-0.2956	60
26	SCIF2	-2.8326	9.5753	-0.2958	60
27	ONE-UB	-2.5027	8.4444	-0.2964	60
28	ONE-WE	-2.3912	7.7663	-0.3079	60
29	KPLUS	-2.5815	8.2507	-0.3129	60
30	THOR	-2.5253	8.0566	-0.3134	60
31	SCBTS3	-2.2794	7.2444	-0.3146	60
32	KPLUS2	-2.6291	8.2676	-0.3180	60
33	SF5	-3.1042	9.3865	-0.3307	60
34	SCBPG	-2.4315	7.2424	-0.3357	60
35	SCIF	-3.3449	9.7152	-0.3443	60
36	SF4	-3.1989	9.2691	-0.3451	60
37	STD2	-3.2949	9.4857	-0.3474	60
38	STD	-3.4254	9.5449	-0.3589	60
39	SCBMF	-2.8396	7.7789	-0.3650	60
40	RRF1	-4.2529	11.5726	-0.3675	60
41	SCBMF2	-3.1796	8.5704	-0.3710	60
42	SCBTS2	-2.5227	6.6308	-0.3804	60
43	SCBMF3	-3.3448	8.7537	-0.3821	60
44	SCBTS	-2.7175	7.0855	-0.3835	60

1999-2000

rank	name	(Rp-Rf)	S.D.	Sharpe ratio	n
1	KPLUS2	-0.7852	11.1265	-0.0706	24
2	KPLUS	-0.8670	11.2522	-0.0770	24
3	TNP	-1.2716	9.9248	-0.1281	24
4	ONE+1	-1.3821	10.5889	-0.1305	24
5	ONE-PR	-1.4505	11.0218	-0.1316	24
6	THANA1	-1.4493	10.9636	-0.1322	24
7	ONE-UB2	-1.4692	10.8300	-0.1357	24
8	ONE-UB	-1.4760	10.7608	-0.1372	24
9	SAN	-1.4894	10.6352	-0.1400	24
10	ONE-PRO	-1.5905	10.7532	-0.1479	24
11	ONE-FAS	-1.6122	10.7355	-0.1502	24
12	ONE-G	-1.6351	10.6872	-0.1530	24
13	ONE-D	-1.6215	10.5457	-0.1538	24
14	ONE-WE	-1.6644	10.8055	-0.1540	24
15	ONE-UB3	-1.6843	10.9343	-0.1540	24
16	NPAT-PRO	-1.6712	10.5029	-0.1591	24
17	THOR	-1.5017	9.0523	-0.1659	24
18	RPF2	-1.8420	9.9519	-0.1851	24
19	AGF	-1.8401	9.6410	-0.1909	24
20	RKF	-1.8197	9.3382	-0.1949	24
21	SW2	-1.9438	9.7350	-0.1997	24
22	RKF-HI	-1.8692	9.1956	-0.2033	24
23	RKF3	-1.9464	9.3800	-0.2075	24
24	RKF2	-1.9428	9.3132	-0.2086	24
25	PPSD	-2.1038	9.7835	-0.2150	24
26	RRF1	-2.0637	9.5276	-0.2166	24
27	THOR2	-1.9626	8.9578	-0.2191	24
28	SCIF2	-2.0721	9.3365	-0.2219	24
29	SF4	-2.1262	9.5735	-0.2221	24
30	SCIF	-2.1109	9.3674	-0.2253	24
31	USD2	-2.2253	9.7739	-0.2277	24
32	STD	-2.3142	10.0422	-0.2304	24
33	USD	-2.2732	9.8046	-0.2318	24
34	STD2	-2.3449	10.0660	-0.2330	24
35	SF5	-2.4530	9.8628	-0.2487	24
36	BKA	-2.4019	9.0313	-0.2660	24
37	SSB	-2.6905	9.3064	-0.2891	24
38	SCBMF	-2.9568	10.1200	-0.2922	24
39	SCBTS3	-2.6857	9.1211	-0.2944	24
40	SCBTS	-2.6087	8.7019	-0.2998	24
41	SCBMF2	-2.8552	9.5092	-0.3003	24
42	SCBMF3	-2.9541	9.4215	-0.3135	24
43	SCBTS2	-2.8018	8.8936	-0.3150	24
44	SCBPG	-3.0398	8.7627	-0.3469	24

1995-1998

rank	name	(Rp-Rf)	S.D.	Sharpe ratio	n
1	THOR2	-2.0537	8.7146	-0.2357	48
2	SSB	-3.0464	12.3649	-0.2464	48
3	BTP	-2.5714	10.2717	-0.2503	48
4	SAN	-3.0208	11.3362	-0.2665	48
5	BKA	-2.9109	10.6273	-0.2739	48
6	RKEC	-2.4502	8.9292	-0.2744	48
7	ONE-D	-2.2713	8.2458	-0.2754	48
8	RPF2	-3.0621	11.0538	-0.2770	48
9	OSA	-2.5631	9.2371	-0.2775	48
10	ONE-PRO	-2.6411	9.4559	-0.2793	48
11	BKA2	-2.9899	10.7001	-0.2794	48
12	TVF	-2.4257	8.5849	-0.2826	48
13	BKD	-3.1026	10.7793	-0.2878	48
14	TNP	-3.3791	11.7335	-0.2880	48
15	TS	-3.2504	11.1390	-0.2918	48
16	SCDF	-3.0921	10.5153	-0.2941	48
17	ONE-PF	-2.4753	8.3926	-0.2949	48
18	PPSD	-2.2475	7.6089	-0.2954	48
19	SF7	-3.5588	12.0136	-0.2962	48
20	KKF	-2.7953	9.4016	-0.2973	48
21	UNF	-3.4671	11.6515	-0.2976	48
22	ONE-FAS	-2.7665	9.1881	-0.3011	48
23	THOR 4	-2.4727	8.1688	-0.3027	48
24	ONE-G	-2.6483	8.7106	-0.3040	48
25	NPAT-PRO	-2.6706	8.7741	-0.3044	48
26	CMICRK	-2.6628	8.7170	-0.3055	48

1999-2000

rank	name	(Rp-Rf)	S.D.	Sharpe ratio	n
1	KKF	-0.6489	14.3284	-0.0453	24
2	TDF	-0.7675	11.0739	-0.0693	24
3	KPLUS2	-0.7852	11.1265	-0.0706	24
4	KPLUS	-0.8670	11.2522	-0.0770	24
5	TNP	-1.2716	9.9248	-0.1281	24
6	ONE+1	-1.3821	10.5889	-0.1305	24
7	ONE-PR	-1.4505	11.0218	-0.1316	24
8	THANA1	-1.4493	10.9636	-0.1322	24
9	ONE-UB2	-1.4692	10.8300	-0.1357	24
10	ONE-UB	-1.4760	10.7608	-0.1372	24
11	SAN	-1.4894	10.6352	-0.1400	24
12	ONE-PRO	-1.5905	10.7532	-0.1479	24
13	ONE-FAS	-1.6122	10.7355	-0.1502	24
14	ONE-UB4	-1.6294	10.6672	-0.1528	24
15	ONE-PF	-1.6104	10.5379	-0.1528	24
16	ONE-G	-1.6351	10.6872	-0.1530	24
17	ONE-D	-1.6215	10.5457	-0.1538	24
18	ONE-WE	-1.6644	10.8055	-0.1540	24
19	ONE-UB3	-1.6843	10.9343	-0.1540	24
20	NPAT-PRO	-1.6712	10.5029	-0.1591	24
21	THOR	-1.5017	9.0523	-0.1659	24
22	DE-1	-1.8728	10.4371	-0.1794	24
23	RPF2	-1.8420	9.9519	-0.1851	24
24	SCBRT	-1.9184	10.1100	-0.1898	24
25	AGF	-1.8401	9.6410	-0.1909	24
26	SCDF	-2.0441	10.5820	-0.1932	24

Table D-2 (continued)

1995-1998

rank	name	(Rp-Rf)	S.D.	Sharpe ratio	n
27	USD2	-2.4981	8.1481	-0.3066	48
28	RKF2	-2.4990	8.1460	-0.3068	48
29	SW2	-3.0235	9.8539	-0.3068	48
30	ONE+1	-2.6916	8.7402	-0.3080	48
31	ONE-UB	-2.7477	8.9184	-0.3081	48
32	ONE-PR	-2.7055	8.7531	-0.3091	48
33	ONE-UB2	-2.7255	8.8087	-0.3094	48
34	ONE-UB3	-2.6725	8.6344	-0.3095	48
35	DE-1	-3.5320	11.4102	-0.3095	48
36	THOR	-2.6248	8.4172	-0.3118	48
37	RKF	-2.6781	8.5803	-0.3121	48
38	THANA1	-2.7185	8.6920	-0.3128	48
39	AGF	-3.5000	11.1072	-0.3151	48
40	RKF4	-2.6809	8.4838	-0.3160	48
41	USD	-2.5605	8.0952	-0.3163	48
42	ONE-WE	-2.5830	8.1493	-0.3170	48
43	ONE-UB4	-2.6997	8.5087	-0.3173	48
44	SPF	-3.1633	9.9022	-0.3195	48
45	RKF-HI	-2.7103	8.4790	-0.3196	48
46	SF5	-3.1861	9.9554	-0.3200	48
47	SCIF2	-3.3526	10.1890	-0.3290	48
48	RKF3	-2.5778	7.7693	-0.3318	48
49	SCBDA	-3.8772	11.5999	-0.3342	48
50	KPLUS	-3.0011	8.9351	-0.3359	48
51	SCBMF4	-3.6288	10.7524	-0.3375	48
52	TDF	-3.1843	9.4175	-0.3381	48
53	SF4	-3.3152	9.7179	-0.3411	48
54	SCIF	-3.4998	10.2367	-0.3419	48
55	KPLUS2	-3.0497	8.9168	-0.3420	48
56	SCBMF5	-3.6624	10.4724	-0.3497	48
57	STD2	-3.5691	10.1357	-0.3521	48
58	STD	-3.5932	10.1035	-0.3556	48
59	SCBTS3	-2.8031	7.6366	-0.3671	48
60	RRF1	-4.2237	11.2554	-0.3753	48
61	SCBRT	-3.2346	8.6105	-0.3757	48
62	SCBPG	-3.0138	7.6699	-0.3929	48
63	SCBMF	-3.1847	8.0605	-0.3951	48
64	SCBMF2	-3.5724	9.0113	-0.3964	48
65	SCBMF3	-3.7464	9.2241	-0.4062	48
66	SCBTS	-3.1748	7.4180	-0.4280	48
67	SCBTS2	-2.9478	6.8659	-0.4293	48

1999-2000

rank	name	(Rp-Rf)	S.D.	Sharpe ratio	n
27	RKF	-1.8197	9.3382	-0.1949	24
28	TVF	-1.7891	8.9798	-0.1992	24
29	SW2	-1.9438	9.7350	-0.1997	24
30	THOR 4	-1.8120	8.9844	-0.2017	24
31	RKF-HI	-1.8692	9.1956	-0.2033	24
32	CMICRK	-1.8781	9.1619	-0.2050	24
33	SPF	-2.1505	10.4248	-0.2063	24
34	RKF3	-1.9464	9.3800	-0.2075	24
35	RKF2	-1.9428	9.3132	-0.2086	24
36	RKEC	-1.9239	9.2080	-0.2089	24
37	RKF4	-1.9201	9.0221	-0.2128	24
38	PPSD	-2.1038	9.7835	-0.2150	24
39	RRF1	-2.0637	9.5276	-0.2166	24
40	THOR2	-1.9626	8.9578	-0.2191	24
41	TS	-2.2649	10.3044	-0.2198	24
42	SCIF2	-2.0721	9.3365	-0.2219	24
43	SF4	-2.1262	9.5735	-0.2221	24
44	SCIF	-2.1109	9.3674	-0.2253	24
45	USD2	-2.2253	9.7739	-0.2277	24
46	STD	-2.3142	10.0422	-0.2304	24
47	USD	-2.2732	9.8046	-0.2318	24
48	UNF	-2.3988	10.3129	-0.2326	24
49	STD2	-2.3449	10.0660	-0.2330	24
50	SF7	-2.4999	10.5023	-0.2380	24
51	SF5	-2.4530	9.8628	-0.2487	24
52	OSA	-2.4057	9.6675	-0.2488	24
53	BKA2	-2.3497	9.0415	-0.2599	24
54	BKD	-2.3716	9.0180	-0.2630	24
55	BKA	-2.4019	9.0313	-0.2660	24
56	BTP	-2.4062	8.6028	-0.2797	24
57	SSB	-2.6905	9.3064	-0.2891	24
58	SCBMF	-2.9568	10.1200	-0.2922	24
59	SCBTS3	-2.6857	9.1211	-0.2944	24
60	SCBTS	-2.6087	8.7019	-0.2998	24
61	SCBMF2	-2.8552	9.5092	-0.3003	24
62	SCBDA	-2.9310	9.5526	-0.3068	24
63	SCBMF3	-2.9541	9.4215	-0.3135	24
64	SCBTS2	-2.8018	8.8936	-0.3150	24
65	SCBMF4	-2.8626	8.9148	-0.3211	24
66	SCBMF5	-2.9626	9.0613	-0.3270	24
67	SCBPG	-3.0398	8.7627	-0.3469	24

1996-1998

rank	name	(Rp-Rf)	S.D.	Sharpe ratio	n
1	THOR2	-2.4210	9.5023	-0.2548	36
2	SSB	-3.7852	13.8314	-0.2737	36
3	BTP	-3.2409	11.4730	-0.2825	36
4	ONE-D	-2.5730	9.0287	-0.2850	36
5	ONE-PRO	-3.1512	10.6709	-0.2953	36
6	BKD	-3.5132	11.8684	-0.2960	36
7	B-SUB	-3.6781	12.1149	-0.3036	36
8	SRT	-3.0623	10.0579	-0.3045	36
9	ONE-G	-2.9041	9.5362	-0.3045	36
10	BKA	-3.6131	11.8371	-0.3052	36
11	ONE-FAS	-3.1855	10.2936	-0.3095	36
12	BKA2	-3.6939	11.9256	-0.3097	36
13	APF	-3.2216	10.3201	-0.3122	36
14	SAN	-3.9048	12.4705	-0.3131	36
15	RPF2	-3.8179	12.1379	-0.3145	36
16	OSA	-3.2896	10.4042	-0.3162	36
17	TNP	-4.1152	12.9259	-0.3184	36
18	SPT	-3.3370	10.4476	-0.3194	36
19	RKEC	-3.1744	9.9325	-0.3196	36
20	NPAT-PRO	-3.1752	9.7849	-0.3245	36
21	TVF	-3.1327	9.6345	-0.3252	36
22	UNF	-4.1727	12.7884	-0.3263	36
23	ONE-PF	-3.1059	9.5080	-0.3267	36
24	KKF	-3.3966	10.3538	-0.3280	36
25	ONE-PR	-3.1704	9.6359	-0.3290	36
26	TS	-4.0262	12.2048	-0.3299	36
27	THOR 4	-2.8957	8.7607	-0.3305	36
28	ONE+1	-3.1849	9.6138	-0.3313	36
29	ONE-UB4	-3.1383	9.3669	-0.3350	36
30	ONE-WE	-2.9933	8.9078	-0.3360	36
31	SF7	-4.4449	13.1915	-0.3370	36
32	THANA1	-3.2225	9.5485	-0.3375	36
33	SCDF	-3.8668	11.4143	-0.3388	36
34	USD2	-3.0029	8.8122	-0.3408	36
35	ONE-UB3	-3.2313	9.4505	-0.3419	36
36	SF8	-4.4137	12.9011	-0.3421	36
37	ONE-UB2	-3.3062	9.6508	-0.3426	36
38	DE-1	-4.2959	12.5337	-0.3427	36
39	CMICRK	-3.2522	9.4753	-0.3432	36
40	PISD	-3.6556	10.5964	-0.3450	36
41	PPSD	-2.6373	7.6005	-0.3470	36
42	RKF2	-3.0765	8.7653	-0.3510	36
43	SW2	-3.7837	10.7098	-0.3533	36
44	RKF	-3.2961	9.3034	-0.3543	36
45	THOR	-3.1930	9.0113	-0.3543	36
46	USD	-3.0979	8.7407	-0.3544	36
47	ONE-UB	-3.4440	9.7146	-0.3545	36
48	RKF4	-3.2963	9.2102	-0.3579	36
49	AGF	-4.3128	12.0324	-0.3584	36
50	RKF-HI	-3.3152	9.1744	-0.3614	36
51	KPLUS	-3.5679	9.8363	-0.3627	36
52	SCBDA	-4.6962	12.8551	-0.3653	36
53	SF5	-3.9266	10.7284	-0.3660	36
54	SPF	-3.8917	10.6142	-0.3667	36
55	SCBMF4	-4.3801	11.8632	-0.3692	36

1999-2000

rank	name	(Rp-Rf)	S.D.	Sharpe ratio	n
1	KKF	-0.6489	14.3284	-0.0453	24
2	TDF	-0.7675	11.0739	-0.0693	24
3	KPLUS2	-0.7852	11.1265	-0.0706	24
4	APF	-0.7912	11.0057	-0.0719	24
5	KPLUS	-0.8670	11.2522	-0.0770	24
6	TNP	-1.2716	9.9248	-0.1281	24
7	ONE+1	-1.3821	10.5889	-0.1305	24
8	ONE-PR	-1.4505	11.0218	-0.1316	24
9	THANA1	-1.4493	10.9636	-0.1322	24
10	ONE-UB2	-1.4692	10.8300	-0.1357	24
11	ONE-UB	-1.4760	10.7608	-0.1372	24
12	SAN	-1.4894	10.6352	-0.1400	24
13	ONE-PRO	-1.5905	10.7532	-0.1479	24
14	ONE-FAS	-1.6122	10.7355	-0.1502	24
15	ONE-UB4	-1.6294	10.6672	-0.1528	24
16	ONE-PF	-1.6104	10.5379	-0.1528	24
17	ONE-G	-1.6351	10.6872	-0.1530	24
18	ONE-D	-1.6215	10.5457	-0.1538	24
19	ONE-WE	-1.6644	10.8055	-0.1540	24
20	ONE-UB3	-1.6843	10.9343	-0.1540	24
21	NPAT-PRO	-1.6712	10.5029	-0.1591	24
22	THOR	-1.5017	9.0523	-0.1659	24
23	PISD	-2.5491	14.3156	-0.1781	24
24	DE-1	-1.8728	10.4371	-0.1794	24
25	BMBF	-1.8256	9.9680	-0.1831	24
26	RPF2	-1.8420	9.9519	-0.1851	24
27	SCBRT	-1.9184	10.1100	-0.1898	24
28	AGF	-1.8401	9.6410	-0.1909	24
29	SCDF	-2.0441	10.5820	-0.1932	24
30	RKF	-1.8197	9.3382	-0.1949	24
31	TVF	-1.7891	8.9798	-0.1992	24
32	SW2	-1.9438	9.7350	-0.1997	24
33	THOR 4	-1.8120	8.9844	-0.2017	24
34	RKF-HI	-1.8692	9.1956	-0.2033	24
35	CMICRK	-1.8781	9.1619	-0.2050	24
36	SPF	-2.1505	10.4248	-0.2063	24
37	RKF3	-1.9464	9.3800	-0.2075	24
38	RKF2	-1.9428	9.3132	-0.2086	24
39	RKEC	-1.9239	9.2080	-0.2089	24
40	RKF4	-1.9201	9.0221	-0.2128	24
41	PPSD	-2.1038	9.7835	-0.2150	24
42	RRF1	-2.0637	9.5276	-0.2166	24
43	THOR2	-1.9626	8.9578	-0.2191	24
44	TS	-2.2649	10.3044	-0.2198	24
45	SRT	-2.2770	10.3141	-0.2208	24
46	SCIF2	-2.0721	9.3365	-0.2219	24
47	SF4	-2.1262	9.5735	-0.2221	24
48	SCIF	-2.1109	9.3674	-0.2253	24
49	USD2	-2.2253	9.7739	-0.2277	24
50	STD	-2.3142	10.0422	-0.2304	24
51	SF8	-2.3587	10.1858	-0.2316	24
52	USD	-2.2732	9.8046	-0.2318	24
53	UNF	-2.3988	10.3129	-0.2326	24
54	STD2	-2.3449	10.0660	-0.2330	24
55	SF7	-2.4999	10.5023	-0.2380	24

Table D-2 (continued)

1996-1998

rank	name	(Rp-Rf)	S.D.	Sharpe ratio	n
56	KPLUS2	-3.6130	9.7807	-0.3694	36
57	TDF	-3.8806	10.4866	-0.3701	36
58	SCIF2	-4.1696	11.0291	-0.3781	36
59	SCBMF5	-4.4018	11.5712	-0.3804	36
60	RKF3	-3.1603	8.3033	-0.3806	36
61	RRF1	-4.7228	12.2036	-0.3870	36
62	SF4	-4.1089	10.3581	-0.3967	36
63	SCIF	-4.3580	10.9761	-0.3970	36
64	STD	-4.3912	10.8845	-0.4034	36
65	STD2	-4.4310	10.8855	-0.4071	36
66	SCBRT	-3.9986	9.7626	-0.4096	36
67	BMBF	-4.4977	10.9752	-0.4098	36
68	SCBTS3	-3.2668	7.9350	-0.4117	36
69	SCBPMO	-3.7282	8.6595	-0.4305	36
70	SCBPG	-3.5091	8.0187	-0.4376	36
71	SCBMF2	-4.3043	9.7218	-0.4427	36
72	SCBMF	-3.8006	8.5420	-0.4449	36
73	SCBMF3	-4.5190	9.9523	-0.4541	36
74	SCBTS	-3.7616	7.6139	-0.4940	36
75	SCBTS2	-3.4551	6.8971	-0.5009	36

1999-2000

rank	name	(Rp-Rf)	S.D.	Sharpe ratio	n
56	SF5	-2.4530	9.8628	-0.2487	24
57	OSA	-2.4057	9.6675	-0.2488	24
58	BKA2	-2.3497	9.0415	-0.2599	24
59	BKD	-2.3716	9.0180	-0.2630	24
60	BKA	-2.4019	9.0313	-0.2660	24
61	SPT	-2.7090	9.9222	-0.2730	24
62	B-SUB	-2.4780	8.9491	-0.2769	24
63	BTP	-2.4062	8.6028	-0.2797	24
64	SCBPMO	-2.6031	9.1446	-0.2847	24
65	SSB	-2.6905	9.3064	-0.2891	24
66	SCBMF	-2.9568	10.1200	-0.2922	24
67	SCBTS3	-2.6857	9.1211	-0.2944	24
68	SCBTS	-2.6087	8.7019	-0.2998	24
69	SCBMF2	-2.8552	9.5092	-0.3003	24
70	SCBDA	-2.9310	9.5526	-0.3068	24
71	SCBMF3	-2.9541	9.4215	-0.3135	24
72	SCBTS2	-2.8018	8.8936	-0.3150	24
73	SCBMF4	-2.8626	8.9148	-0.3211	24
74	SCBMF5	-2.9626	9.0613	-0.3270	24
75	SCBPG	-3.0398	8.7627	-0.3469	24

1997-1998

rank	name	(Rp-Rf)	S.D.	Sharpe ratio	n
1	THOR2	-2.0569	11.0648	-0.1859	24
2	ONE-D	-2.1508	10.3823	-0.2072	24
3	BCAP	-3.1149	14.7672	-0.2109	24
4	SSB	-3.6893	16.5778	-0.2225	24
5	APF	-2.7632	12.0446	-0.2294	24
6	SRT	-2.7626	11.8206	-0.2337	24
7	ONE-G	-2.6720	11.0820	-0.2411	24
8	ONE-PRO	-3.0536	12.5160	-0.2440	24
9	OSA	-2.9681	12.1632	-0.2440	24
10	BKD	-3.5296	14.2440	-0.2478	24
11	KKF	-3.0124	12.0760	-0.2495	24
12	SPT	-3.0434	12.1557	-0.2504	24
13	B-SUB	-3.6995	14.5641	-0.2540	24
14	SAN	-3.8094	14.8083	-0.2572	24
15	USD2	-2.5746	9.9928	-0.2576	24
16	TNP	-4.0046	15.4516	-0.2592	24
17	ONE-FAS	-3.1412	12.1048	-0.2595	24
18	BKA	-3.6893	14.1872	-0.2600	24
19	ONE-WE	-2.6751	10.2561	-0.2608	24
20	UNF	-4.0331	15.3528	-0.2627	24
21	BTP	-3.6430	13.7923	-0.2641	24
22	BKA2	-3.7830	14.3009	-0.2645	24
23	SCDF	-3.5661	13.4714	-0.2647	24
24	TS	-3.8349	14.4371	-0.2656	24
25	ONE-UB3	-2.9472	11.0027	-0.2679	24
26	THOR 4	-2.6885	10.0260	-0.2682	24
27	ONE-PR	-3.0080	11.2110	-0.2683	24
28	ONE-PF	-2.9758	11.0482	-0.2693	24
29	RPF2	-3.9000	14.4346	-0.2702	24
30	ONE-UB4	-2.9440	10.8798	-0.2706	24
31	NPAT-PRO	-3.1098	11.4555	-0.2715	24
32	THANA1	-3.0160	11.1067	-0.2715	24
33	ONE+1	-3.0489	11.1911	-0.2724	24
34	TVF	-3.0757	11.2596	-0.2732	24
35	DE-1	-4.0893	14.9482	-0.2736	24
36	ONE-UB	-3.1031	11.3370	-0.2737	24
37	USD	-2.7171	9.9029	-0.2744	24
38	ONE-UB2	-3.0946	11.2693	-0.2746	24
39	RKEC	-3.1932	11.6024	-0.2752	24
40	PISD	-3.4319	12.4299	-0.2761	24
41	PPSD	-2.3325	8.2930	-0.2813	24
42	SF7	-4.3835	15.5824	-0.2813	24
43	SF5	-3.5714	12.5858	-0.2838	24
44	SF8	-4.3842	15.2781	-0.2870	24
45	KPLUS	-3.3063	11.4940	-0.2877	24
46	CMICRK	-3.1779	11.0441	-0.2877	24
47	RKEDC	-3.3995	11.7601	-0.2891	24
48	RKF2	-2.9495	10.0822	-0.2925	24
49	AGF	-4.1948	14.2393	-0.2946	24
50	KPLUS2	-3.3695	11.4249	-0.2949	24
51	SW2	-3.7501	12.5698	-0.2983	24
52	2SCBDA	-4.6186	15.3594	-0.3007	24
53	RKF4	-3.2790	10.7261	-0.3057	24
54	RKF	-3.3035	10.7959	-0.3060	24
55	TDF	-3.7850	12.3195	-0.3072	24
56	THOR	-3.2152	10.4359	-0.3081	24
57	RKF-HI	-3.2916	10.6658	-0.3086	24
58	SPF	-3.8759	12.4557	-0.3112	24
59	SF4	-3.7629	12.0906	-0.3112	24
60	SCIF2	-4.0802	13.0344	-0.3130	24
61	SCBRT	-3.5717	11.3785	-0.3139	24
62	RRF1	-4.5895	14.2973	-0.3210	24
63	RKF3	-3.0996	9.5116	-0.3259	24
64	SCIF	-4.2729	12.9671	-0.3295	24
65	STD2	-4.2717	12.8905	-0.3314	24
66	STD	-4.3112	12.8908	-0.3344	24
67	BMBF	-4.3820	12.6461	-0.3465	24
68	SCBMF4	-4.9779	14.1204	-0.3525	24
69	SCBTS3	-3.2407	9.0953	-0.3563	24
70	SCBMF5	-4.9360	13.7847	-0.3581	24
71	SCBMF	-3.5279	9.6791	-0.3645	24
72	SCBPG	-3.4962	9.3194	-0.3752	24
73	SCBPMO	-3.8336	10.1669	-0.3771	24
74	SCBMF2	-4.3280	11.3279	-0.3821	24
75	SCBMF3	-4.5319	11.5788	-0.3914	24
76	SCBTS	-3.3772	8.3208	-0.4059	24
77	SCBTS2	-3.2876	7.5940	-0.4329	24

1999-2000

rank	name	(Rp-Rf)	S.D.	Sharpe ratio	n
1	KKF	-0.6489	14.3284	-0.0453	24
2	TDF	-0.7675	11.0739	-0.0693	24
3	KPLUS2	-0.7852	11.1265	-0.0706	24
4	APF	-0.7912	11.0057	-0.0719	24
5	KPLUS	-0.8670	11.2522	-0.0770	24
6	TNP	-1.2716	9.9248	-0.1281	24
7	ONE+1	-1.3821	10.5889	-0.1305	24
8	ONE-PR	-1.4505	11.0218	-0.1316	24
9	THANA1	-1.4493	10.9636	-0.1322	24
10	ONE-UB2	-1.4692	10.8300	-0.1357	24
11	ONE-UB	-1.4760	10.7608	-0.1372	24
12	SAN	-1.4894	10.6352	-0.1400	24
13	ONE-PRO	-1.5905	10.7532	-0.1479	24
14	ONE-FAS	-1.6122	10.7355	-0.1502	24
15	ONE-UB4	-1.6294	10.6672	-0.1528	24
16	ONE-PF	-1.6104	10.5379	-0.1528	24
17	ONE-G	-1.6351	10.6872	-0.1530	24
18	ONE-D	-1.6215	10.5457	-0.1538	24
19	ONE-WE	-1.6644	10.8055	-0.1540	24
20	ONE-UB3	-1.6843	10.9343	-0.1540	24
21	NPAT-PRO	-1.6712	10.5029	-0.1591	24
22	THOR	-1.5017	9.0523	-0.1659	24
23	PISD	-2.5491	14.3156	-0.1781	24
24	DE-1	-1.8728	10.4371	-0.1794	24
25	BMBF	-1.8256	9.9680	-0.1831	24
26	RPF2	-1.8420	9.9519	-0.1851	24
27	SCBRT	-1.9184	10.1100	-0.1898	24
28	AGF	-1.8401	9.6410	-0.1909	24
29	SCDF	-2.0441	10.5820	-0.1932	24
30	RKF	-1.8197	9.3382	-0.1949	24
31	TVF	-1.7891	8.9798	-0.1992	24
32	SW2	-1.9438	9.7350	-0.1997	24
33	THOR 4	-1.8120	8.9844	-0.2017	24
34	RKF-HI	-1.8692	9.1956	-0.2033	24
35	CMICRK	-1.8781	9.1619	-0.2050	24
36	SPF	-2.1505	10.4248	-0.2063	24
37	RKF3	-1.9464	9.3800	-0.2075	24
38	RKF2	-1.9428	9.3132	-0.2086	24
39	RKEC	-1.9239	9.2080	-0.2089	24
40	RKF4	-1.9201	9.0221	-0.2128	24
41	PPSD	-2.1038	9.7835	-0.2150	24
42	RRF1	-2.0637	9.5276	-0.2166	24
43	RKEDC	-2.0614	9.4187	-0.2189	24
44	THOR2	-1.9626	8.9578	-0.2191	24
45	TS	-2.2649	10.3044	-0.2198	24
46	SRT	-2.2770	10.3141	-0.2208	24
47	BCAP	-2.0237	9.1608	-0.2209	24
48	SCIF2	-2.0721	9.3365	-0.2219	24
49	SF4	-2.1262	9.5735	-0.2221	24
50	SCIF	-2.1109	9.3674	-0.2253	24
51	USD2	-2.2253	9.7739	-0.2277	24
52	STD	-2.3142	10.0422	-0.2304	24
53	SF8	-2.3587	10.1858	-0.2316	24
54	USD	-2.2732	9.8046	-0.2318	24
55	UNF	-2.3988	10.3129	-0.2326	24
56	STD2	-2.3449	10.0660	-0.2330	24
57	SF7	-2.4999	10.5023	-0.2380	24
58	SF5	-2.4530	9.8628	-0.2487	24
59	OSA	-2.4057	9.6675	-0.2488	24
60	BKA2	-2.3497	9.0415	-0.2599	24
61	BKD	-2.3716	9.0180	-0.2630	24
62	BKA	-2.4019	9.0313	-0.2660	24
63	SPT	-2.7090	9.9222	-0.2730	24
64	B-SUB	-2.4780	8.9491	-0.2769	24
65	BTP	-2.4062	8.6028	-0.2797	24
66	SCBPMO	-2.6031	9.1446	-0.2847	24
67	SSB	-2.6905	9.3064	-0.2891	24
68	SCBMF	-2.9568	10.1200	-0.2922	24
69	SCBTS3	-2.6857	9.1211	-0.2944	24
70	SCBTS	-2.6087	8.7019	-0.2998	24
71	SCBMF2	-2.8552	9.5092	-0.3003	24
72	SCBDA	-2.9310	9.5526	-0.3068	24
73	SCBMF3	-2.9541	9.4215	-0.3135	24
74	SCBTS2	-2.8018	8.8936	-0.3150	24
75	SCBMF4	-2.8626	8.9148	-0.3211	24
76	SCBMF5	-2.9626	9.0613	-0.3270	24
77	SCBPG	-3.0398	8.7627	-0.3469	24

Table D-3 Fund performance as ranked by the Jensen Alpha, prior periods of varying length and subsequent period (1999-2000)

1992-1998

rank	name	Jensen Alpha	t-stat	Sig.	D.W.	n	Serial correlation
1	RPF2	0.4600	1.2525	0.2140	2.3774	84	-
2	SW2	0.2573	0.6133	0.5414	2.3714	84	-
3	SSB	0.2179	0.3098	0.7575	2.0844	84	-
4	TNP	0.0854	0.2155	0.8299	2.5561	84	-
5	SF5	-0.0221	-0.0523	0.9584	2.1552	84	-
6	SF4	-0.0683	-0.1452	0.8849	2.3059	84	-

1999-2000

rank	name	Jensen Alpha	t-stat	Sig.	D.W.	n	Serial correlation
1	TNP	0.0333	0.0634	0.9500	2.6240	24	-
2	RPF2	-0.5451	-0.9211	0.3670	2.1159	24	-
3	SW2	-0.6997	-1.0077	0.3246	2.3624	24	-
4	SF4	-0.8704	-1.6670	0.1097	2.0248	24	-
5	SF5	-1.1835	-1.7822	0.0885*	2.1963	24	-
6	SSB	-1.4890	-2.4498	0.0227*	2.1024	24	-

1993-1998

rank	name	Jensen Alpha	t-stat	Sig.	D.W.	n	Serial correlation
1	RKF	0.5627	1.0117	0.3151	2.1201	72	-
2	RPF2	0.4540	1.0671	0.2896	2.3517	72	-
3	SAN	0.4158	0.7660	0.4462	2.8322	72	-
4	SSB	0.2927	0.3583	0.7212	2.0497	72	-
5	ONE-D	0.2757	0.5675	0.5722	2.3810	72	-
6	SW2	0.2097	0.4396	0.6616	2.3053	72	-
7	THOR2	0.1938	0.3674	0.7144	1.9895	72	-
8	TNP	0.1594	0.3730	0.7103	2.6741	72	-
9	SCBMF	0.1449	0.2483	0.8046	1.7572	72	-
10	ONE-G	0.1162	0.2591	0.7963	2.1400	72	-
11	PPSD	0.0228	0.0316	0.9749	2.4173	72	-
12	SF5	-0.1209	-0.2590	0.7964	2.1806	72	-
13	SF4	-0.1806	-0.3398	0.7350	2.2989	72	-
14	THOR	-0.4177	-0.6946	0.4896	2.3610	72	-

1999-2000

rank	name	Jensen Alpha	t-stat	Sig.	D.W.	n	Serial correlation
1	TNP	0.0333	0.0634	0.9500	2.6240	24	-
2	SAN	-0.0786	-0.1633	0.8718	2.5287	24	-
3	ONE-G	-0.2222	-0.4322	0.6698	2.1158	24	-
4	ONE-D	-0.2254	-0.4558	0.6530	2.0838	24	-
5	THOR	-0.3424	-0.5407	0.5941	2.6106	24	-
6	RPF2	-0.5451	-0.9211	0.3670	2.1159	24	-
7	RKF	-0.5911	-1.2179	0.2362	3.0494	24	-
8	SW2	-0.6997	-1.0077	0.3246	2.3624	24	-
9	PPSD	-0.8032	-1.9038	0.0701*	2.6608	24	-
10	THOR2	-0.8179	-1.2818	0.2132	2.7859	24	-
11	SF4	-0.8704	-1.6670	0.1097	2.0248	24	-
12	SF5	-1.1835	-1.7822	0.0885*	2.1963	24	-
13	SSB	-1.4890	-2.4498	0.0227*	2.1024	24	-
14	SCBMF	-2.0408	-1.2830	0.2128	2.8033	24	-

1994-1998

rank	name	Jensen Alpha	t-stat	Sig.	D.W.	n	Serial correlation
1	BKA	0.0282	0.0543	0.9569	2.3998	60	-
2	ONE-PR	-0.0637	-0.1316	0.8958	2.3006	60	-
3	THANA1	-0.0869	-0.1826	0.8557	2.3364	60	-
4	RPF2	-0.0934	-0.2010	0.8414	2.6736	60	-
5	THOR2	-0.1287	-0.2076	0.8363	2.0068	60	-
6	SAN	-0.1700	-0.2753	0.7841	2.9584	60	-
7	ONE-FAS	-0.2009	-0.4208	0.6755	2.3984	60	-
8	RKF2	-0.2050	-0.3299	0.7427	2.2354	60	-
9	TNP	-0.2117	-0.4356	0.6648	2.6690	60	-
10	ONE-D	-0.2145	-0.3911	0.6971	2.5260	60	-
11	ONE+1	-0.2229	-0.4886	0.6270	2.3750	60	-
12	RKF	-0.2665	-0.4486	0.6554	2.3675	60	-
13	ONE-PRO	-0.2758	-0.4980	0.6204	2.3194	60	-
14	NPAT-PRO	-0.2874	-0.6223	0.5362	2.3917	60	-
15	ONE-UB3	-0.2995	-0.6603	0.5117	2.3872	60	-
16	ONE-UB2	-0.3401	-0.7432	0.4604	2.4685	60	-
17	SW2	-0.3408	-0.6430	0.5227	2.3463	60	-
18	ONE-UB	-0.3684	-0.7652	0.4472	2.4413	60	-
19	SSB	-0.3728	-0.3852	0.7015	2.0513	60	-
20	ONE-G	-0.3762	-0.7516	0.4554	2.2804	60	-
21	SCIF2	-0.3955	-0.7459	0.4588	2.3607	60	-
22	AGF	-0.3992	-0.6559	0.5145	2.3270	60	-
23	RKF-HI	-0.4392	-0.7617	0.4493	2.5004	60	-
24	ONE-WE	-0.4458	-0.9670	0.3376	2.2991	60	-
25	RKF3	-0.4627	-0.8130	0.4195	2.1686	60	-
26	USD2	-0.4667	-0.7736	0.4423	2.4535	60	-
27	KPLUS	-0.5357	-1.0517	0.2973	2.2625	60	-
28	USD	-0.5479	-0.8838	0.3805	2.4627	60	-
29	SCBPG	-0.6839	-1.3889	0.1702	2.0500	60	-
30	SF5	-0.7170	-1.3820	0.1723	2.3256	60	-
31	THOR	-0.8278	-1.1621	0.2500	2.4130	60	-
32	PPSD	-0.8448	-1.0673	0.2902	2.4818	60	-
33	SCIF	-0.8477	-1.6692	0.1005	2.3396	60	-
34	SF4	-0.8669	-1.6094	0.1130	2.3692	60	-
35	STD2	-0.8875	-1.6718	0.0999*	2.1181	60	-
36	SCBMF	-1.0044	-1.7939	0.0780*	2.0170	60	-
37	STD	-1.0101	-1.8697	0.0666*	2.1563	60	-
38	SCBTS2	-1.0230	-1.9543	0.0555*	1.9773	60	-
39	SCBMF2	-1.0738	-1.9581	0.0550*	2.1389	60	-
40	SCBTS	-1.0789	-2.0190	0.0481*	1.8803	60	-
41	SCBMF3	-1.1848	-2.1469	0.0360*	2.1109	60	-
42	RRF1	-1.5509	-1.8164	0.0745*	1.9672	60	-

1999-2000

rank	name	Jensen Alpha	t-stat	Sig.	D.W.	n	Serial correlation
1	KPLUS	0.5992	0.9983	0.3295	1.9546	23	first order
2	TNP	0.0333	0.0634	0.9500	2.6240	24	-
3	ONE+1	0.0154	0.0294	0.9768	1.8564	24	-
4	ONE-PR	0.0034	0.0062	0.9951	1.8151	24	-
5	THANA1	-0.0012	-0.0023	0.9982	1.9368	24	-
6	ONE-UB2	-0.0374	-0.0718	0.9434	1.9469	24	-
7	ONE-UB	-0.0552	-0.1043	0.9179	1.9776	24	-
8	SAN	-0.0786	-0.1633	0.8718	2.5287	24	-
9	ONE-PRO	-0.1731	-0.3181	0.7534	2.1509	24	-
10	ONE-FAS	-0.1950	-0.3676	0.7167	2.0456	24	-
11	ONE-G	-0.2222	-0.4322	0.6698	2.1158	24	-
12	ONE-D	-0.2254	-0.4558	0.6530	2.0838	24	-
13	ONE-WE	-0.2331	-0.4648	0.6467	2.1378	24	-
14	ONE-UB3	-0.2471	-0.4265	0.6739	1.7914	24	-
15	NPAT-PRO	-0.2834	-0.5558	0.5840	2.0681	24	-
16	THOR	-0.3424	-0.5407	0.5941	2.6106	24	-
17	RPF2	-0.5451	-0.9211	0.3670	2.1159	24	-
18	AGF	-0.5739	-1.1121	0.2781	1.9239	24	-
19	RKF	-0.5911	-1.2179	0.2362	3.0494	24	-
20	RKF-HI	-0.6612	-1.3557	0.1889	2.7730	24	-
21	SW2	-0.6997	-1.0077	0.3246	2.3624	24	-
22	RKF3	-0.7109	-1.4854	0.1516	2.9530	24	-
23	RKF2	-0.7144	-1.5377	0.1384	2.9851	24	-
24	PPSD	-0.8032	-1.9038	0.0701*	2.6608	24	-
25	RRF1	-0.8162	-1.5331	0.1395	1.9493	24	-
26	THOR2	-0.8179	-1.2818	0.2132	2.7859	24	-
27	SCIF2	-0.8528	-1.5851	0.1272	2.0481	24	-
28	SF4	-0.8704	-1.6670	0.1097	2.0248	24	-
29	SCIF	-0.8853	-1.6780	0.1075	2.0767	24	-
30	USD2	-0.9256	-2.2144	0.0375*	2.2812	24	-
31	USD	-0.9707	-2.2602	0.0340*	2.3028	24	-
32	STD	-1.0118	-1.6086	0.1220	2.2694	24	-
33	STD2	-1.0431	-1.6064	0.1224	2.1989	24	-
34	SF5	-1.1835	-1.7822	0.0885*	2.1963	24	-
35	BKA	-1.2724	-1.7132	0.1007	2.9879	24	-
36	SSB	-1.4890	-2.4498	0.0227*	2.1024	24	-
37	SCBTS	-1.5217	-2.1124976	0.0462*	2.479298163	24	-
38	SCBMF2	-1.6727	-2.0705	0.0503*	2.0454	24	-
39	SCBTS2	-1.6965	-2.2427	0.0353*	2.5387	24	-
40	SCBMF3	-1.7719	-2.3246	0.0297*	1.9593	24	-
41	SCBPG	-1.9352	-2.8130	0.0101*	2.4583	24	-
42	SCBMF	-2.0408	-1.2830	0.2128	2.8033	24	-

1995-1998

rank	name	Jensen Alpha	t-stat	Sig.	D.W.	n	Serial correlation
1	BTP	0.0379	0.0628	0.9502	2.5630	48	-
2	THOR2	-0.0802	-0.1071	0.9152	2.0635	48	-
3	SAN	-0.0856	-0.1452	0.8852	2.6527	48	-
4	RPF2	-0.1930	-0.3439	0.7325	2.7117	48	-
5	BKA	-0.2014	-0.3297	0.7432	2.4803	48	-
6	ONE-D	-0.2302	-0.4194	0.6769	2.1819	48	-
7	BKA2	-0.2703	-0.4317	0.6680	2.4673	48	-
8	OSA	-0.2863	-0.4582	0.6490	2.7131	48	-
9	TNP	-0.3236	-0.5576	0.5798	2.7955	48	-
10	ONE-PRO	-0.3441	-0.5093	0.6130	2.3810	48	-
11	BKD	-0.3700	-0.5770	0.5668	2.5305	48	-
12	SCDF	-0.3794	-0.6784	0.5009	2.4567	48	-
13	RKEC	-0.3805	-0.5212	0.6047	2.5950	48	-
14	KKF	-0.4231	-0.7415	0.4622	2.5561	48	-
15	TS	-0.4235	-0.6468	0.5210	2.5241	48	-
16	SSB	-0.4315	-0.3590	0.7212	2.0411	48	-
17	ONE-PF	-0.4536	-0.7372	0.4647	2.3385	48	-
18	SF7	-0.4629	-0.7199	0.4752	2.7676	48	-
19	ONE-FAS	-0.4632	-0.8033	0.4259	2.4713	48	-
20	NPAT-PRO	-0.4703	-0.8556	0.3966	2.4655	48	-
21	UNF	-0.4731	-0.7430	0.4613	2.7987	48	-
22	ONE+1	-0.4865	-0.9152	0.3649	2.5311	48	-
23	TVF	-0.4882	-0.6563	0.5149	2.4118	48	-
24	ONE-PR	-0.5037	-0.9325	0.3559	2.5631	48	-

1999-2000

rank	name	Jensen Alpha	t-stat	Sig.	D.W.	n	Serial correlation
1	KKF	0.8421	0.4348	0.6679	1.6263	24	-
2	KPLUS	0.5992	0.9983	0.3295	1.9546	23	first order
3	TNP	0.0333	0.0634	0.9500	2.6240	24	-
4	ONE+1	0.0154	0.0294	0.9768	1.8564	24	-
5	ONE-PR	0.0034	0.0062	0.9951	1.8151	24	-
6	THANA1	-0.0012	-0.0023	0.9982	1.9368	24	-
7	ONE-UB2	-0.0374	-0.0718	0.9434	1.9469	24	-
8	ONE-UB	-0.0552	-0.1043	0.9179	1.9776	24	-
9	SAN	-0.0786	-0.1633	0.8718	2.5287	24	-
10	ONE-PRO	-0.1731	-0.3181	0.7534	2.1509	24	-
11	ONE-FAS	-0.1950	-0.3676	0.7167	2.0456	24	-
12	ONE-PF	-0.2151	-0.4362	0.6669	2.1304	24	-
13	ONE-UB4	-0.2211	-0.4209	0.6779	1.9758	24	-
14	ONE-G	-0.2222	-0.4322	0.6698	2.1158	24	-
15	ONE-D	-0.2254	-0.4558	0.6530	2.0838	24	-
16	ONE-WE	-0.2331	-0.4648	0.6467	2.1378	24	-
17	ONE-UB3	-0.2471	-0.4265	0.6739	1.7914	24	-
18	NPAT-PRO	-0.2834	-0.5558	0.5840	2.0681	24	-
19	THOR	-0.3424	-0.5407	0.5941	2.6106	24	-
20	DE-1	-0.4942	-0.9659	0.3446	2.0878	24	-
21	RPF2	-0.5451	-0.9211	0.3670	2.1159	24	-
22	AGF	-0.5739	-1.1121	0.2781	1.9239	24	-
23	RKF	-0.5911	-1.2179	0.2362	3.0494	24	-
24	TVF	-0.6025	-1.3887	0.1788	2.9906	24	-

Table D-3 (continued)

1995-1998

rank	name	Jensen Alpha	t-stat	Sig.	D.W.	n	Serial correlation
25	ONE-UB3	-0.5042	-0.9398	0.3522	2.4983	48	-
26	ONE-UB2	-0.5132	-0.9380	0.3532	2.5231	48	-
27	ONE-G	-0.5139	-0.8501	0.3997	2.2800	48	-
28	ONE-UB	-0.5284	-0.9142	0.3654	2.4853	48	-
29	SW2	-0.5299	-0.8991	0.3733	2.5673	48	-
30	THANA1	-0.5348	-0.9905	0.3271	2.5804	48	-
31	ONE-UB4	-0.5565	-1.0673	0.2914	2.4658	48	-
32	ONE-WE	-0.5725	-1.0433	0.3023	2.3439	48	-
33	DE-1	-0.5731	-0.9802	0.3321	2.6843	48	-
34	USD2	-0.5814	-0.9090	0.3681	2.3521	48	-
35	CMICRK	-0.6147	-0.8930	0.3765	2.6217	48	-
36	THOR 4	-0.6207	-0.8870	0.3797	2.2346	48	-
37	RKF2	-0.6476	-0.9313	0.3566	2.4767	48	-
38	RKF	-0.6731	-0.9797	0.3324	2.5702	48	-
39	SPF	-0.6794	-1.0978	0.2780	2.4144	48	-
40	USD	-0.6835	-1.0371	0.3051	2.3784	48	-
41	RKF4	-0.6927	-1.0277	0.3094	2.5137	48	-
42	AGF	-0.6950	-1.0346	0.3063	2.6648	48	-
43	SF5	-0.6960	-1.1035	0.2756	2.3767	48	-
44	RKF-HI	-0.7240	-1.0720	0.2893	2.6883	48	-
45	SCIF2	-0.7681	-1.2786	0.2075	2.5898	48	-
46	RKF3	-0.7936	-1.2255	0.2266	2.3799	48	-
47	KPLUS	-0.8199	-1.3142	0.1953	2.2797	48	-
48	SCIF	-0.9060	-1.4918	0.1426	2.4378	48	-
49	SF4	-0.9091	-1.4116	0.1648	2.4924	48	-
50	THOR	-0.9136	-1.0640	0.2929	2.4635	48	-
51	SCBMF4	-1.0208	-1.3202	0.1933	2.2393	48	-
52	SCBTS3	-1.0258	-1.6633	0.1031	2.0306	48	-
53	STD2	-1.0338	-1.6109	0.1140	2.1542	48	-
54	SCBDA	-1.0395	-1.2869	0.2046	2.3484	48	-
55	PPSD	-1.0694	-1.1209	0.2682	2.4893	48	-
56	STD	-1.0808	-1.6464	0.1065	2.2103	48	-
57	SCBRT	-1.0920	-1.9477	0.0576*	2.1959	48	-
58	SCBMF5	-1.1249	-1.4881	0.1436	2.2374	48	-
59	SCBPG	-1.1664	-2.0743	0.0437*	2.1864	48	-
60	SCBMF	-1.3195	-1.9963	0.0518*	2.1561	48	-
61	SCBMF2	-1.3968	-2.1252	0.0390*	2.2565	48	-
62	SCBTS2	-1.4259	-2.3202	0.0248*	2.0264	48	-
63	RRF1	-1.4915	-1.8490	0.0709*	2.4581	48	-
64	SCBTS	-1.4926	-2.3510	0.0231*	1.9168	48	-
65	SCBMF3	-1.5099	-2.2764	0.0275*	2.2186	48	-

1999-2000

rank	name	Jensen Alpha	t-stat	Sig.	D.W.	n	Serial correlation
25	SCBRT	-0.6277	-0.8657	0.3960	2.3396	24	-
26	SCDF	-0.6610	-1.0909	0.2871	2.1875	24	-
27	RKF-HI	-0.6612	-1.3557	0.1889	2.7730	24	-
28	THOR 4	-0.6614	-1.0497	0.3052	2.5206	24	-
29	CMICRK	-0.6687	-1.4822	0.1525	3.0611	24	-
30	SW2	-0.6997	-1.0077	0.3246	2.3624	24	-
31	RKEC	-0.7103	-1.5282	0.1407	2.9949	24	-
32	RKF3	-0.7109	-1.4854	0.1516	2.9530	24	-
33	RKF2	-0.7144	-1.5377	0.1384	2.9851	24	-
34	RKF4	-0.7285	-1.6589	0.1113	3.0487	24	-
35	SPF	-0.7839	-1.3656	0.1859	2.2402	24	-
36	PPSD	-0.8032	-1.9038	0.0701*	2.6608	24	-
37	RRF1	-0.8162	-1.5331	0.1395	1.9493	24	-
38	THOR2	-0.8179	-1.2818	0.2132	2.7859	24	-
39	SCIF2	-0.8528	-1.5851	0.1272	2.0481	24	-
40	SF4	-0.8704	-1.6670	0.1097	2.0248	24	-
41	SCIF	-0.8853	-1.6780	0.1075	2.0767	24	-
42	TS	-0.9198	-1.5344	0.1392	2.3568	24	-
43	USD2	-0.9256	-2.2144	0.0375*	2.2812	24	-
44	USD	-0.9707	-2.2602	0.0340*	2.3028	24	-
45	STD	-1.0118	-1.6086	0.1220	2.2694	24	-
46	STD2	-1.0431	-1.6064	0.1224	2.1989	24	-
47	UNF	-1.0501	-1.7876	0.0876*	2.0312	24	-
48	OSA	-1.1190	-2.7628	0.0114*	2.3764	24	-
49	SF7	-1.1397	-1.7025	0.1027	1.9906	24	-
50	SF5	-1.1835	-1.7822	0.0885*	2.1963	24	-
51	BKA2	-1.2161	-1.6584	0.1114	2.9628	24	-
52	BKD	-1.2424	-1.6862	0.1059	2.9665	24	-
53	BKA	-1.2724	-1.7132	0.1007	2.9879	24	-
54	BTP	-1.3526	-1.7238	0.0988*	2.8062	24	-
55	SSB	-1.4890	-2.4498	0.0227*	2.1024	24	-
56	SCBTS	-1.5217	-2.1125	0.0462*	2.4793	24	-
57	SCBTS3	-1.5244	-2.2765	0.0329*	2.5433	24	-
58	SCBMF2	-1.6727	-2.0705	0.0503*	2.0454	24	-
59	SCBTS2	-1.6965	-2.2427	0.0353*	2.5387	24	-
60	SCBDA	-1.7345	-2.2285	0.0364*	2.1524	24	-
61	SCBMF4	-1.7416	-2.4474	0.0228*	1.8853	24	-
62	SCBMF3	-1.7719	-2.3246	0.0297*	1.9593	24	-
63	SCBMF5	-1.8133	-2.6505	0.0146*	1.9807	24	-
64	SCBPG	-1.9352	-2.8130	0.0101*	2.4583	24	-
65	SCBMF	-2.0408	-1.2830	0.2128	2.8033	24	-

1996-1998

rank	name	Jensen Alpha	t-stat	Sig.	D.W.	n	Serial correlation
1	BTP	-0.1039	-0.1293	0.8979	2.5726	36	-
2	THOR2	-0.1296	-0.1322	0.8956	2.0921	36	-
3	ONE-D	-0.1668	-0.2342	0.8162	2.1419	36	-
4	BKD	-0.2575	-0.3152	0.7546	2.4960	36	-
5	SRT	-0.3025	-0.4379	0.6642	2.6062	36	-
6	B-SUB	-0.3548	-0.4252	0.6734	2.4577	36	-
7	ONE-PRO	-0.3666	-0.4039	0.6888	2.3746	36	-
8	BKA	-0.3669	-0.4496	0.6558	2.4970	36	-
9	ONE-G	-0.3728	-0.4874	0.6291	2.2914	36	-
10	SAN	-0.3733	-0.5463	0.5884	3.0066	36	-
11	ONE-FAS	-0.4039	-0.5297	0.5998	2.4720	36	-
12	RPF2	-0.4226	-0.5748	0.5692	2.7756	36	-
13	BKA2	-0.4343	-0.5189	0.6072	2.4842	36	-
14	TNP	-0.4906	-0.6387	0.5273	2.8139	36	-
15	OSA	-0.5010	-0.6257	0.5357	2.7694	36	-
16	NPAT-PRO	-0.5388	-0.7327	0.4687	2.4813	36	-
17	ONE-PR	-0.5631	-0.7931	0.4332	2.5692	36	-
18	ONE+1	-0.5754	-0.8240	0.4157	2.5269	36	-
19	SPT	-0.5778	-0.6781	0.5023	2.7960	36	-
20	KKF	-0.5898	-0.7803	0.4406	2.5911	36	-
21	ONE-UB4	-0.5996	-0.8758	0.3873	2.4663	36	-
22	ONE-PF	-0.6059	-0.7705	0.4463	2.3189	36	-
23	ONE-WE	-0.6302	-0.8823	0.3838	2.3464	36	-
24	UNF	-0.6328	-0.7596	0.4527	2.8706	36	-
25	THANA1	-0.6417	-0.9067	0.3709	2.5885	36	-
26	ONE-UB3	-0.6774	-0.9679	0.3399	2.5082	36	-
27	SCDF	-0.6898	-0.9608	0.3434	2.5079	36	-
28	SSB	-0.6905	-0.4276	0.6716	2.0379	36	-
29	TS	-0.6967	-0.8081	0.4247	2.5786	36	-
30	ONE-UB2	-0.6996	-0.9759	0.3360	2.5369	36	-
31	RKEC	-0.7128	-0.7332	0.4684	2.6485	36	-
32	THOR 4	-0.7783	-0.8643	0.3935	2.2782	36	-
33	TVF	-0.7805	-0.8027	0.4277	2.4523	36	-
34	PISD	-0.7809	-1.0123	0.3185	2.6451	36	-
35	SF7	-0.7842	-0.9285	0.3597	2.8465	36	-
36	USD2	-0.7861	-0.9467	0.3505	2.4433	36	-
37	DE-1	-0.7944	-1.0342	0.3083	2.7157	36	-
38	ONE-UB	-0.8357	-1.1276	0.2674	2.5246	36	-
39	SF8	-0.8390	-1.0058	0.3216	2.8897	36	-
40	SW2	-0.8646	-1.1345	0.2645	2.6473	36	-
41	CMICRK	-0.8722	-0.9705	0.3386	2.7029	36	-
42	USD	-0.9342	-1.0924	0.2823	2.4759	36	-
43	RKF2	-0.9525	-1.0599	0.2967	2.5799	36	-
44	RKF	-0.9734	-1.0873	0.2846	2.6616	36	-
45	RKF4	-0.9897	-1.1255	0.2683	2.6066	36	-
46	KPLUS	-0.9953	-1.2038	0.2370	2.3256	36	-
47	RKF-HI	-1.0169	-1.1598	0.2542	2.7768	36	-
48	SPF	-1.0186	-1.3045	0.2008	2.4595	36	-
49	SF5	-1.0370	-1.2845	0.2077	2.4738	36	-
50	AGF	-1.0416	-1.2013	0.2379	2.7609	36	-
51	PPSD	-1.0854	-1.1060	0.2765	2.2631	36	-
52	RKF3	-1.1218	-1.3543	0.1846	2.4887	36	-
53	SCIF2	-1.1556	-1.4952	0.1441	2.6996	36	-
54	SCBTS3	-1.2709	-1.6978	0.0987*	2.1391	36	-

1999-2000

rank	name	Jensen Alpha	t-stat	Sig.	D.W.	n	Serial correlation
1	KKF	0.8421	0.4348	0.6679	1.6263	24	-
2	KPLUS	0.5992	0.9983	0.3295	1.9546	23	first order
3	TNP	0.0333	0.0634	0.9500	2.6240	24	-
4	ONE+1	0.0154	0.0294	0.9768	1.8564	24	-
5	ONE-PR	0.0034	0.0062	0.9951	1.8151	24	-
6	THANA1	-0.0012	-0.0023	0.9982	1.9368	24	-
7	ONE-UB2	-0.0374	-0.0718	0.9434	1.9469	24	-
8	ONE-UB	-0.0552	-0.1043	0.9179	1.9776	24	-
9	SAN	-0.0786	-0.1633	0.8718	2.5287	24	-
10	ONE-PRO	-0.1731	-0.3181	0.7534	2.1509	24	-
11	ONE-FAS	-0.1950	-0.3676	0.7167	2.0456	24	-
12	ONE-PF	-0.2151	-0.4362	0.6669	2.1304	24	-
13	ONE-UB4	-0.2211	-0.4209	0.6779	1.9758	24	-
14	ONE-G	-0.2222	-0.4322	0.6698	2.1158	24	-
15	ONE-D	-0.2254	-0.4558	0.6530	2.0838	24	-
16	ONE-WE	-0.2331	-0.4648	0.6467	2.1378	24	-
17	ONE-UB3	-0.2471	-0.4265	0.6739	1.7914	24	-
18	NPAT-PRO	-0.2834	-0.5558	0.5840	2.0681	24	-
19	THOR	-0.3424	-0.5407	0.5941	2.6106	24	-
20	DE-1	-0.4942	-0.9659	0.3446	2.0878	24	-
21	BMBF	-0.5089	-1.0407	0.3093	2.4605	24	-
22	RPF2	-0.5451	-0.9211	0.3670	2.1159	24	-
23	AGF	-0.5739	-1.1121	0.2781	1.9239	24	-
24	RKF	-0.5911	-1.2179	0.2362	3.0494	24	-
25	TVF	-0.6025	-1.3887	0.1788	2.9906	24	-
26	SCBRT	-0.6277	-0.8657	0.3960	2.3396	24	-
27	SCDF	-0.6610	-1.0909	0.2871	2.1875	24	-
28	RKF-HI	-0.6612	-1.3557	0.1889	2.7730	24	-
29	THOR 4	-0.6614	-1.0497	0.3052	2.5206	24	-
30	CMICRK	-0.6687	-1.4822	0.1525	3.0611	24	-
31	SW2	-0.6997	-1.0077	0.3246	2.3624	24	-
32	RKEC	-0.7103	-1.5282	0.1407	2.9949	24	-
33	RKF3	-0.7109	-1.4854	0.1516	2.9530	24	-
34	RKF2	-0.7144	-1.5377	0.1384	2.9851	24	-
35	RKF4	-0.7285	-1.6589	0.1113	3.0487	24	-
36	PISD	-0.7774	-0.6243	0.5388	2.5419	24	-
37	SPF	-0.7839	-1.3656	0.1859	2.2402	24	-
38	PPSD	-0.8032	-1.9038	0.0701*	2.6608	24	-
39	RRF1	-0.8162	-1.5331	0.1395	1.9493	24	-
40	THOR2	-0.8179	-1.2818	0.2132	2.7859	24	-
41	SCIF2	-0.8528	-1.5851	0.1272	2.0481	24	-
42	SF4	-0.8704	-1.6670	0.1097	2.0248	24	-
43	SCIF	-0.8853	-1.6780	0.1075	2.0767	24	-
44	TS	-0.9198	-1.5344	0.1392	2.3568	24	-
45	USD2	-0.9256	-2.2144	0.0375*	2.2812	24	-
46	SRT	-0.9316	-1.5351	0.1390	2.1753	24	-
47	USD	-0.9707	-2.2602	0.0340*	2.3028	24	-
48	STD	-1.0118	-1.6086	0.1220	2.2694	24	-
49	SF8	-1.0378	-1.6228	0.1189	2.0241	24	-
50	STD2	-1.0431	-1.6064	0.1224	2.1989	24	-
51	UNF	-1.0501	-1.7876	0.0876*	2.0312	24	-
52	OSA	-1.1190	-2.7628	0.0114*	2.3764	24	-
53	SF7	-1.1397	-1.7025	0.1027	1.9906	24	-
54	SF5	-1.1835	-1.7822	0.0885*	2.1963	24	-

Table D-3 (continued)

1996-1998

rank	name	Jensen Alpha	t-stat	Sig.	D.W.	n	Serial correlation
55	THOR	-1.2717	-1.1455	0.2600	2.5234	36	-
56	SCBMF4	-1.2969	-1.2657	0.2142	2.2717	36	-
57	SCBRT	-1.3177	-1.9711	0.0569*	2.1953	36	-
58	SCBDA	-1.3277	-1.2315	0.2266	2.3794	36	-
59	SF4	-1.3426	-1.6604	0.1060	2.6381	36	-
60	SCIF	-1.3544	-1.7725	0.0853*	2.5637	36	-
61	SCBMF5	-1.4026	-1.3912	0.1732	2.2739	36	-
62	SCBPG	-1.4169	-2.0784	0.0453*	2.2623	36	-
63	RRF1	-1.4198	-1.5770	0.1241	2.9594	36	-
64	SCBPMO	-1.4489	-2.0220	0.0511*	2.2404	36	-
65	STD	-1.4780	-1.7574	0.0879*	2.3266	36	-
66	STD2	-1.4938	-1.8381	0.0748*	2.3016	36	-
67	BMBF	-1.5143	-1.9121	0.0643*	2.7636	36	-
68	SCBMF	-1.6835	-2.0141	0.0520*	2.2595	36	-
69	SCBMF2	-1.7872	-2.1039	0.0429*	2.3410	36	-
70	SCBTS2	-1.7951	-2.5106	0.0170*	2.1611	36	-
71	SCBTS	-1.8969	-2.4876	0.0179*	1.9974	36	-
72	SCBMF3	-1.9305	-2.2517	0.0309*	2.3072	36	-

1999-2000

rank	name	Jensen Alpha	t-stat	Sig.	D.W.	n	Serial correlation
55	BKA2	-1.2161	-1.6584	0.1114	2.9628	24	-
56	BKD	-1.2424	-1.6862	0.1059	2.9665	24	-
57	BKA	-1.2724	-1.7132	0.1007	2.9879	24	-
58	BTP	-1.3526	-1.7238	0.0988*	2.8062	24	-
59	B-SUB	-1.3615	-1.8249	0.0816*	2.9269	24	-
60	SPT	-1.3894	-3.2868	0.0034*	2.4240	24	-
61	SCBPMO	-1.4617	-1.9257	0.0672*	2.7245	24	-
62	SSB	-1.4890	-2.4498	0.0227*	2.1024	24	-
63	SCBTS	-1.5217	-2.1125	0.0462*	2.4793	24	-
64	SCBTS3	-1.5244	-2.2765	0.0329*	2.5433	24	-
65	SCBMF2	-1.6727	-2.0705	0.0503*	2.0454	24	-
66	SCBTS2	-1.6965	-2.2427	0.0353*	2.5387	24	-
67	SCBDA	-1.7345	-2.2285	0.0364*	2.1524	24	-
68	SCBMF4	-1.7416	-2.4474	0.0228*	1.8853	24	-
69	SCBMF3	-1.7719	-2.3246	0.0297*	1.9593	24	-
70	SCBMF5	-1.8133	-2.6505	0.0146*	1.9807	24	-
71	SCBPG	-1.9352	-2.8130	0.0101*	2.4583	24	-
72	SCBMF	-2.0408	-1.2830	0.2128	2.8033	24	-

1997-1998

rank	name	Jensen Alpha	t-stat	Sig.	D.W.	n	Serial correlation
1	ONE-D	0.1600	0.1636	0.8715	2.2832	24	-
2	BCAP	0.1597	0.1135	0.9107	2.2908	24	-
3	THOR2	0.1438	0.1019	0.9197	2.1856	24	-
4	SRT	-0.0691	-0.0697	0.9451	2.7310	24	-
5	ONE-G	-0.2282	-0.2105	0.8352	2.3866	24	-
6	OSA	-0.2586	-0.2271	0.8224	2.9177	24	-
7	KKF	-0.2900	-0.2713	0.7887	2.7709	24	-
8	BKD	-0.2931	-0.2418	0.8112	2.4917	24	-
9	ONE-PRO	-0.3171	-0.2517	0.8036	2.4791	24	-
10	SAN	-0.3299	-0.3307	0.7440	3.0850	24	-
11	SPT	-0.3728	-0.3101	0.7594	2.9652	24	-
12	B-SUB	-0.3902	-0.3148	0.7559	2.4517	24	-
13	ONE-WE	-0.4070	-0.4111	0.6850	2.5505	24	-
14	TNP	-0.4154	-0.3643	0.7191	2.8470	24	-
15	ONE-FAS	-0.4308	-0.3898	0.7005	2.5670	24	-
16	SCDF	-0.4518	-0.4374	0.6661	2.6100	24	-
17	BKA	-0.4659	-0.3859	0.7033	2.4935	24	-
18	ONE-UB3	-0.4720	-0.4797	0.6362	2.6758	24	-
19	USD2	-0.4732	-0.4184	0.6797	2.7456	24	-
20	ONE-PR	-0.4863	-0.4844	0.6329	2.7369	24	-
21	ONE-UB4	-0.4906	-0.5097	0.6153	2.6326	24	-
22	BTP	-0.5118	-0.4342	0.6683	2.6125	24	-
23	UNF	-0.5146	-0.4145	0.6826	2.9045	24	-
24	THANA1	-0.5197	-0.5202	0.6082	2.7494	24	-
25	ONE+1	-0.5232	-0.5303	0.6012	2.6784	24	-
26	BKA2	-0.5451	-0.4399	0.6643	2.4819	24	-
27	NPAT-PRO	-0.5491	-0.5203	0.6080	2.5965	24	-
28	RPF2	-0.5534	-0.5117	0.6140	2.8345	24	-
29	ONE-UB	-0.5617	-0.5450	0.5912	2.6744	24	-
30	ONE-UB2	-0.5648	-0.5548	0.5846	2.6826	24	-
31	ONE-PF	-0.5652	-0.5054	0.6183	2.4540	24	-
32	TS	-0.5719	-0.4543	0.6541	2.6737	24	-
33	DE-1	-0.6287	-0.5546	0.5848	2.7642	24	-
34	PISD	-0.6306	-0.5720	0.5731	2.7578	24	-
35	SSB	-0.6589	-0.2736	0.7869	2.0358	24	-
36	USD	-0.6713	-0.5738	0.5719	2.7677	24	-
37	THOR 4	-0.6807	-0.5388	0.5954	2.4660	24	-
38	SF5	-0.7571	-0.6543	0.5197	2.5797	24	-
39	SF7	-0.7963	-0.6501	0.5224	2.9699	24	-
40	TVF	-0.8129	-0.5761	0.5704	2.5534	24	-
41	KPLUS	-0.8167	-0.6865	0.4995	2.4479	24	-
42	RKEC	-0.8213	-0.5840	0.5651	2.7554	24	-
43	SF8	-0.8746	-0.7183	0.4801	2.9899	24	-
44	CMICRK	-0.8874	-0.6845	0.5008	2.8338	24	-
45	SW2	-0.9072	-0.8275	0.4168	2.7744	24	-
46	PPSD	-0.9206	-0.7057	0.4878	2.1603	24	-
47	RKF2	-0.9314	-0.7304	0.4728	2.7564	24	-
48	SCBRT	-0.9664	-1.0389	0.3101	2.3445	24	-
49	AGF	-0.9864	-0.7805	0.4434	2.8380	24	-
50	RKEDC	-0.9980	-0.6989	0.4919	2.6750	24	-
51	RKF4	-1.0612	-0.8373	0.4115	2.7384	24	-
52	RKF	-1.0765	-0.8388	0.4106	2.8186	24	-
53	SPF	-1.0781	-0.9608	0.3471	2.5463	24	-
54	SF4	-1.0796	-0.9399	0.3575	2.7589	24	-
55	RKF-HI	-1.0845	-0.8605	0.3988	2.9210	24	-
56	SCIF2	-1.1271	-1.0026	0.3269	2.8025	24	-
57	RKF3	-1.1657	-1.0003	0.3280	2.6906	24	-
58	SCBDA	-1.2952	-0.8094	0.4269	2.4030	24	-
59	SCIF	-1.3308	-1.1981	0.2436	2.6588	24	-
60	SCBTS3	-1.3387	-1.2813	0.2134	2.3195	24	-
61	RRF1	-1.3715	-1.0730	0.2949	3.0546	24	-
62	STD2	-1.3898	-1.1721	0.2537	2.3606	24	-
63	THOR	-1.4031	-0.8770	0.3900	2.6129	24	-
64	STD	-1.4572	-1.1804	0.2504	2.3715	24	-
65	SCBPG	-1.4782	-1.5244	0.1417	2.3727	24	-
66	BMBF	-1.5045	-1.4079	0.1731	2.8461	24	-
67	SCBMF	-1.5289	-1.3313	0.1967	2.5276	24	-
68	SCBPMO	-1.6160	-1.5614	0.1327	2.2998	24	-
69	SCBTS	-1.6518	-1.6923	0.1047	2.3619	24	-
70	SCBTS2	-1.7512	-1.8634	0.0758*	2.5028	24	-
71	SCBMF2	-1.8995	-1.5576	0.1336	2.4839	24	-
72	SCBMF4	-1.9317	-1.2976	0.2079	2.3276	24	-
73	SCBMF5	-1.9711	-1.3434	0.1928	2.3178	24	-
74	SCBMF3	-2.0361	-1.6606	0.1110	2.4451	24	-

1999-2000

rank	name	Jensen Alpha	t-stat	Sig.	D.W.	n	Serial correlation
1	KKF	0.8421	0.4348	0.6679	1.6263	24	-
2	KPLUS	0.5992	0.9983	0.3295	1.9546	23	first order
3	TNP	0.0333	0.0634	0.9500	2.6240	24	-
4	ONE+1	0.0154	0.0294	0.9768	1.8564	24	-
5	ONE-PR	0.0034	0.0062	0.9951	1.8151	24	-
6	THANA1	-0.0012	-0.0023	0.9982	1.9368	24	-
7	ONE-UB2	-0.0374	-0.0718	0.9434	1.9469	24	-
8	ONE-UB	-0.0552	-0.1043	0.9179	1.9776	24	-
9	SAN	-0.0786	-0.1633	0.8718	2.5287	24	-
10	ONE-PRO	-0.1731	-0.3181	0.7534	2.1509	24	-
11	ONE-FAS	-0.1950	-0.3676	0.7167	2.0456	24	-
12	ONE-PF	-0.2151	-0.4362	0.6669	2.1304	24	-
13	ONE-UB4	-0.2211	-0.4209	0.6779	1.9758	24	-
14	ONE-G	-0.2222	-0.4322	0.6698	2.1158	24	-
15	ONE-D	-0.2254	-0.4558	0.6530	2.0838	24	-
16	ONE-WE	-0.2331	-0.4648	0.6467	2.1378	24	-
17	ONE-UB3	-0.2471	-0.4265	0.6739	1.7914	24	-
18	NPAT-PRO	-0.2834	-0.5558	0.5840	2.0681	24	-
19	THOR	-0.3424	-0.5407	0.5941	2.6106	24	-
20	DE-1	-0.4942	-0.9659	0.3446	2.0878	24	-
21	BMBF	-0.5089	-1.0407	0.3093	2.4605	24	-
22	RPF2	-0.5451	-0.9211	0.3670	2.1159	24	-
23	AGF	-0.5739	-1.1121	0.2781	1.9239	24	-
24	RKF	-0.5911	-1.2179	0.2362	3.0494	24	-
25	TVF	-0.6025	-1.3887	0.1788	2.9906	24	-
26	SCBRT	-0.6277	-0.8657	0.3960	2.3396	24	-
27	SCDF	-0.6610	-1.0909	0.2871	2.1875	24	-
28	RKF-HI	-0.6612	-1.3557	0.1889	2.7730	24	-
29	THOR 4	-0.6614	-1.0497	0.3052	2.5206	24	-
30	CMICRK	-0.6687	-1.4822	0.1525	3.0611	24	-
31	SW2	-0.6997	-1.0077	0.3246	2.3624	24	-
32	RKEC	-0.7103	-1.5282	0.1407	2.9949	24	-
33	RKF3	-0.7109	-1.4854	0.1516	2.9530	24	-
34	RKF2	-0.7144	-1.5377	0.1384	2.9851	24	-
35	RKF4	-0.7285	-1.6589	0.1113	3.0487	24	-
36	PISD	-0.7774	-0.6243	0.5388	2.5419	24	-
37	SPF	-0.7839	-1.3656	0.1859	2.2402	24	-
38	PPSD	-0.8032	-1.9038	0.0701*	2.6608	24	-
39	RRF1	-0.8162	-1.5331	0.1395	1.9493	24	-
40	THOR2	-0.8179	-1.2818	0.2132	2.7859	24	-
41	RKEDC	-0.8210	-1.7014	0.1030	2.9753	24	-
42	SCIF2	-0.8528	-1.5851	0.1272	2.0481	24	-
43	SF4	-0.8704	-1.6670	0.1097	2.0248	24	-
44	SCIF	-0.8853	-1.6780	0.1075	2.0767	24	-
45	BCAP	-0.9158	-1.0406	0.3093	2.7381	24	-
46	TS	-0.9198	-1.5344	0.1392	2.3568	24	-
47	USD2	-0.9256	-2.2144	0.0375*	2.2812	24	-
48	SRT	-0.9316	-1.5351	0.1390	2.1753	24	-
49	USD	-0.9707	-2.2602	0.0340*	2.3028	24	-
50	STD	-1.0118	-1.6086	0.1220	2.2694	24	-
51	SF8	-1.0378	-1.6228	0.1189	2.0241	24	-
52	STD2	-1.0431	-1.6064	0.1224	2.1989	24	-
53	UNF	-1.0501	-1.7876	0.0876*	2.0312	24	-
54	OSA	-1.1190	-2.7628	0.0115*	2.3764	24	-
55	SF7	-1.1397	-1.7025	0.1027	1.9906	24	-
56	SF5	-1.1835	-1.7822	0.0885*	2.1963	24	-
57	BKA2	-1.2161	-1.6584	0.1114	2.9628	24	-
58	BKD	-1.2424	-1.6862	0.1059	2.9665	24	-
59	BKA	-1.2724	-1.7132	0.1007	2.9879	24	-
60	BTP	-1.3526	-1.7238	0.0988*	2.8062	24	-
61	B-SUB	-1.3615	-1.8249	0.0816*	2.9269	24	-
62	SPT	-1.3894	-3.2868	0.0034*	2.4240	24	-
63	SCBPMO	-1.4617	-1.9257	0.0672*	2.7245	24	-
64	SSB	-1.4890	-2.4498	0.0227*	2.1024	24	-
65	SCBTS	-1.5217	-2.1125	0.0462*	2.4793	24	-
66	SCBTS3	-1.5244	-2.2765	0.0329*	2.5433	24	-
67	SCBMF2	-1.6727	-2.0705	0.0503*	2.0454	24	-
68	SCBTS2	-1.6965	-2.2427	0.0353*	2.5387	24	-
69	SCBDA	-1.7345	-2.2285	0.0364*	2.1524	24	-
70	SCBMF4	-1.7416	-2.4474	0.0228*	1.8853	24	-
71	SCBMF3	-1.7719	-2.3246	0.0297*	1.9593	24	-
72	SCBMF5	-1.8133	-2.6505	0.0146*	1.9807	24	-
73	SCBPG	-1.9352	-2.8130	0.0101*	2.4583	24	-
74	SCBMF	-2.0408	-1.2830	0.2128	2.8033	24	-

Note 1. Positive serial correlation is tested at the 5 % siginificance level (1-tail test).

2. Number of funds as ranked by the Jesen Alpha differs from other measures because funds that fall into inconclusive region when tested for positive serial correlation (D W statistic) are excluded from sample set.

* significant at the 0.10 level

Table D-4 Fund performance as ranked by the M Squared, prior periods of varying length and subsequent period (1999-2000)

1992-1998

rank	name	Rp	Rf	S.D. fund	S.D. market	M squared	n
1	RPF2	-0.1447	0.7433	10.5760	11.5673	-0.2280	84
2	SSB	-0.2842	0.7433	11.2386	11.5673	-0.3143	84
3	SW2	-0.2161	0.7433	9.8243	11.5673	-0.3864	84
4	TNP	-0.5853	0.7433	11.1263	11.5673	-0.6380	84
5	SF5	-0.4936	0.7433	9.8213	11.5673	-0.7135	84
6	SF4	-0.4947	0.7433	9.6960	11.5673	-0.7336	84

1999-2000

rank	name	Rp	Rf	S.D.fund	S.D.market	M squared	n
1	TNP	-0.9209	0.3506	9.9248	11.1715	-1.0807	24
2	RPF2	-1.4913	0.3506	9.9519	11.1715	-1.7171	24
3	SW2	-1.5932	0.3506	9.7350	11.1715	-1.8800	24
4	SF4	-1.7755	0.3506	9.5735	11.1715	-2.1305	24
5	SF5	-2.1023	0.3506	9.8628	11.1715	-2.4278	24
6	SSB	-2.3399	0.3506	9.3064	11.1715	-2.8791	24

1993-1998

rank	name	Rp	Rf	S.D. fund	S.D. market	M squared	n
1	RKF	-0.0588	0.7436	9.3496	12.0466	-0.2903	72
2	PPSD	-0.1038	0.7436	7.9040	12.0466	-0.5479	72
3	SSB	-0.5931	0.7436	11.8395	12.0466	-0.6165	72
4	ONE-D	-0.2488	0.7436	8.5612	12.0466	-0.6528	72
5	SAN	-0.5872	0.7436	11.3381	12.0466	-0.6703	72
6	RPF2	-0.5623	0.7436	11.0661	12.0466	-0.6780	72
7	THOR2	-0.2873	0.7436	8.5170	12.0466	-0.7145	72
8	SCBMF	-0.4466	0.7436	9.3097	12.0466	-0.7965	72
9	SW2	-0.6315	0.7436	10.2407	12.0466	-0.8740	72
10	ONE-G	-0.4761	0.7436	8.7809	12.0466	-0.9298	72
11	TNP	-0.9493	0.7436	11.5958	12.0466	-1.0151	72
12	SF5	-0.9388	0.7436	10.0824	12.0466	-1.2666	72
13	SF4	-0.9582	0.7436	10.0837	12.0466	-1.2895	72
14	THOR	-0.7757	0.7436	8.2484	12.0466	-1.4752	72

1999-2000

rank	name	Rp	Rf	S.D.fund	S.D.market	M squared	n
1	TNP	-0.9209	0.3506	9.9248	11.1715	-1.0807	24
2	SAN	-1.1387	0.3506	10.6352	11.1715	-1.2138	24
3	ONE-G	-1.2844	0.3506	10.6872	11.1715	-1.3585	24
4	ONE-D	-1.2709	0.3506	10.5457	11.1715	-1.3671	24
5	THOR	-1.1511	0.3506	9.0523	11.1715	-1.5026	24
6	RPF2	-1.4913	0.3506	9.9519	11.1715	-1.7171	24
7	RKF	-1.4691	0.3506	9.3382	11.1715	-1.8263	24
8	SW2	-1.5932	0.3506	9.7350	11.1715	-1.8800	24
9	PPSD	-1.7531	0.3506	9.7835	11.1715	-2.0516	24
10	THOR2	-1.6120	0.3506	8.9578	11.1715	-2.0970	24
11	SF4	-1.7755	0.3506	9.5735	11.1715	-2.1305	24
12	SF5	-2.1023	0.3506	9.8628	11.1715	-2.4278	24
13	SSB	-2.3399	0.3506	9.3064	11.1715	-2.8791	24
14	SCBMF	-2.6062	0.3506	10.1200	11.1715	-2.9134	24

1994-1998

rank	name	Rp	Rf	S.D. fund	S.D. market	M squared	n
1	THOR2	-1.2925	0.7597	8.2950	12.0046	-2.2103	60
2	SSB	-2.1077	0.7597	11.4505	12.0046	-2.2464	60
3	RKF2	-1.2980	0.7597	8.0803	12.0046	-2.2974	60
4	BKA	-1.7910	0.7597	10.0110	12.0046	-2.2989	60
5	ONE-PR	-1.3832	0.7597	8.2626	12.0046	-2.3537	60
6	THANA1	-1.3922	0.7597	8.1911	12.0046	-2.3941	60
7	ONE-D	-1.3877	0.7597	8.0300	12.0046	-2.4506	60
8	SAN	-2.1580	0.7597	10.8559	12.0046	-2.4667	60
9	RKF	-1.4920	0.7597	8.3659	12.0046	-2.4714	60
10	RPF2	-2.0648	0.7597	10.3803	12.0046	-2.5067	60
11	ONE-FAS	-1.6486	0.7597	8.6662	12.0046	-2.5763	60
12	ONE-PRO	-1.7213	0.7597	8.9065	12.0046	-2.5844	60
13	ONE+1	-1.5882	0.7597	8.3322	12.0046	-2.6231	60
14	PPSD	-1.3004	0.7597	7.2928	12.0046	-2.6314	60
15	TNP	-2.3766	0.7597	11.0872	12.0046	-2.6361	60
16	USD2	-1.5044	0.7597	7.8483	12.0046	-2.7034	60
17	NPAT-PRO	-1.6545	0.7597	8.3570	12.0046	-2.7083	60
18	SW2	-2.0003	0.7597	9.5223	12.0046	-2.7199	60
19	AGF	-2.2484	0.7597	10.3764	12.0046	-2.7205	60
20	ONE-UB3	-1.6351	0.7597	8.2309	12.0046	-2.7330	60
21	RKF-HI	-1.6322	0.7597	8.1987	12.0046	-2.7425	60
22	RKF3	-1.4743	0.7597	7.6252	12.0046	-2.7574	60
23	ONE-G	-1.6734	0.7597	8.2488	12.0046	-2.7813	60
24	USD	-1.5544	0.7597	7.8293	12.0046	-2.7884	60
25	ONE-UB2	-1.6975	0.7597	8.3136	12.0046	-2.7885	60
26	SCIF2	-2.0729	0.7597	9.5753	12.0046	-2.7915	60
27	ONE-UB	-1.7430	0.7597	8.4444	12.0046	-2.7982	60
28	ONE-WE	-1.6315	0.7597	7.7663	12.0046	-2.9365	60
29	KPLUS	-1.8218	0.7597	8.2507	12.0046	-2.9964	60
30	THOR	-1.7655	0.7597	8.0566	12.0046	-3.0030	60
31	SCBTS3	-1.5157	0.7637	7.2444	12.0561	-3.0297	60
32	KPLUS2	-1.8694	0.7597	8.2676	12.0046	-3.0578	60
33	SF5	-2.3444	0.7597	9.3865	12.0046	-3.2103	60
34	SCBPG	-1.6717	0.7597	7.2424	12.0046	-3.2705	60
35	SCIF	-2.5852	0.7597	9.7152	12.0046	-3.3734	60
36	SF4	-2.4391	0.7597	9.2691	12.0046	-3.3832	60
37	STD2	-2.5351	0.7597	9.4857	12.0046	-3.4101	60
38	STD	-2.6657	0.7597	9.5449	12.0046	-3.5484	60
39	SCBMF	-2.0799	0.7597	7.7789	12.0046	-3.6225	60
40	RRF1	-3.4931	0.7597	11.5726	12.0046	-3.6519	60
41	SCBMF2	-2.4199	0.7597	8.5704	12.0046	-3.6939	60
42	SCBTS2	-1.7629	0.7597	6.6308	12.0046	-3.8074	60
43	SCBMF3	-2.5851	0.7597	8.7537	12.0046	-3.8273	60
44	SCBTS	-1.9578	0.7597	7.0855	12.0046	-3.8444	60

1999-2000

rank	name	Rp	Rf	S.D.fund	S.D.market	M squared	n
1	KPLUS2	-0.4346	0.3506	11.1265	11.1715	-0.4377	24
2	KPLUS	-0.5163	0.3506	11.2522	11.1715	-0.5101	24
3	TNP	-0.9209	0.3506	9.9248	11.1715	-1.0807	24
4	ONE+1	-1.0315	0.3506	10.5889	11.1715	-1.1075	24
5	ONE-PR	-1.0999	0.3506	11.0218	11.1715	-1.1196	24
6	THANA1	-1.0987	0.3506	10.9636	11.1715	-1.1262	24
7	ONE-UB2	-1.1185	0.3506	10.8300	11.1715	-1.1649	24
8	ONE-UB	-1.1253	0.3506	10.7608	11.1715	-1.1817	24
9	SAN	-1.1387	0.3506	10.6352	11.1715	-1.2138	24
10	ONE-PRO	-1.2398	0.3506	10.7532	11.1715	-1.3017	24
11	ONE-FAS	-1.2615	0.3506	10.7355	11.1715	-1.3270	24
12	ONE-G	-1.2844	0.3506	10.6872	11.1715	-1.3585	24
13	ONE-D	-1.2709	0.3506	10.5457	11.1715	-1.3671	24
14	ONE-WE	-1.3138	0.3506	10.8055	11.1715	-1.3701	24
15	ONE-UB3	-1.3336	0.3506	10.9343	11.1715	-1.3702	24
16	NPAT-PRO	-1.3206	0.3506	10.5029	11.1715	-1.4270	24
17	THOR	-1.1511	0.3506	9.0523	11.1715	-1.5026	24
18	RPF2	-1.4913	0.3506	9.9519	11.1715	-1.7171	24
19	AGF	-1.4894	0.3506	9.6410	11.1715	-1.7816	24
20	RKF	-1.4691	0.3506	9.3382	11.1715	-1.8263	24
21	SW2	-1.5932	0.3506	9.7350	11.1715	-1.8800	24
22	RKF-HI	-1.5186	0.3506	9.1956	11.1715	-1.9203	24
23	RKF3	-1.5957	0.3506	9.3800	11.1715	-1.9675	24
24	RKF2	-1.5922	0.3506	9.3132	11.1715	-1.9799	24
25	PPSD	-1.7531	0.3506	9.7835	11.1715	-2.0516	24
26	RRF1	-1.7131	0.3506	9.5276	11.1715	-2.0691	24
27	THOR2	-1.6120	0.3506	8.9578	11.1715	-2.0970	24
28	SCIF2	-1.7215	0.3506	9.3365	11.1715	-2.1287	24
29	SF4	-1.7755	0.3506	9.5735	11.1715	-2.1305	24
30	SCIF	-1.7603	0.3506	9.3674	11.1715	-2.1668	24
31	USD2	-1.8746	0.3506	9.7739	11.1715	-2.1929	24
32	STD	-1.9636	0.3506	10.0422	11.1715	-2.2238	24
33	USD	-1.9225	0.3506	9.8046	11.1715	-2.2395	24
34	STD2	-1.9943	0.3506	10.0660	11.1715	-2.2518	24
35	SF5	-2.1023	0.3506	9.8628	11.1715	-2.4278	24
36	BKA	-2.0513	0.3506	9.0313	11.1715	-2.6205	24
37	SSB	-2.3399	0.3506	9.3064	11.1715	-2.8791	24
38	SCBMF	-2.6062	0.3506	10.1200	11.1715	-2.9134	24
39	SCBTS3	-2.3351	0.3506	9.1211	11.1715	-2.9388	24
40	SCBTS	-2.2581	0.3506	8.7019	11.1715	-2.9984	24
41	SCBMF2	-2.5045	0.3506	9.5092	11.1715	-3.0036	24
42	SCBMF3	-2.6034	0.3506	9.4215	11.1715	-3.1522	24
43	SCBTS2	-2.4512	0.3506	8.8936	11.1715	-3.1688	24
44	SCBPG	-2.6891	0.3506	8.7627	11.1715	-3.5247	24

1995-1998

rank	name	Rp	Rf	S.D. fund	S.D. market	M squared	n
1	THOR2	-1.2628	0.7909	8.7146	13.0019	-2.2731	48
2	SSB	-2.2555	0.7909	12.3649	13.0019	-2.4125	48
3	BTP	-1.7805	0.7909	10.2717	13.0019	-2.4639	48
4	SAN	-2.2299	0.7909	11.3362	13.0019	-2.6738	48
5	BKA	-2.1200	0.7909	10.6273	13.0019	-2.7705	48
6	RKEC	-1.6593	0.7909	8.9292	13.0019	-2.7768	48
7	ONE-D	-1.4804	0.7909	8.2458	13.0019	-2.7904	48
8	RPF2	-2.2712	0.7909	11.0538	13.0019	-2.8109	48
9	OSA	-1.7722	0.7909	9.2371	13.0019	-2.8169	48
10	ONE-PRO	-1.8502	0.7909	9.4559	13.0019	-2.8406	48
11	BKA2	-2.1990	0.7909	10.7001	13.0019	-2.8422	48
12	TVF	-1.6348	0.7909	8.5849	13.0019	-2.8828	48
13	BKD	-2.3117	0.7909	10.7793	13.0019	-2.9514	48
14	TNP	-2.5882	0.7909	11.7335	13.0019	-2.9535	48
15	TS	-2.4595	0.7909	11.1390	13.0019	-3.0031	48
16	SCDF	-2.3012	0.7909	10.5153	13.0019	-3.0324	48
17	ONE-PF	-1.6844	0.7909	8.3926	13.0019	-3.0439	48
18	PPSD	-1.4566	0.7909	7.6089	13.0019	-3.0497	48
19	SF7	-2.7679	0.7909	12.0136	13.0019	-3.0607	48
20	KKF	-2.0044	0.7909	9.4016	13.0019	-3.0749	48
21	UNF	-2.6762	0.7909	11.6515	13.0019	-3.0780	48
22	ONE-FAS	-1.9756	0.7909	9.1881	13.0019	-3.1240	48
23	THOR 4	-1.6818	0.7909	8.1688	13.0019	-3.1448	48
24	ONE-G	-1.8574	0.7909	8.7106	13.0019	-3.1621	48
25	NPAT-PRO	-1.8797	0.7909	8.7741	13.0019	-3.1666	48

1999-2000

rank	name	Rp	Rf	S.D.fund	S.D.market	M squared	n
1	KKF	-0.2983	0.3506	14.3284	11.1715	-0.1553	24
2	TDF	-0.4169	0.3506	11.0739	11.1715	-0.4237	24
3	KPLUS2	-0.4346	0.3506	11.1265	11.1715	-0.4377	24
4	KPLUS	-0.5163	0.3506	11.2522	11.1715	-0.5101	24
5	TNP	-0.9209	0.3506	9.9248	11.1715	-1.0807	24
6	ONE+1	-1.0315	0.3506	10.5889	11.1715	-1.1075	24
7	ONE-PR	-1.0999	0.3506	11.0218	11.1715	-1.1196	24
8	THANA1	-1.0987	0.3506	10.9636	11.1715	-1.1262	24
9	ONE-UB2	-1.1185	0.3506	10.8300	11.1715	-1.1649	24
10	ONE-UB	-1.1253	0.3506	10.7608	11.1715	-1.1817	24
11	SAN	-1.1387	0.3506	10.6352	11.1715	-1.2138	24
12	ONE-PRO	-1.2398	0.3506	10.7532	11.1715	-1.3017	24
13	ONE-FAS	-1.2615	0.3506	10.7355	11.1715	-1.3270	24
14	ONE-UB4	-1.2788	0.3506	10.6672	11.1715	-1.3558	24
15	ONE-PF	-1.2598	0.3506	10.5379	11.1715	-1.3566	24
16	ONE-G	-1.2844	0.3506	10.6872	11.1715	-1.3585	24
17	ONE-D	-1.2709	0.3506	10.5457	11.1715	-1.3671	24
18	ONE-WE	-1.3138	0.3506	10.8055	11.1715	-1.3701	24
19	ONE-UB3	-1.3336	0.3506	10.9343	11.1715	-1.3702	24
20	NPAT-PRO	-1.3206	0.3506	10.5029	11.1715	-1.4270	24
21	THOR	-1.1511	0.3506	9.0523	11.1715	-1.5026	24
22	DE-1	-1.5222	0.3506	10.4371	11.1715	-1.6539	24
23	RPF2	-1.4913	0.3506	9.9519	11.1715	-1.7171	24
24	SCBRT	-1.5677	0.3506	10.1100	11.1715	-1.7692	24
25	AGF	-1.4894	0.3506	9.6410	11.1715	-1.7816	24

Table D-4 (continued)

1995-1998

rank	name	Rp	Rf	S.D. fund	S.D. market	M squared	n
26	CMICRK	-1.8719	0.7909	8.7170	13.0019	-3.1809	48
27	USD2	-1.7072	0.7909	8.1481	13.0019	-3.1954	48
28	RKF2	-1.7081	0.7909	8.1460	13.0019	-3.1978	48
29	SW2	-2.2326	0.7909	9.8539	13.0019	-3.1985	48
30	ONE+1	-1.9007	0.7909	8.7402	13.0019	-3.2131	48
31	ONE-UB	-1.9568	0.7909	8.9184	13.0019	-3.2149	48
32	ONE-PR	-1.9146	0.7909	8.7531	13.0019	-3.2279	48
33	ONE-UB2	-1.9346	0.7909	8.8087	13.0019	-3.2321	48
34	ONE-UB3	-1.8816	0.7909	8.6344	13.0019	-3.2333	48
35	DE-1	-2.7411	0.7909	11.4102	13.0019	-3.2338	48
36	THOR	-1.8339	0.7909	8.4172	13.0019	-3.2635	48
37	RKF	-1.8872	0.7909	8.5803	13.0019	-3.2673	48
38	THANA1	-1.9276	0.7909	8.6920	13.0019	-3.2756	48
39	AGF	-2.7091	0.7909	11.1072	13.0019	-3.3062	48
40	RKF4	-1.8900	0.7909	8.4838	13.0019	-3.3177	48
41	USD	-1.7696	0.7909	8.0952	13.0019	-3.3216	48
42	ONE-WE	-1.7921	0.7909	8.1493	13.0019	-3.3302	48
43	ONE-UB4	-1.9088	0.7909	8.5087	13.0019	-3.3344	48
44	SPF	-2.3724	0.7909	9.9022	13.0019	-3.3627	48
45	RKF-HI	-1.9194	0.7909	8.4790	13.0019	-3.3652	48
46	SF5	-2.3952	0.7909	9.9554	13.0019	-3.3702	48
47	SCIF2	-2.5617	0.7909	10.1890	13.0019	-3.4873	48
48	RKF3	-1.7869	0.7909	7.7693	13.0019	-3.5231	48
49	2SCBDA	-3.0863	0.7909	11.5999	13.0019	-3.5549	48
50	KPLUS	-2.2102	0.7909	8.9351	13.0019	-3.5761	48
51	SCBMF4	-2.8379	0.7909	10.7524	13.0019	-3.5971	48
52	TDF	-2.3934	0.7909	9.4175	13.0019	-3.6054	48
53	SF4	-2.5243	0.7909	9.7179	13.0019	-3.6446	48
54	SCIF	-2.7089	0.7909	10.2367	13.0019	-3.6543	48
55	KPLUS2	-2.2588	0.7909	8.9168	13.0019	-3.6560	48
56	SCBMF5	-2.8715	0.7909	10.4724	13.0019	-3.7561	48
57	STD2	-2.7782	0.7909	10.1357	13.0019	-3.7875	48
58	STD	-2.8023	0.7909	10.1035	13.0019	-3.8331	48
59	SCBTS3	-2.0122	0.7909	7.6366	13.0019	-3.9816	48
60	RRF1	-3.4328	0.7909	11.2554	13.0019	-4.0882	48
61	SCBRT	-2.4437	0.7909	8.6105	13.0019	-4.0933	48
62	SCBPG	-2.2229	0.7909	7.6699	13.0019	-4.3181	48
63	SCBMF	-2.3938	0.7909	8.0605	13.0019	-4.3461	48
64	SCBMF2	-2.7815	0.7909	9.0113	13.0019	-4.3635	48
65	SCBMF3	-2.9555	0.7909	9.2241	13.0019	-4.4899	48
66	SCBTS	-2.3839	0.7909	7.4180	13.0019	-4.7738	48
67	SCBTS2	-2.1569	0.7909	6.8659	13.0019	-4.7913	48

1999-2000

rank	name	Rp	Rf	S.D.fund	S.D.market	M squared	n
26	SCDF	-1.6934	0.3506	10.5820	11.1715	-1.8073	24
27	RKF	-1.4691	0.3506	9.3382	11.1715	-1.8263	24
28	TVF	-1.4384	0.3506	8.9798	11.1715	-1.8751	24
29	SW2	-1.5932	0.3506	9.7350	11.1715	-1.8800	24
30	THOR 4	-1.4613	0.3506	8.9844	11.1715	-1.9024	24
31	RKF-HI	-1.5186	0.3506	9.1956	11.1715	-1.9203	24
32	CMICRK	-1.5275	0.3506	9.1619	11.1715	-1.9394	24
33	SPF	-1.7999	0.3506	10.4248	11.1715	-1.9539	24
34	RKF3	-1.5957	0.3506	9.3800	11.1715	-1.9675	24
35	RKF2	-1.5922	0.3506	9.3132	11.1715	-1.9799	24
36	RKEC	-1.5733	0.3506	9.2080	11.1715	-1.9835	24
37	RKF4	-1.5695	0.3506	9.0221	11.1715	-2.0270	24
38	PPSD	-1.7531	0.3506	9.7835	11.1715	-2.0516	24
39	RRF1	-1.7131	0.3506	9.5276	11.1715	-2.0691	24
40	THOR2	-1.6120	0.3506	8.9578	11.1715	-2.0970	24
41	TS	-1.9142	0.3506	10.3044	11.1715	-2.1048	24
42	SCIF2	-1.7215	0.3506	9.3365	11.1715	-2.1287	24
43	SF4	-1.7755	0.3506	9.5735	11.1715	-2.1305	24
44	SCIF	-1.7603	0.3506	9.3674	11.1715	-2.1668	24
45	USD2	-1.8746	0.3506	9.7739	11.1715	-2.1929	24
46	STD	-1.9636	0.3506	10.0422	11.1715	-2.2238	24
47	USD	-1.9225	0.3506	9.8046	11.1715	-2.2395	24
48	UNF	-2.0481	0.3506	10.3129	11.1715	-2.2478	24
49	STD2	-1.9943	0.3506	10.0660	11.1715	-2.2518	24
50	SF7	-2.1492	0.3506	10.5023	11.1715	-2.3085	24
51	SF5	-2.1023	0.3506	9.8628	11.1715	-2.4278	24
52	OSA	-2.0550	0.3506	9.6675	11.1715	-2.4293	24
53	BKA2	-1.9991	0.3506	9.0415	11.1715	-2.5526	24
54	BKD	-2.0209	0.3506	9.0180	11.1715	-2.5873	24
55	BKA	-2.0513	0.3506	9.0313	11.1715	-2.6205	24
56	BTP	-2.0556	0.3506	8.6028	11.1715	-2.7741	24
57	SSB	-2.3399	0.3506	9.3064	11.1715	-2.8791	24
58	SCBMF	-2.6062	0.3506	10.1200	11.1715	-2.9134	24
59	SCBTS3	-2.3351	0.3506	9.1211	11.1715	-2.9388	24
60	SCBTS	-2.2581	0.3506	8.7019	11.1715	-2.9984	24
61	SCBMF2	-2.5045	0.3506	9.5092	11.1715	-3.0036	24
62	SCBDA	-2.5803	0.3506	9.5526	11.1715	-3.0771	24
63	SCBMF3	-2.6034	0.3506	9.4215	11.1715	-3.1522	24
64	SCBTS2	-2.4512	0.3506	8.8936	11.1715	-3.1688	24
65	SCBMF4	-2.5120	0.3506	8.9148	11.1715	-3.2367	24
66	SCBMF5	-2.6120	0.3506	9.0613	11.1715	-3.3019	24
67	SCBPG	-2.6891	0.3506	8.7627	11.1715	-3.5247	24

1996-1998

rank	name	Rp	Rf	S.D. fund	S.D. market	M squared	n
1	THOR2	-1.6510	0.7700	9.5023	14.5277	-2.9313	36
2	SSB	-3.0152	0.7700	13.8314	14.5277	-3.2058	36
3	BTP	-2.4709	0.7700	11.4730	14.5277	-3.3338	36
4	ONE-D	-1.8030	0.7700	9.0287	14.5277	-3.3701	36
5	ONE-PRO	-2.3812	0.7700	10.6709	14.5277	-3.5202	36
6	BKD	-2.7432	0.7700	11.8684	14.5277	-3.5304	36
7	B-SUB	-2.9081	0.7700	12.1149	14.5277	-3.6407	36
8	SRT	-2.2923	0.7700	10.0579	14.5277	-3.6531	36
9	ONE-G	-2.1341	0.7700	9.5362	14.5277	-3.6541	36
10	BKA	-2.8431	0.7700	11.8371	14.5277	-3.6644	36
11	ONE-FAS	-2.4155	0.7700	10.2936	14.5277	-3.7257	36
12	BKA2	-2.9239	0.7700	11.9256	14.5277	-3.7298	36
13	APF	-2.4516	0.7700	10.3201	14.5277	-3.7651	36
14	SAN	-3.1348	0.7700	12.4705	14.5277	-3.7790	36
15	RPF2	-3.0479	0.7700	12.1379	14.5277	-3.7996	36
16	OSA	-2.5196	0.7700	10.4042	14.5277	-3.8233	36
17	TNP	-3.3452	0.7700	12.9259	14.5277	-3.8551	36
18	SPT	-2.5670	0.7700	10.4476	14.5277	-3.8702	36
19	RKEC	-2.4044	0.7700	9.9325	14.5277	-3.8730	36
20	NPAT-PRO	-2.4052	0.7700	9.7849	14.5277	-3.9442	36
21	TVF	-2.3627	0.7700	9.6345	14.5277	-3.9538	36
22	UNF	-3.4027	0.7700	12.7884	14.5277	-3.9702	36
23	ONE-PF	-2.3359	0.7700	9.5080	14.5277	-3.9756	36
24	KKF	-2.6266	0.7700	10.3538	14.5277	-3.9958	36
25	ONE-PR	-2.4004	0.7700	9.6359	14.5277	-4.0099	36
26	TS	-3.2562	0.7700	12.2048	14.5277	-4.0225	36
27	THOR 4	-2.1257	0.7700	8.7607	14.5277	-4.0319	36
28	ONE+1	-2.4149	0.7700	9.6138	14.5277	-4.0428	36
29	ONE-UB4	-2.3683	0.7700	9.3669	14.5277	-4.0973	36
30	ONE-WE	-2.2233	0.7700	8.9078	14.5277	-4.1118	36
31	SF7	-3.6749	0.7700	13.1915	14.5277	-4.1252	36
32	THANA1	-2.4525	0.7700	9.5485	14.5277	-4.1330	36
33	SCDF	-3.0968	0.7700	11.4143	14.5277	-4.1515	36
34	USD2	-2.2329	0.7700	8.8122	14.5277	-4.1806	36
35	ONE-UB3	-2.4614	0.7700	9.4505	14.5277	-4.1974	36
36	SF8	-3.6438	0.7700	12.9011	14.5277	-4.2002	36
37	ONE-UB2	-2.5362	0.7700	9.6508	14.5277	-4.2068	36
38	DE-1	-3.5259	0.7700	12.5337	14.5277	-4.2093	36
39	CMICRK	-2.4822	0.7700	9.4753	14.5277	-4.2164	36
40	PISD	-2.8856	0.7700	10.5964	14.5277	-4.2418	36
41	PPSD	-1.8673	0.7700	7.6005	14.5277	-4.2710	36
42	RKF2	-2.3065	0.7700	8.7653	14.5277	-4.3291	36
43	SW2	-3.0138	0.7700	10.7098	14.5277	-4.3626	36
44	RKF	-2.5261	0.7700	9.3034	14.5277	-4.3770	36
45	THOR	-2.4230	0.7700	9.0113	14.5277	-4.3777	36
46	USD	-2.3279	0.7700	8.7407	14.5277	-4.3789	36
47	ONE-UB	-2.6740	0.7700	9.7146	14.5277	-4.3802	36
48	RKF4	-2.5263	0.7700	9.2102	14.5277	-4.4294	36
49	AGF	-3.5429	0.7700	12.0324	14.5277	-4.4372	36
50	RKF-HI	-2.5453	0.7700	9.1744	14.5277	-4.4797	36
51	KPLUS	-2.7979	0.7700	9.8363	14.5277	-4.4995	36
52	SCBDA	-3.9262	0.7700	12.8551	14.5277	-4.5372	36
53	SF5	-3.1566	0.7700	10.7284	14.5277	-4.5471	36
54	SPF	-3.1217	0.7700	10.6142	14.5277	-4.5566	36
55	SCBMF4	-3.6101	0.7700	11.8632	14.5277	-4.5939	36

1999-2000

rank	name	Rp	Rf	S.D.fund	S.D.market	M squared	n
1	KKF	-0.2983	0.3506	14.3284	11.1715	-0.1553	24
2	TDF	-0.4169	0.3506	11.0739	11.1715	-0.4237	24
3	KPLUS2	-0.4346	0.3506	11.1265	11.1715	-0.4377	24
4	APF	-0.4405	0.3506	11.0057	11.1715	-0.4525	24
5	KPLUS	-0.5163	0.3506	11.2522	11.1715	-0.5101	24
6	TNP	-0.9209	0.3506	9.9248	11.1715	-1.0807	24
7	ONE+1	-1.0315	0.3506	10.5889	11.1715	-1.1075	24
8	ONE-PR	-1.0999	0.3506	11.0218	11.1715	-1.1196	24
9	THANA1	-1.0987	0.3506	10.9636	11.1715	-1.1262	24
10	ONE-UB2	-1.1185	0.3506	10.8300	11.1715	-1.1649	24
11	ONE-UB	-1.1253	0.3506	10.7608	11.1715	-1.1817	24
12	SAN	-1.1387	0.3506	10.6352	11.1715	-1.2138	24
13	ONE-PRO	-1.2398	0.3506	10.7532	11.1715	-1.3017	24
14	ONE-FAS	-1.2615	0.3506	10.7355	11.1715	-1.3270	24
15	ONE-UB4	-1.2788	0.3506	10.6672	11.1715	-1.3558	24
16	ONE-PF	-1.2598	0.3506	10.5379	11.1715	-1.3566	24
17	ONE-G	-1.2844	0.3506	10.6872	11.1715	-1.3585	24
18	ONE-D	-1.2709	0.3506	10.5457	11.1715	-1.3671	24
19	ONE-WE	-1.3138	0.3506	10.8055	11.1715	-1.3701	24
20	ONE-UB3	-1.3336	0.3506	10.9343	11.1715	-1.3702	24
21	NPAT-PRO	-1.3206	0.3506	10.5029	11.1715	-1.4270	24
22	THOR	-1.1511	0.3506	9.0523	11.1715	-1.5026	24
23	PISD	-2.1985	0.3506	14.3156	11.1715	-1.6386	24
24	DE-1	-1.5222	0.3506	10.4371	11.1715	-1.6539	24
25	BMBF	-1.4749	0.3506	9.9680	11.1715	-1.6953	24
26	RPF2	-1.4913	0.3506	9.9519	11.1715	-1.7171	24
27	SCBRT	-1.5677	0.3506	10.1100	11.1715	-1.7692	24
28	AGF	-1.4894	0.3506	9.6410	11.1715	-1.7816	24
29	SCDF	-1.6934	0.3506	10.5820	11.1715	-1.8073	24
30	RKF	-1.4691	0.3506	9.3382	11.1715	-1.8263	24
31	TVF	-1.4384	0.3506	8.9798	11.1715	-1.8751	24
32	SW2	-1.5932	0.3506	9.7350	11.1715	-1.8800	24
33	THOR 4	-1.4613	0.3506	8.9844	11.1715	-1.9024	24
34	RKF-HI	-1.5186	0.3506	9.1956	11.1715	-1.9203	24
35	CMICRK	-1.5275	0.3506	9.1619	11.1715	-1.9394	24
36	SPF	-1.7999	0.3506	10.4248	11.1715	-1.9539	24
37	RKF3	-1.5957	0.3506	9.3800	11.1715	-1.9675	24
38	RKF2	-1.5922	0.3506	9.3132	11.1715	-1.9799	24
39	RKEC	-1.5733	0.3506	9.2080	11.1715	-1.9835	24
40	RKF4	-1.5695	0.3506	9.0221	11.1715	-2.0270	24
41	PPSD	-1.7531	0.3506	9.7835	11.1715	-2.0516	24
42	RRF1	-1.7131	0.3506	9.5276	11.1715	-2.0691	24
43	THOR2	-1.6120	0.3506	8.9578	11.1715	-2.0970	24
44	TS	-1.9142	0.3506	10.3044	11.1715	-2.1048	24
45	SRT	-1.9263	0.3506	10.3141	11.1715	-2.1156	24
46	SCIF2	-1.7215	0.3506	9.3365	11.1715	-2.1287	24
47	SF4	-1.7755	0.3506	9.5735	11.1715	-2.1305	24
48	SCIF	-1.7603	0.3506	9.3674	11.1715	-2.1668	24
49	USD2	-1.8746	0.3506	9.7739	11.1715	-2.1929	24
50	STD	-1.9636	0.3506	10.0422	11.1715	-2.2238	24
51	SF8	-2.0081	0.3506	10.1858	11.1715	-2.2363	24
52	USD	-1.9225	0.3506	9.8046	11.1715	-2.2395	24
53	UNF	-2.0481	0.3506	10.3129	11.1715	-2.2478	24
54	STD2	-1.9943	0.3506	10.0660	11.1715	-2.2518	24
55	SF7	-2.1492	0.3506	10.5023	11.1715	-2.3085	24

Table D-4 (continued)

1996-1998

rank	name	Rp	Rf	S.D. fund	S.D. market	M squared	n
56	KPLUS2	-2.8430	0.7700	9.7807	14.5277	-4.5966	36
57	TDF	-3.1106	0.7700	10.4866	14.5277	-4.6060	36
58	SCIF2	-3.3996	0.7700	11.0291	14.5277	-4.7223	36
59	SCBMF5	-3.6318	0.7700	11.5712	14.5277	-4.7564	36
60	RKF3	-2.3903	0.7700	8.3033	14.5277	-4.7593	36
61	RRF1	-3.9528	0.7700	12.2036	14.5277	-4.8523	36
62	SF4	-3.3389	0.7700	10.3581	14.5277	-4.9928	36
63	SCIF	-3.5880	0.7700	10.9761	14.5277	-4.9982	36
64	STD	-3.6212	0.7700	10.8845	14.5277	-5.0910	36
65	STD2	-3.6610	0.7700	10.8855	14.5277	-5.1435	36
66	SCBRT	-3.2286	0.7700	9.7626	14.5277	-5.1803	36
67	BMBF	-3.7277	0.7700	10.9752	14.5277	-5.1835	36
68	SCBTS3	-2.4968	0.7700	7.9350	14.5277	-5.2110	36
69	SCBPMO	-2.9582	0.7700	8.6595	14.5277	-5.4847	36
70	SCBPG	-2.7391	0.7700	8.0187	14.5277	-5.5876	36
71	SCBMF2	-3.5343	0.7700	9.7218	14.5277	-5.6621	36
72	SCBMF	-3.0306	0.7700	8.5420	14.5277	-5.6938	36
73	SCBMF3	-3.7491	0.7700	9.9523	14.5277	-5.8266	36
74	SCBTS	-2.9916	0.7700	7.6139	14.5277	-6.4074	36
75	SCBTS2	-2.6851	0.7700	6.8971	14.5277	-6.5076	36

1999-2000

rank	name	Rp	Rf	S.D. fund	S.D. market	M squared	n
56	SF5	-2.1023	0.3506	9.8628	11.1715	-2.4278	24
57	OSA	-2.0550	0.3506	9.6675	11.1715	-2.4293	24
58	BKA2	-1.9991	0.3506	9.0415	11.1715	-2.5526	24
59	BKD	-2.0209	0.3506	9.0180	11.1715	-2.5873	24
60	BKA	-2.0513	0.3506	9.0313	11.1715	-2.6205	24
61	SPT	-2.3583	0.3506	9.9222	11.1715	-2.6994	24
62	B-SUB	-2.1274	0.3506	8.9491	11.1715	-2.7428	24
63	BTP	-2.0556	0.3506	8.6028	11.1715	-2.7741	24
64	SCBPMO	-2.2524	0.3506	9.1446	11.1715	-2.8294	24
65	SSB	-2.3399	0.3506	9.3064	11.1715	-2.8791	24
66	SCBMF	-2.6062	0.3506	10.1200	11.1715	-2.9134	24
67	SCBTS3	-2.3351	0.3506	9.1211	11.1715	-2.9388	24
68	SCBTS	-2.2581	0.3506	8.7019	11.1715	-2.9984	24
69	SCBMF2	-2.5045	0.3506	9.5092	11.1715	-3.0036	24
70	SCBDA	-2.5803	0.3506	9.5526	11.1715	-3.0771	24
71	SCBMF3	-2.6034	0.3506	9.4215	11.1715	-3.1522	24
72	SCBTS2	-2.4512	0.3506	8.8936	11.1715	-3.1688	24
73	SCBMF4	-2.5120	0.3506	8.9148	11.1715	-3.2367	24
74	SCBMF5	-2.6120	0.3506	9.0613	11.1715	-3.3019	24
75	SCBPG	-2.6891	0.3506	8.7627	11.1715	-3.5247	24

1997-1998

rank	name	Rp	Rf	S.D. fund	S.D. market	M squared	n
1	THOR2	-1.2846	0.7723	11.0648	17.5010	-2.4810	24
2	ONE-D	-1.3785	0.7723	10.3823	17.5010	-2.8532	24
3	BCAP	-2.3426	0.7723	14.7672	17.5010	-2.9193	24
4	SSB	-2.9171	0.7723	16.5778	17.5010	-3.1225	24
5	APF	-1.9909	0.7723	12.0446	17.5010	-3.2427	24
6	SRT	-1.9903	0.7723	11.8206	17.5010	-3.3179	24
7	ONE-G	-1.8997	0.7723	11.0820	17.5010	-3.4474	24
8	ONE-PRO	-2.2813	0.7723	12.5160	17.5010	-3.4975	24
9	OSA	-2.1958	0.7723	12.1632	17.5010	-3.4983	24
10	BKD	-2.7573	0.7723	14.2440	17.5010	-3.5643	24
11	KKF	-2.2402	0.7723	12.0760	17.5010	-3.5935	24
12	SPT	-2.2711	0.7723	12.1557	17.5010	-3.6094	24
13	B-SUB	-2.9272	0.7723	14.5641	17.5010	-3.6732	24
14	SAN	-3.0371	0.7723	14.8083	17.5010	-3.7298	24
15	USD2	-1.8023	0.7723	9.9928	17.5010	-3.7368	24
16	TNP	-3.2324	0.7723	15.4516	17.5010	-3.7635	24
17	ONE-FAS	-2.3689	0.7723	12.1048	17.5010	-3.7692	24
18	BKA	-2.9170	0.7723	14.1872	17.5010	-3.7788	24
19	ONE-WE	-1.9028	0.7723	10.2561	17.5010	-3.7925	24
20	UNF	-3.2608	0.7723	15.3528	17.5010	-3.8251	24
21	BTP	-2.8708	0.7723	13.7923	17.5010	-3.8504	24
22	BKA2	-3.0107	0.7723	14.3009	17.5010	-3.8573	24
23	SCDF	-2.7938	0.7723	13.4714	17.5010	-3.8605	24
24	TS	-3.0626	0.7723	14.4371	17.5010	-3.8765	24
25	ONE-UB3	-2.1749	0.7723	11.0027	17.5010	-3.9155	24
26	THOR 4	-1.9163	0.7723	10.0260	17.5010	-3.9208	24
27	ONE-PR	-2.2358	0.7723	11.2110	17.5010	-3.9235	24
28	ONE-PF	-2.2035	0.7723	11.0482	17.5010	-3.9416	24
29	RPF2	-3.1277	0.7723	14.4346	17.5010	-3.9562	24
30	ONE-UB4	-2.1717	0.7723	10.8798	17.5010	-3.9633	24
31	NPAT-PRO	-2.3376	0.7723	11.4555	17.5010	-3.9787	24
32	THANA1	-2.2437	0.7723	11.1067	17.5010	-3.9801	24
33	ONE+1	-2.2767	0.7723	11.1911	17.5010	-3.9958	24
34	TVF	-2.3034	0.7723	11.2596	17.5010	-4.0083	24
35	DE-1	-3.3171	0.7723	14.9482	17.5010	-4.0154	24
36	ONE-UB	-2.3308	0.7723	11.3370	17.5010	-4.0180	24
37	USD	-1.9448	0.7723	9.9029	17.5010	-4.0296	24
38	ONE-UB2	-2.3224	0.7723	11.2693	17.5010	-4.0336	24
39	RKEC	-2.4209	0.7723	11.6024	17.5010	-4.0443	24
40	PISD	-2.6596	0.7723	12.4299	17.5010	-4.0597	24
41	PPSD	-1.5602	0.7723	8.2930	17.5010	-4.1500	24
42	SF7	-3.6112	0.7723	15.5824	17.5010	-4.1510	24
43	SF5	-2.7991	0.7723	12.5858	17.5010	-4.1939	24
44	SF8	-3.6119	0.7723	15.2781	17.5010	-4.2498	24
45	KPLUS	-2.5340	0.7723	11.4940	17.5010	-4.2620	24
46	CMICRK	-2.4057	0.7723	11.0441	17.5010	-4.2636	24
47	RKEDC	-2.6273	0.7723	11.7601	17.5010	-4.2868	24
48	RKF2	-2.1772	0.7723	10.0822	17.5010	-4.3475	24
49	AGF	-3.4225	0.7723	14.2393	17.5010	-4.3834	24
50	KPLUS2	-2.5972	0.7723	11.4249	17.5010	-4.3892	24
51	SW2	-2.9778	0.7723	12.5698	17.5010	-4.4490	24
52	SCBDA	-3.8464	0.7723	15.3594	17.5010	-4.4903	24
53	RKF4	-2.5067	0.7723	10.7261	17.5010	-4.5778	24
54	RKF	-2.5312	0.7723	10.7959	17.5010	-4.5830	24
55	TDF	-3.0128	0.7723	12.3195	17.5010	-4.6047	24
56	THOR	-2.4429	0.7723	10.4359	17.5010	-4.6196	24
57	RKF-HI	-2.5194	0.7723	10.6658	17.5010	-4.6288	24
58	SPF	-3.1037	0.7723	12.4557	17.5010	-4.6736	24
59	SF4	-2.9906	0.7723	12.0906	17.5010	-4.6744	24
60	SCIF2	-3.3079	0.7723	13.0344	17.5010	-4.7061	24
61	SCBRT	-2.7995	0.7723	11.3785	17.5010	-4.7214	24
62	RRF1	-3.8172	0.7723	14.2973	17.5010	-4.8456	24
63	RKF3	-2.3273	0.7723	9.5116	17.5010	-4.9309	24
64	SCIF	-3.5007	0.7723	12.9671	17.5010	-4.9947	24
65	STD2	-3.4995	0.7723	12.8905	17.5010	-5.0273	24
66	STD	-3.5389	0.7723	12.8908	17.5010	-5.0807	24
67	BMBF	-3.6097	0.7723	12.6461	17.5010	-5.2920	24
68	SCBMF4	-4.2057	0.7723	14.1204	17.5010	-5.3974	24
69	SCBTS3	-2.4685	0.7723	9.0953	17.5010	-5.4635	24
70	SCBMF5	-4.1638	0.7723	13.7847	17.5010	-5.4945	24
71	SCBMF	-2.7556	0.7723	9.6791	17.5010	-5.6066	24
72	SCBPG	-2.7240	0.7723	9.3194	17.5010	-5.7933	24
73	SCBPMO	-3.0613	0.7723	10.1669	17.5010	-5.8267	24
74	SCBMF2	-3.5558	0.7723	11.3279	17.5010	-5.9143	24
75	SCBMF3	-3.7596	0.7723	11.5788	17.5010	-6.0775	24
76	SCBTS	-2.6049	0.7723	8.3208	17.5010	-6.3310	24
77	SCBTS2	-2.5153	0.7723	7.5940	17.5010	-6.8043	24

1999-2000

rank	name	Rp	Rf	S.D. fund	S.D. market	M squared	n
1	KKF	-0.2983	0.3506	14.3284	11.1715	-0.1553	24
2	TDF	-0.4169	0.3506	11.0739	11.1715	-0.4237	24
3	KPLUS2	-0.4346	0.3506	11.1265	11.1715	-0.4377	24
4	APF	-0.4405	0.3506	11.0057	11.1715	-0.4525	24
5	KPLUS	-0.5163	0.3506	11.2522	11.1715	-0.5101	24
6	TNP	-0.9209	0.3506	9.9248	11.1715	-1.0807	24
7	ONE+1	-1.0315	0.3506	10.5889	11.1715	-1.1075	24
8	ONE-PR	-1.0999	0.3506	11.0218	11.1715	-1.1196	24
9	THANA1	-1.0987	0.3506	10.9636	11.1715	-1.1262	24
10	ONE-UB2	-1.1185	0.3506	10.8300	11.1715	-1.1649	24
11	ONE-UB	-1.1253	0.3506	10.7608	11.1715	-1.1817	24
12	SAN	-1.1387	0.3506	10.6352	11.1715	-1.2138	24
13	ONE-PRO	-1.2398	0.3506	10.7532	11.1715	-1.3017	24
14	ONE-FAS	-1.2615	0.3506	10.7355	11.1715	-1.3270	24
15	ONE-UB4	-1.2788	0.3506	10.6672	11.1715	-1.3558	24
16	ONE-PF	-1.2598	0.3506	10.5379	11.1715	-1.3566	24
17	ONE-G	-1.2844	0.3506	10.6872	11.1715	-1.3585	24
18	ONE-D	-1.2709	0.3506	10.5457	11.1715	-1.3671	24
19	ONE-WE	-1.3138	0.3506	10.8055	11.1715	-1.3701	24
20	ONE-UB3	-1.3336	0.3506	10.9343	11.1715	-1.3702	24
21	NPAT-PRO	-1.3206	0.3506	10.5029	11.1715	-1.4270	24
22	THOR	-1.1511	0.3506	9.0523	11.1715	-1.5026	24
23	PISD	-2.1985	0.3506	14.3156	11.1715	-1.6386	24
24	DE-1	-1.5222	0.3506	10.4371	11.1715	-1.6539	24
25	BMBF	-1.4749	0.3506	9.9680	11.1715	-1.6953	24
26	RPF2	-1.4913	0.3506	9.9519	11.1715	-1.7171	24
27	SCBRT	-1.5677	0.3506	10.1100	11.1715	-1.7692	24
28	AGF	-1.4894	0.3506	9.6410	11.1715	-1.7816	24
29	SCDF	-1.6934	0.3506	10.5820	11.1715	-1.8073	24
30	RKF	-1.4691	0.3506	9.3382	11.1715	-1.8263	24
31	TVF	-1.4384	0.3506	8.9798	11.1715	-1.8751	24
32	SW2	-1.5932	0.3506	9.7350	11.1715	-1.8800	24
33	THOR 4	-1.4613	0.3506	8.9844	11.1715	-1.9024	24
34	RKF-HI	-1.5186	0.3506	9.1956	11.1715	-1.9203	24
35	CMICRK	-1.5275	0.3506	9.1619	11.1715	-1.9394	24
36	SPF	-1.7999	0.3506	10.4248	11.1715	-1.9539	24
37	RKF3	-1.5957	0.3506	9.3800	11.1715	-1.9675	24
38	RKF2	-1.5922	0.3506	9.3132	11.1715	-1.9799	24
39	RKEC	-1.5733	0.3506	9.2080	11.1715	-1.9835	24
40	RKF4	-1.5695	0.3506	9.0221	11.1715	-2.0270	24
41	PPSD	-1.7531	0.3506	9.7835	11.1715	-2.0516	24
42	RRF1	-1.7131	0.3506	9.5276	11.1715	-2.0691	24
43	RKEDC	-1.7107	0.3506	9.4187	11.1715	-2.0944	24
44	THOR2	-1.6120	0.3506	8.9578	11.1715	-2.0970	24
45	TS	-1.9142	0.3506	10.3044	11.1715	-2.1048	24
46	SRT	-1.9263	0.3506	10.3141	11.1715	-2.1156	24
47	BCAP	-1.6731	0.3506	9.1608	11.1715	-2.1173	24
48	SCIF2	-1.7215	0.3506	9.3365	11.1715	-2.1287	24
49	SF4	-1.7755	0.3506	9.5735	11.1715	-2.1305	24
50	SCIF	-1.7603	0.3506	9.3674	11.1715	-2.1668	24
51	USD2	-1.8746	0.3506	9.7739	11.1715	-2.1929	24
52	STD	-1.9636	0.3506	10.0422	11.1715	-2.2238	24
53	SF8	-2.0081	0.3506	10.1858	11.1715	-2.2363	24
54	USD	-1.9225	0.3506	9.8046	11.1715	-2.2395	24
55	UNF	-2.0481	0.3506	10.3129	11.1715	-2.2478	24
56	STD2	-1.9943	0.3506	10.0660	11.1715	-2.2518	24
57	SF7	-2.1492	0.3506	10.5023	11.1715	-2.3085	24
58	SF5	-2.1023	0.3506	9.8628	11.1715	-2.4278	24
59	OSA	-2.0550	0.3506	9.6675	11.1715	-2.4293	24
60	BKA2	-1.9991	0.3506	9.0415	11.1715	-2.5526	24
61	BKD	-2.0209	0.3506	9.0180	11.1715	-2.5873	24
62	BKA	-2.0513	0.3506	9.0313	11.1715	-2.6205	24
63	SPT	-2.3583	0.3506	9.9222	11.1715	-2.6994	24
64	B-SUB	-2.1274	0.3506	8.9491	11.1715	-2.7428	24
65	BTP	-2.0556	0.3506	8.6028	11.1715	-2.7741	24
66	SCBPMO	-2.2524	0.3506	9.1446	11.1715	-2.8294	24
67	SSB	-2.3399	0.3506	9.3064	11.1715	-2.8791	24
68	SCBMF	-2.6062	0.3506	10.1200	11.1715	-2.9134	24
69	SCBTS3	-2.3351	0.3506	9.1211	11.1715	-2.9388	24
70	SCBTS	-2.2581	0.3506	8.7019	11.1715	-2.9984	24
71	SCBMF2	-2.5045	0.3506	9.5092	11.1715	-3.0036	24
72	SCBDA	-2.5803	0.3506	9.5526	11.1715	-3.0771	24
73	SCBMF3	-2.6034	0.3506	9.4215	11.1715	-3.1522	24
74	SCBTS2	-2.4512	0.3506	8.8936	11.1715	-3.1688	24
75	SCBMF4	-2.5120	0.3506	8.9148	11.1715	-3.2367	24
76	SCBMF5	-2.6120	0.3506	9.0613	11.1715	-3.3019	24
77	SCBPG	-2.6891	0.3506	8.7627	11.1715	-3.5247	24

Table D-5 Fund performance as ranked by the raw returns, prior periods of varying length and subsequent period (1999-2000)

1992-1998

rank	name	raw returns (mean monthly return)	n
1	RPF2	-0.1447	84
2	SW2	-0.2161	84
3	SSB	-0.2842	84
4	SF5	-0.4936	84
5	SF4	-0.4947	84
6	TNP	-0.5853	84

1999-2000

rank	name	raw returns (mean monthly return)	n
1	TNP	-0.9209	24
2	RPF2	-1.4913	24
3	SW2	-1.5932	24
4	SF4	-1.7755	24
5	SF5	-2.1023	24
6	SSB	-2.3399	24

1993-1998

rank	name	raw returns (mean monthly return)	n
1	RKF	-0.0588	72
2	PPSD	-0.1038	72
3	ONE-D	-0.2488	72
4	THOR2	-0.2873	72
5	SCBMF	-0.4466	72
6	ONE-G	-0.4761	72
7	RPF2	-0.5623	72
8	SAN	-0.5872	72
9	SSB	-0.5931	72
10	SW2	-0.6315	72
11	THOR	-0.7757	72
12	SF5	-0.9388	72
13	TNP	-0.9493	72
14	SF4	-0.9582	72

1999-2000

rank	name	raw returns (mean monthly return)	n
1	TNP	-0.9209	24
2	SAN	-1.1387	24
3	THOR	-1.1511	24
4	ONE-D	-1.2709	24
5	ONE-G	-1.2844	24
6	RKF	-1.4691	24
7	RPF2	-1.4913	24
8	SW2	-1.5932	24
9	THOR2	-1.6120	24
10	PPSD	-1.7531	24
11	SF4	-1.7755	24
12	SF5	-2.1023	24
13	SSB	-2.3399	24
14	SCBMF	-2.6062	24

1994-1998

rank	name	raw returns (mean monthly return)	n
1	THOR2	-1.2925	60
2	RKF2	-1.2980	60
3	PPSD	-1.3004	60
4	ONE-PR	-1.3832	60
5	ONE-D	-1.3877	60
6	THANA1	-1.3922	60
7	RKF3	-1.4743	60
8	RKF	-1.4920	60
9	USD2	-1.5044	60
10	SCBTS3	-1.5157	60
11	USD	-1.5544	60
12	ONE+1	-1.5882	60
13	ONE-WE	-1.6315	60
14	RKF-HI	-1.6322	60
15	ONE-UB3	-1.6351	60
16	ONE-FAS	-1.6486	60
17	NPAT-PRO	-1.6545	60
18	SCBPG	-1.6717	60
19	ONE-G	-1.6734	60
20	ONE-UB2	-1.6975	60
21	ONE-PRO	-1.7213	60
22	ONE-UB	-1.7430	60
23	SCBTS2	-1.7629	60
24	THOR	-1.7655	60
25	BKA	-1.7910	60
26	KPLUS	-1.8218	60
27	KPLUS2	-1.8694	60
28	SCBTS	-1.9578	60
29	SW2	-2.0003	60
30	RPF2	-2.0648	60
31	SCIF2	-2.0729	60
32	SCBMF	-2.0799	60
33	SSB	-2.1077	60
34	SAN	-2.1580	60
35	AGF	-2.2484	60
36	SF5	-2.3444	60
37	TNP	-2.3766	60
38	SCBMF2	-2.4199	60
39	SF4	-2.4391	60
40	STD2	-2.5351	60
41	SCBMF3	-2.5851	60
42	SCIF	-2.5852	60
43	STD	-2.6657	60
44	RRF1	-3.4931	60

1999-2000

rank	name	raw returns (mean monthly return)	n
1	KPLUS2	-0.4346	24
2	KPLUS	-0.5163	24
3	TNP	-0.9209	24
4	ONE+1	-1.0315	24
5	THANA1	-1.0987	24
6	ONE-PR	-1.0999	24
7	ONE-UB2	-1.1185	24
8	ONE-UB	-1.1253	24
9	SAN	-1.1387	24
10	THOR	-1.1511	24
11	ONE-PRO	-1.2398	24
12	ONE-FAS	-1.2615	24
13	ONE-D	-1.2709	24
14	ONE-G	-1.2844	24
15	ONE-WE	-1.3138	24
16	NPAT-PRO	-1.3206	24
17	ONE-UB3	-1.3336	24
18	RKF	-1.4691	24
19	AGF	-1.4894	24
20	RPF2	-1.4913	24
21	RKF-HI	-1.5186	24
22	RKF2	-1.5922	24
23	SW2	-1.5932	24
24	RKF3	-1.5957	24
25	THOR2	-1.6120	24
26	RRF1	-1.7131	24
27	SCIF2	-1.7215	24
28	PPSD	-1.7531	24
29	SCIF	-1.7603	24
30	SF4	-1.7755	24
31	USD2	-1.8746	24
32	USD	-1.9225	24
33	STD	-1.9636	24
34	STD2	-1.9943	24
35	BKA	-2.0513	24
36	SF5	-2.1023	24
37	SCBTS	-2.2581	24
38	SCBTS3	-2.3351	24
39	SSB	-2.3399	24
40	SCBTS2	-2.4512	24
41	SCBMF2	-2.5045	24
42	SCBMF3	-2.6034	24
43	SCBMF	-2.6062	24
44	SCBPG	-2.6891	24

1995-1998

rank	name	raw returns (mean monthly return)	n
1	THOR2	-1.2628	48
2	PPSD	-1.4566	48
3	ONE-D	-1.4804	48
4	TVF	-1.6348	48
5	RKEC	-1.6593	48
6	THOR 4	-1.6818	48
7	ONE-PF	-1.6844	48
8	USD2	-1.7072	48
9	RKF2	-1.7081	48
10	USD	-1.7696	48
11	OSA	-1.7722	48
12	BTP	-1.7805	48
13	RKF3	-1.7869	48
14	ONE-WE	-1.7921	48
15	THOR	-1.8339	48
16	ONE-PRO	-1.8502	48
17	ONE-G	-1.8574	48
18	CMICRK	-1.8719	48
19	NPAT-PRO	-1.8797	48
20	ONE-UB3	-1.8816	48
21	RKF	-1.8872	48
22	RKF4	-1.8900	48
23	ONE+1	-1.9007	48
24	ONE-UB4	-1.9088	48
25	ONE-PR	-1.9146	48

1999-2000

rank	name	raw returns (mean monthly return)	n
1	KKF	-0.2983	24
2	TDF	-0.4169	24
3	KPLUS2	-0.4346	24
4	KPLUS	-0.5163	24
5	TNP	-0.9209	24
6	ONE+1	-1.0315	24
7	THANA1	-1.0987	24
8	ONE-PR	-1.0999	24
9	ONE-UB2	-1.1185	24
10	ONE-UB	-1.1253	24
11	SAN	-1.1387	24
12	THOR	-1.1511	24
13	ONE-PRO	-1.2398	24
14	ONE-PF	-1.2598	24
15	ONE-FAS	-1.2615	24
16	ONE-D	-1.2709	24
17	ONE-UB4	-1.2788	24
18	ONE-G	-1.2844	24
19	ONE-WE	-1.3138	24
20	NPAT-PRO	-1.3206	24
21	ONE-UB3	-1.3336	24
22	TVF	-1.4384	24
23	THOR 4	-1.4613	24
24	RKF	-1.4691	24
25	AGF	-1.4894	24

Table D-5 (continued)

1995-1998

rank	name	raw returns (mean monthly return)	n
26	RKF-HI	-1.9194	48
27	THANA1	-1.9276	48
28	ONE-UB2	-1.9346	48
29	ONE-UB	-1.9568	48
30	ONE-FAS	-1.9756	48
31	KKF	-2.0044	48
32	SCBTS3	-2.0122	48
33	BKA	-2.1200	48
34	SCBTS2	-2.1569	48
35	BKA2	-2.1990	48
36	KPLUS	-2.2102	48
37	SCBPG	-2.2229	48
38	SAN	-2.2299	48
39	SW2	-2.2326	48
40	SSB	-2.2555	48
41	KPLUS2	-2.2588	48
42	RPF2	-2.2712	48
43	SCDF	-2.3012	48
44	BKD	-2.3117	48
45	SPF	-2.3724	48
46	SCBTS	-2.3839	48
47	TDF	-2.3934	48
48	SCBMF	-2.3938	48
49	SF5	-2.3952	48
50	SCBRT	-2.4437	48
51	TS	-2.4595	48
52	SF4	-2.5243	48
53	SCIF2	-2.5617	48
54	TNP	-2.5882	48
55	UNF	-2.6762	48
56	SCIF	-2.7089	48
57	AGF	-2.7091	48
58	DE-1	-2.7411	48
59	SF7	-2.7679	48
60	STD2	-2.7782	48
61	SCBMF2	-2.7815	48
62	STD	-2.8023	48
63	SCBMF4	-2.8379	48
64	SCBMF5	-2.8715	48
65	SCBMF3	-2.9555	48
66	SCBDA	-3.0863	48
67	RRF1	-3.4328	48

1999-2000

rank	name	raw returns (mean monthly return)	n
26	RPF2	-1.4913	24
27	RKF-HI	-1.5186	24
28	DE-1	-1.5222	24
29	CMICRK	-1.5275	24
30	SCBRT	-1.5677	24
31	RKF4	-1.5695	24
32	RKEC	-1.5733	24
33	RKF2	-1.5922	24
34	SW2	-1.5932	24
35	RKF3	-1.5957	24
36	THOR2	-1.6120	24
37	SCDF	-1.6934	24
38	RRF1	-1.7131	24
39	SCIF2	-1.7215	24
40	PPSD	-1.7531	24
41	SCIF	-1.7603	24
42	SF4	-1.7755	24
43	SPF	-1.7999	24
44	USD2	-1.8746	24
45	TS	-1.9142	24
46	USD	-1.9225	24
47	STD	-1.9636	24
48	STD2	-1.9943	24
49	BKA2	-1.9991	24
50	BKD	-2.0209	24
51	UNF	-2.0481	24
52	BKA	-2.0513	24
53	OSA	-2.0550	24
54	BTP	-2.0556	24
55	SF5	-2.1023	24
56	SF7	-2.1492	24
57	SCBTS	-2.2581	24
58	SCBTS3	-2.3351	24
59	SSB	-2.3399	24
60	SCBTS2	-2.4512	24
61	SCBMF2	-2.5045	24
62	SCBMF4	-2.5120	24
63	SCBDA	-2.5803	24
64	SCBMF3	-2.6034	24
65	SCBMF	-2.6062	24
66	SCBMF5	-2.6120	24
67	SCBPG	-2.6891	24

1996-1998

rank	name	raw returns (mean monthly return)	n
1	THOR2	-1.6510	36
2	ONE-D	-1.8030	36
3	PPSD	-1.8673	36
4	THOR 4	-2.1257	36
5	ONE-G	-2.1341	36
6	ONE-WE	-2.2233	36
7	USD2	-2.2329	36
8	SRT	-2.2923	36
9	RKF2	-2.3065	36
10	USD	-2.3279	36
11	ONE-PF	-2.3359	36
12	TVF	-2.3627	36
13	ONE-UB4	-2.3683	36
14	ONE-PRO	-2.3812	36
15	RKF3	-2.3903	36
16	ONE-PR	-2.4004	36
17	RKEC	-2.4044	36
18	NPAT-PRO	-2.4052	36
19	ONE+1	-2.4149	36
20	ONE-FAS	-2.4155	36
21	THOR	-2.4230	36
22	APF	-2.4516	36
23	THANA1	-2.4525	36
24	ONE-UB3	-2.4614	36
25	BTP	-2.4709	36
26	CMICRK	-2.4822	36
27	SCBTS3	-2.4968	36
28	OSA	-2.5196	36
29	RKF	-2.5261	36
30	RKF4	-2.5263	36
31	ONE-UB2	-2.5362	36
32	RKF-HI	-2.5453	36
33	SPT	-2.5670	36
34	KKF	-2.6266	36
35	ONE-UB	-2.6740	36
36	SCBTS2	-2.6851	36
37	SCBPG	-2.7391	36
38	BKD	-2.7432	36
39	KPLUS	-2.7979	36
40	KPLUS2	-2.8430	36
41	BKA	-2.8431	36
42	PISD	-2.8856	36
43	B-SUB	-2.9081	36
44	BKA2	-2.9239	36
45	SCBPMO	-2.9582	36
46	SCBTS	-2.9916	36
47	SW2	-3.0138	36
48	SSB	-3.0152	36
49	SCBMF	-3.0306	36
50	RPF2	-3.0479	36
51	SCDF	-3.0968	36
52	TDF	-3.1106	36
53	SPF	-3.1217	36
54	SAN	-3.1348	36
55	SF5	-3.1566	36
56	SCBRT	-3.2286	36

1999-2000

rank	name	raw returns (mean monthly return)	n
1	KKF	-0.2983	24
2	TDF	-0.4169	24
3	KPLUS2	-0.4346	24
4	APF	-0.4405	24
5	KPLUS	-0.5163	24
6	TNP	-0.9209	24
7	ONE+1	-1.0315	24
8	THANA1	-1.0987	24
9	ONE-PR	-1.0999	24
10	ONE-UB2	-1.1185	24
11	ONE-UB	-1.1253	24
12	SAN	-1.1387	24
13	THOR	-1.1511	24
14	ONE-PRO	-1.2398	24
15	ONE-PF	-1.2598	24
16	ONE-FAS	-1.2615	24
17	ONE-D	-1.2709	24
18	ONE-UB4	-1.2788	24
19	ONE-G	-1.2844	24
20	ONE-WE	-1.3138	24
21	NPAT-PRO	-1.3206	24
22	ONE-UB3	-1.3336	24
23	TVF	-1.4384	24
24	THOR 4	-1.4613	24
25	RKF	-1.4691	24
26	BMBF	-1.4749	24
27	AGF	-1.4894	24
28	RPF2	-1.4913	24
29	RKF-HI	-1.5186	24
30	DE-1	-1.5222	24
31	CMICRK	-1.5275	24
32	SCBRT	-1.5677	24
33	RKF4	-1.5695	24
34	RKEC	-1.5733	24
35	RKF2	-1.5922	24
36	SW2	-1.5932	24
37	RKF3	-1.5957	24
38	THOR2	-1.6120	24
39	SCDF	-1.6934	24
40	RRF1	-1.7131	24
41	SCIF2	-1.7215	24
42	PPSD	-1.7531	24
43	SCIF	-1.7603	24
44	SF4	-1.7755	24
45	SPF	-1.7999	24
46	USD2	-1.8746	24
47	TS	-1.9142	24
48	USD	-1.9225	24
49	SRT	-1.9263	24
50	STD	-1.9636	24
51	STD2	-1.9943	24
52	BKA2	-1.9991	24
53	SF8	-2.0081	24
54	BKD	-2.0209	24
55	UNF	-2.0481	24
56	BKA	-2.0513	24

Table D-5 (continued)

1996-1998

rank	name	raw returns (mean monthly return)	n
57	TS	-3.2562	36
58	SF4	-3.3389	36
59	TNP	-3.3452	36
60	SCIF2	-3.3996	36
61	UNF	-3.4027	36
62	DE-1	-3.5259	36
63	SCBMF2	-3.5343	36
64	AGF	-3.5429	36
65	SCIF	-3.5880	36
66	SCBMF4	-3.6101	36
67	STD	-3.6212	36
68	SCBMF5	-3.6318	36
69	SF8	-3.6438	36
70	STD2	-3.6610	36
71	SF7	-3.6749	36
72	BMBF	-3.7277	36
73	SCBMF3	-3.7491	36
74	SCBDA	-3.9262	36
75	RRF1	-3.9528	36

1999-2000

rank	name	raw returns (mean monthly return)	n
57	OSA	-2.0550	24
58	BTP	-2.0556	24
59	SF5	-2.1023	24
60	B-SUB	-2.1274	24
61	SF7	-2.1492	24
62	PISD	-2.1985	24
63	SCBPMO	-2.2524	24
64	SCBTS	-2.2581	24
65	SCBTS3	-2.3351	24
66	SSB	-2.3399	24
67	SPT	-2.3583	24
68	SCBTS2	-2.4512	24
69	SCBMF2	-2.5045	24
70	SCBMF4	-2.5120	24
71	SCBDA	-2.5803	24
72	SCBMF3	-2.6034	24
73	SCBMF	-2.6062	24
74	SCBMF5	-2.6120	24
75	SCBPG	-2.6891	24

1997-1998

rank	name	raw return (mean monthly return)	n
1	THOR2	-1.2846	24
2	ONE-D	-1.3785	24
3	PPSD	-1.5602	24
4	USD2	-1.8023	24
5	ONE-G	-1.8997	24
6	ONE-WE	-1.9028	24
7	THOR 4	-1.9163	24
8	USD	-1.9448	24
9	SRT	-1.9903	24
10	APF	-1.9909	24
11	ONE-UB4	-2.1717	24
12	ONE-UB3	-2.1749	24
13	RKF2	-2.1772	24
14	OSA	-2.1958	24
15	ONE-PF	-2.2035	24
16	ONE-PR	-2.2358	24
17	KKF	-2.2402	24
18	THANA1	-2.2437	24
19	SPT	-2.2711	24
20	ONE+1	-2.2767	24
21	ONE-PRO	-2.2813	24
22	TVF	-2.3034	24
23	ONE-UB2	-2.3224	24
24	RKF3	-2.3273	24
25	ONE-UB	-2.3308	24
26	NPAT-PRO	-2.3376	24
27	BCAP	-2.3426	24
28	ONE-FAS	-2.3689	24
29	CMICRK	-2.4057	24
30	RKEC	-2.4209	24
31	THOR	-2.4429	24
32	SCBTS3	-2.4685	24
33	RKF4	-2.5067	24
34	SCBTS2	-2.5153	24
35	RKF-HI	-2.5194	24
36	RKF	-2.5312	24
37	KPLUS	-2.5340	24
38	KPLUS2	-2.5972	24
39	SCBTS	-2.6049	24
40	RKEDC	-2.6273	24
41	PISD	-2.6596	24
42	SCBPG	-2.7240	24
43	SCBMF	-2.7556	24
44	BKD	-2.7573	24
45	SCDF	-2.7938	24
46	SF5	-2.7991	24
47	SCBRT	-2.7995	24
48	BTP	-2.8708	24
49	BKA	-2.9170	24
50	SSB	-2.9171	24
51	B-SUB	-2.9272	24
52	SW2	-2.9778	24
53	SF4	-2.9906	24
54	BKA2	-3.0107	24
55	TDF	-3.0128	24
56	SAN	-3.0371	24
57	SCBPMO	-3.0613	24
58	TS	-3.0626	24
59	SPF	-3.1037	24
60	RPF2	-3.1277	24
61	TNP	-3.2324	24
62	UNF	-3.2608	24
63	SCIF2	-3.3079	24
64	DE-1	-3.3171	24
65	AGF	-3.4225	24
66	STD2	-3.4995	24
67	SCIF	-3.5007	24
68	STD	-3.5389	24
69	SCBMF2	-3.5558	24
70	BMBF	-3.6097	24
71	SF7	-3.6112	24
72	SF8	-3.6119	24
73	SCBMF3	-3.7596	24
74	RRF1	-3.8172	24
75	SCBDA	-3.8464	24
76	SCBMF5	-4.1638	24
77	SCBMF4	-4.2057	24

1999-2000

rank	name	raw return (mean monthly return)	n
1	KKF	-0.2983	24
2	TDF	-0.4169	24
3	KPLUS2	-0.4346	24
4	APF	-0.4405	24
5	KPLUS	-0.5163	24
6	TNP	-0.9209	24
7	ONE+1	-1.0315	24
8	THANA1	-1.0987	24
9	ONE-PR	-1.0999	24
10	ONE-UB2	-1.1185	24
11	ONE-UB	-1.1253	24
12	SAN	-1.1387	24
13	THOR	-1.1511	24
14	ONE-PRO	-1.2398	24
15	ONE-PF	-1.2598	24
16	ONE-FAS	-1.2615	24
17	ONE-D	-1.2709	24
18	ONE-UB4	-1.2788	24
19	ONE-G	-1.2844	24
20	ONE-WE	-1.3138	24
21	NPAT-PRO	-1.3206	24
22	ONE-UB3	-1.3336	24
23	TVF	-1.4384	24
24	THOR 4	-1.4613	24
25	RKF	-1.4691	24
26	BMBF	-1.4749	24
27	AGF	-1.4894	24
28	RPF2	-1.4913	24
29	RKF-HI	-1.5186	24
30	DE-1	-1.5222	24
31	CMICRK	-1.5275	24
32	SCBRT	-1.5677	24
33	RKF4	-1.5695	24
34	RKEC	-1.5733	24
35	RKF2	-1.5922	24
36	SW2	-1.5932	24
37	RKF3	-1.5957	24
38	THOR2	-1.6120	24
39	BCAP	-1.6731	24
40	SCDF	-1.6934	24
41	RKEDC	-1.7107	24
42	RRF1	-1.7131	24
43	SCIF2	-1.7215	24
44	PPSD	-1.7531	24
45	SCIF	-1.7603	24
46	SF4	-1.7755	24
47	SPF	-1.7999	24
48	USD2	-1.8746	24
49	TS	-1.9142	24
50	USD	-1.9225	24
51	SRT	-1.9263	24
52	STD	-1.9636	24
53	STD2	-1.9943	24
54	BKA2	-1.9991	24
55	SF8	-2.0081	24
56	BKD	-2.0209	24
57	UNF	-2.0481	24
58	BKA	-2.0513	24
59	OSA	-2.0550	24
60	BTP	-2.0556	24
61	SF5	-2.1023	24
62	B-SUB	-2.1274	24
63	SF7	-2.1492	24
64	PISD	-2.1985	24
65	SCBPMO	-2.2524	24
66	SCBTS	-2.2581	24
67	SCBTS3	-2.3351	24
68	SSB	-2.3399	24
69	SPT	-2.3583	24
70	SCBTS2	-2.4512	24
71	SCBMF2	-2.5045	24
72	SCBMF4	-2.5120	24
73	SCBDA	-2.5803	24
74	SCBMF3	-2.6034	24
75	SCBMF	-2.6062	24
76	SCBMF5	-2.6120	24
77	SCBPG	-2.6891	24

Appendix E Monthly return on market portfolio (*Rmt*), risk free rate (*Rft*) and funds (*Rpt*)

Date	Rm	Rf	AGF	AJFSCAP	APF	BCAP	BKA	BKA2	BKD	BMBF	BMF*	B-SUB	BTP	CMICRK	DE-1	INGTEF	KKF	KPLUS
31-Jan-92	8.3060	0.8355																
28-Feb-92	2.5093	0.7974																
27-Mar-92	5.6289	0.7207																
24-Apr-92	-4.1140	0.6821																
29-May-92	-14.3081	0.6821																
26-Jun-92	9.1762	0.7207																
31-Jul-92	-1.4165	0.7592																
28-Aug-92	1.1805	0.7592																
25-Sep-92	13.1556	0.7592																
30-Oct-92	9.0285	0.7592																
27-Nov-92	-7.8345	0.7400									16.9743							
30-Dec-92	2.7150	0.6821									-1.2739							
29-Jan-93	8.6847	0.6821									10.7666							
26-Feb-93	-3.8527	0.6821									-1.7809							
26-Mar-93	-7.7830	0.6821									-7.2886							
30-Apr-93	-2.5867	0.6821									3.1017							
28-May-93	-1.1015	0.6821									-1.7606							
25-Jun-93	6.9901	0.6821									3.9187							
30-Jul-93	3.4682	0.6821									2.3630							
27-Aug-93	3.6318	0.6821									3.6844							
24-Sep-93	1.7559	0.6821									4.1722							
29-Oct-93	25.2465	0.6240									24.1761							
26-Nov-93	3.7865	0.6240									0.0000							
30-Dec-93	25.0790	0.5654					31.5723				27.7752							
28-Jan-94	-11.0136	0.5262	6.3913				-10.6167				-12.6994							-4.3952
24-Feb-94	-6.0020	0.5262	-5.3963				-9.8802				-7.4064							-4.3787
25-Mar-94	-10.3418	0.5752	-9.0076				-3.3117	-2.2573			-6.2363			0.3992				-3.8959
29-Apr-94	-1.0523	0.5850	0.5402				2.4658	2.3992			4.0585			1.4830				1.2409
27-May-94	8.8030	0.5947	7.7719				8.0102	7.7947			5.8617			7.6488				5.4539
24-Jun-94	-6.7812	0.6337	-7.1274				-7.4547	-7.5314			-6.4315			-5.9943				-2.7989
29-Jul-94	6.3211	0.6725	7.2271				8.4703	8.7725	2.6311		7.0325			8.4192			2.3717	4.8998
26-Aug-94	5.2261	0.6725	5.8043				7.2355	6.8879	6.4927		11.1996			8.2565	0.0000		5.4170	4.5716
30-Sep-94	2.3812	0.6725	1.1215				2.7120	2.7566	2.3937		-2.7163			4.1606	0.3992		2.0147	1.5764
28-Oct-94	1.3644	0.6821	-0.4658				4.1132	4.0221	3.9809		5.1058		6.6434	4.7446	3.7150		2.3299	1.6692
25-Nov-94	-10.9884	0.7400	-12.4328				-9.1249	-8.8436	-8.8832		-8.8695		-7.5444	-9.9729	-10.3017		-9.2745	-9.0647
30-Dec-94	0.7898	0.7400	0.7067				1.6847	1.7374	1.6118		1.1096		2.4785	-0.0868	3.1416		1.3314	1.9008
27-Jan-95	-11.2988	0.7496	-11.9545				-10.1335	-10.2570	-10.3607		-10.2300		-7.7799	-11.4858	-12.5026		-10.1469	-10.8134
24-Feb-95	6.3322	0.7879	7.0227				6.6121	6.6416	6.5123		5.7158		6.4082	6.2284	6.4466		6.3729	5.6640
31-Mar-95	-6.1759	0.9112	-6.4950		1.4218		-4.8054	-4.7065	-13.2454		-5.8791	2.3424	-5.0923	-4.6825	-7.5035		-4.7677	-4.5053
28-Apr-95	-0.6589	0.8829	-0.2635		2.0492		1.4767	1.3722	1.4019	0.1000	2.4777	1.4960	2.4060	1.5224	0.5886		0.7404	0.0000
26-May-95	13.9702	0.8829	17.0600		8.2655		11.2001	11.0017	11.3013	1.8803	11.3178	11.0769	10.8392	11.7468	14.8096		11.6053	10.1822
30-Jun-95	0.3491	0.8829	1.4357		-0.9507		0.0532	-0.0993	0.0029	0.8785	-0.2263	-0.4412	-0.7321	0.4466	-0.2026		-0.4937	0.1100
28-Jul-95	0.1626	0.8829	0.6557		-0.9846		-1.2998	-1.3386	-1.3876	-0.7805	-1.9833	-1.4134	-1.5501	-1.4363	-0.3047		-0.8379	-1.4389
25-Aug-95	-3.4748	0.8829	-2.6492		-2.5304		-1.5690	-1.5932	-1.6093	-2.2785	-1.0066	-1.4523	-1.0073	-1.9170	-1.5377		-2.3819	-2.3690
29-Sep-95	-4.1692	0.8450	-5.5186		-2.2686		-2.1408	-2.2718	-5.7121	-3.0521	-2.5642	-2.3660	-2.4665	-2.1426	-3.1482		-2.3390	-2.5435
27-Oct-95	-1.7789	0.8450	-1.7890		-0.1343		0.0559	0.0822	-0.1418	-0.5179	-0.1733	-0.1241	0.5984	0.1881	-1.5038		-0.2468	-0.3519
24-Nov-95	-4.2678	0.8450	-5.6089		-3.5492		-2.7641	-2.9947	-2.9502	-4.8946	-3.2616	-3.0973	-2.3251	-3.4420	-4.6520		-3.6251	-3.5889
29-Dec-95	5.0044	0.8450	5.6089		4.3353		3.9057	3.8691	3.9836	4.9984	4.2111	4.0539	4.1932	4.4806	4.8682		4.4642	4.2915
26-Jan-96	7.3249	0.8450	9.0576		7.9783		6.6546	6.4603	6.4522	7.4923	6.7273	6.2134	8.4860	8.0417	6.7840		8.3793	7.6356
23-Feb-96	-2.6164	0.8260	-3.0105		-2.7405		-3.2727	-3.4329	-3.2058	-2.8308	-3.5149	-3.0979	-3.0293	-2.2718	-2.8661		-2.8514	-2.4071
29-Mar-96	-4.0145	0.8070	-4.2453		-3.5650		-1.5455	-1.5677	-1.4837	-3.7322	-0.9594	-1.5643	-0.6456	-2.1366	-3.8100		-3.4321	-3.4933
26-Apr-96	0.5821	0.8070	1.0152		1.5391		1.4311	1.4196	1.1699	0.5126	1.1329	1.1683	1.3301	1.2133	1.7878		1.3262	1.2536
30-May-96	1.1230	0.7783	-1.1429		0.7760		-0.4982	-0.4464	-0.4152	-0.8214	0.2596	-0.8749	-0.2865	3.1053	0.3317		0.6541	0.7896
28-Jun-96	-5.0679	0.7592	-6.8719		-5.7236		-3.4100	-3.4102	-3.4679	-6.4951	-4.5983	-3.5369	-2.9007	-4.6564	-6.8520		-5.6795	-5.5441
26-Jul-96	-11.6238	0.7304	-10.6729		-12.0433		-10.8190	-10.8437	-10.6632	-16.7254	-10.5863	-10.5571	-3.9882	-11.0997	-12.0446		-12.3300	-11.5707
30-Aug-96	-0.7150	0.7304	0.0000		-0.0323		-1.6155	-1.7002	-1.6248	3.4508	-1.1128	-1.8192	-0.7623	-0.6543	-2.0203		-0.0882	-0.5348
27-Sep-96	-5.0581	0.7304	-5.3137		-5.1543		-2.9658	-2.8830	-3.0306	-5.4658	-3.7822	-3.3236	-3.1025	-4.1324	-5.0220		-5.3972	-5.2282
25-Oct-96	-11.0521	0.7304	-13.1928		-11.2165		-8.8210	-8.8536	-8.8215	-13.1928	-9.2231	-9.0429	-7.1399	-9.3146	-11.9931		-11.4765	-10.7246
29-Nov-96	-1.3228	0.7304	-1.1050		-0.5516		1.5468	1.4706	1.3971	0.6390	1.3198	1.1080	1.8285	-0.5019	-1.4623		-0.5042	-0.6309
27-Dec-96	-10.2560	0.7111	-9.9207		-9.7422	0.5624	-9.0292	-9.2144	-8.8870	-10.3946	-9.4953	-9.1130	-7.8448	-9.2170	-10.1549		-9.3932	-9.4519
31-Jan-97	-5.8733	0.7111	-7.0440		-4.4817	1.1754	-4.1334	-4.7288	-4.2247	-6.0073	-5.1086	-4.1506	-3.3344	-4.5142	-6.9381		-4.3707	-4.0822
28-Feb-97	-7.9852	0.7111	-9.0252		-6.8252	1.0412	-7.7179	-7.9697	-7.7244	-9.2313	-4.6586	-7.8803	-8.2614	-8.4260	-8.0852		-6.9026	-6.5505
28-Mar-97	-2.5714	0.7111	-2.5268		0.0829	1.0209	-0.0944	-0.0474	-0.0650	-2.5001	-2.9328	0.0970	0.2228	-0.9464	-0.8457		0.2200	0.1932
25-Apr-97	-3.6025	0.6918	0.0296		-0.8827	0.6994	2.5533	2.6811	2.7335	-1.9170	2.6433	2.8360	4.0657	-0.9554	-0.6390		-0.9314	-0.9699
30-May-97	-18.8675	0.6725	-17.4288		-15.4014	-14.4029	-18.3854	-18.1721	-17.7506	-15.3076	-17.3663	-18.3648	-18.5880	-13.6966	-16.4532		-15.0386	-22.6561
27-Jun-97	-6.9903	0.6725	-4.6986		-3.6871	-17.1579	-9.8735	-10.5346	-7.9086	-5.1425	-11.8861	-8.0608	-8.8852	-4.5036	-5.7010		-3.1617	-5.0136
25-Jul-97	20.2317	0.8545	19.9620	0.2417	18.2531	19.0164	18.4886	18.4564	17.9609	18.0561	14.7750	18.1148	18.5497	14.4507	18.4541		18.7389	16.3290
29-Aug-97	-25.2639	0.8545	-23.5555	-1.8770	-22.6382	-18.8671	-18.8106	-19.2323	-18.4774	-20.1895	-6.2196	-18.6698	-19.7494	-21.1993	-20.8834		-22.0341	-23.5225
26-Sep-97	10.5265	0.8545	12.9199	3.7145	13.1973	9.2194	8.8153	8.9544	9.1684	10.7246	-0.1784	8.7257	9.1550	11.4355	12.5645		12.8190	12.6949
31-Oct-97	-22.1295	0.8545	-17.9683	-1.9653	-12.9185	-22.7513	-21.8544	-22.3528	-20.3485	-19.1565	-12.7428	-22.6765	-20.3312	-12.8833	-20.5233		-12.4732	-11.0510
28-Nov-97	-12.2953	0.8545	-11.5358	0.7206	-6.6021	-12.3124	-11.5708	-11.7239	-12.2251	-10.5035	-5.4180	-13.6563	-9.8172	-6.2319	-10.6018		-8.1519	-7.6200
26-Dec-97	-10.1975	0.9112	-4.5053	1.4394	-4.2294	-10.4920	-12.8702	-12.9123	-13.5224	-8.1401	-3.4862	-12.9846	-13.1214	-4.0730	-6.1036		-4.5247	-4.8057
30-Jan-98	32.6922	0.8545	25.4329	8.4580	27.5877	32.0046	27.2261	27.5523	29.4710	25.4450	5.8143	27.6088	27.0221	24.6427	27.0934		26.2300	27.0614
27-Feb-98	6.4869	0.8829	2.3296	6.5305	-1.8221	8.0154	8.7119	9.0508	8.3811	1.6305	1.0406	9.9801	6.6004	-2.9306	3.6653		-1.6359	-1.8958
27-Mar-98	-11.7478	0.8829	-10.0474	-3.1455	-9.8762	-9.6691	-9.5433	-9.7609	-9.9654	-10.2072	0.8247	-9.4025	-9.8922	-10.5774	-9.7111		-10.3726	-9.0061
24-Apr-98	-10.0819	0.8829	-7.9242	-7.0062	-7.0962	-5.0514	-4.4070	-4.3229	-4.4144	-6.4738	0.8180	-4.2974	-4.1288	-4.2200	-8.2643		-8.0935	-6.2098
29-May-98	-26.5956	0.8829	-29.7427	-16.8894	-18.0375	-26.7499	-26.4758	-26.6478	-26.6985	-24.0005	1.0132	-27.3359	-25.6735	-16.6075	-29.9028		-19.7068	-16.6295
26-Jun-98	-20.5985	0.8545	-19.3793	-16.8353	-8.7369	-17.8502	-18.2364	-18.2991	-18.5132	-17.1850	1.0030	-19.8088	-16.9344	-11.0178	-23.2524		-9.4190	-6.8053
31-Jul-98	0.6545	0.8924	6.0426	7.2677	2.5811	5.6283	4.6326	4.7770	4.5110	0.9569	-	4.7039	3.9357	3.0772	4.0311		2.6200	2.4349
28-Aug-98	-19.7813	0.8355	-17.2855	-9.9161	-12.5646	-15.4510	-14.5522	-14.5166	-14.2873	-14.8610	-	-14.8324	-14.2395	-12.2962	-19.9555		-14.0233	-7.8612
25-Sep-98	-1.9145	0.6240	13.4786	13.9110	11.1823	14.7146	14.2897	14.4517	14.2060	10.9771	-	14.7325	13.3229	16.3453	14.2692		11.1083	4.3643
30-Oct-98	43.3752	0.5850	15.1118	7.4231	14.7073	17.7862	18.5820	18.2244	18.1827	12.5454	-	18.9059	17.5363	7.3919	21.4596		14.4041	9.8218
27-Nov-98	11.8826	0.5163	7.5915	6.0615	4.9783	3.7994	4.4645	4.2098	4.6267	5.9339	-	6.4035	3.8576	1.9465	7.4414		5.5434	5.3388
25-Dec-98	-4.6440	0.4868	-2.3709	-0.8042	-4.5526	0.4109	0.7525	0.6058	0.7093	-2.0791	-	0.4596	-0.2103	-1.9465	-0.8000		-4.6079	-4.3757
29-Jan-99	1.9023	0.4670	2.1754	0.0215	0.4110	-3.9994	-3.5435	-3.4493	-3.4676	1.4060	-	-3.6434	-4.0392	0.0491	2.1416		32.4876	-2.4614
26-Feb-99	-6.2696	0.4174	-7.2297	-7.2155	-6.6014	-5.0139	-5.0374	-5.1065	-5.1178	-6.0720	-	-5.4373	-5.7921	-6.0539	-5.5483		-6.5534	-7.0997
26-Mar-99	7.3410	0.4074	7.0885	6.2816	5.6311	4.4238	4.2732	4.3693	4.2842	5.5736	-	4.1602	4.0203	7.7969	7.2709		5.5769	6.1191
30-Apr-99	22.4696	0.4074	15.9247	21.9176	24.9732	13.6666	14.0849	14.1001	13.9220	16.4383	-	13.5738	12.6407	15.3675	18.8478		25.0115	25.6873
28-May-99	-1.2597	0.4074	-0.3542	2.1089	6.7997	-0.4920	-0.8617	-0.9853	-1.0406	-1.9512	-	-1.2408	-0.6243	1.4506	-3.2392	-0.1256	6.8302	7.3216
25-Jun-99	18.1458	0.4074	15.5603	28.8361	22.8118	4.9070	4.9064	4.9265	4.9568	12.0465	-	4.6180	3.9816	9.7376	11.9849	8.4926	23.0953	22.8587
30-Jul-99	-17.4406	0.4074	-10.8834	-11.2932	-12.7103	-10.2478	-10.5712	-10.8465	-10.7002	-11.6798	-	-10.9722	-10.4326	-11.3227	-14.3563	-14.8625	-12.7167	-12.6939
27-Aug-99	0.1597	0.3974	-3.2792	1.3176	-0.0863	0.6482	0.4044	0.4611	0.4606	-1.6939	-	0.1681	-0.3578	1.5974	-2.5887	-1.4218	-28.4087	0.2424
24-Sep-99	-18.0418	0.3775	-21.2882	-20.2874	-16.2438	-18.7173	-17.8060	-17.9925	-17.9019	-21.3788	-	-17.6471	-17.8219	-16.8182	-19.6926	-18.8889	-17.1836	-17.2051
29-Oct-99	3.4830	0.3575	5.7539	6.8665	2.9864	5.0390	4.8108	4.8079	4.8125	6.0045	-	4.7368	4.8170	5.3421	6.0717	4.3943	2.7780	2.8193
26-Nov-99	4.1498	0.3575	1.0321	5.4736	-0.9810	-0.3894	-0.2512	-0.1652	-0.2591	2.2894	-	-0.3916	0.2145	1.5345	2.4573	-0.1615	-0.8526	-0.8008
30-Dec-99	15.6003	0.3374	10.2850	19.1874	16.5011	8.4665	8.2755	8.4461	8.3494	14.6424	-	7.8185	8.1818	10.0718	17.0124	10.6962	17.2614	17.3209
28-Jan-00	-0.9319	0.3173	-6.1149	-0.6282	-2.3710	3.4795	3.3350	3.4081	3.4025	-4.5212	-	3.2162	2.7977	-0.7765	-6.8822	-3.2155	-2.5278	-2.5046
25-Feb-00	-16.0482	0.3173	-15.7753	-16.3437	-13.4973	-20.2892	-20.5431	-20.1688	-20.3360	-17.1350	-	-20.6239	-21.2798	-15.9375	-18.1992	-17.1567	-13.4903	-13.4820
31-Mar-00	-1.5713	0.3173	0.0749	-2.3094	-4.0473	0.1049	0.1952	0.4965	0.3863	0.2941	-	0.5551	0.5789	-3.4182	0.4369	-1.8195	-4.0842	-4.0542
28-Apr-00	-2.6015	0.3173	-1.3914	-4.0053	-1.3371	2.0963	1.9184	1.9788	1.9425	-1.4161	-	1.9126	1.0123	-1.0599	-0.8250	-3.1926	-1.3620	-1.3451
26-May-00	-21.9791	0.3173	-17.9110	-24.5386	-19.8247	-20.9116	-21.0520	-21.0355	-21.0360	-18.6292	-	-21.0036	-18.7600	-21.4577	-17.7044	-21.5973	-19.8114	-19.8754
30-Jun-00	3.9487	0.3173	4.7325	4.6474	3.6006	3.0395	5.4997	5.5548	5.5683	6.2800	-	5.5276	4.3899	4.1518	5.6160	6.5269	3.5635	3.5714
28-Jul-00	-11.0563	0.3073	-8.4491	-7.2234	-6.0509	-5.6532	-8.4857	-8.4505	-8.4293	-10.2397	-	-8.2758	-5.5490	-10.7545	-11.3844	-9.0129	-6.0823	-6.1043
25-Aug-00	5.0943	0.3073	4.9373	5.4047	4.6458	5.3205	5.2557	5.2608	5.2312	5.8609	-	5.1938	2.7924	3.9295	3.7915	3.2539	4.6042	4.6622
29-Sep-00	-10.1263	0.2871	-10.2900	-12.2219	-10.5717	-11.1611	-11.1588	-11.1307	-11.1137	-10.8721	-	-11.1080	-11.3630	-9.9387	-11.2516	-12.7269	-10.6212	-10.6495
27-Oct-00	-1.0696	0.2871	-0.2786	-0.7607	-3.6545	8.6442	1.3423	1.0166	1.0267	0.0357	-	0.9445	4.1491	0.6826	0.6143	-0.0305	-3.6552	-3.7211
24-Nov-00	3.9594	0.2871	3.9979	5.7363	2.8003	2.5308	1.8750	2.3252	2.3311	3.9120	-	2.4163	1.9034	3.7309	3.6030	4.5865	2.7752	2.8152
29-Dec-00	-3.8544	0.2871	-4.0644	-6.4349	-3.7570	-5.6461	-6.0968	-5.7984	-5.7741	-4.5921	-	-5.5555	-4.7942	-4.5638	-4.7080	-3.8660	-3.7934	-3.8131
average	-0.8883	0.6560	-2.0316	-0.1937	-1.3311	-1.9554	-1.4720	-1.6804	-1.9389	-2.5110	-0.0392	-2.0811	-1.7762	-1.3104	-2.2227	-3.6063	-1.2713	-1.4488

* Funds terminated before December 2000

Appendix E (continued)

Date	KPLUS82	N SAFETY*	NPAT-PRO	NSG	ONE+1	ONE-D	ONE-FAS	ONE-FF*	ONE-G	ONE-PF	ONE-PR	ONE-PRO	ONE-UB	ONE-UB2	ONE-UB3	ONE-UB4	ONE-UBS*	ONEUB-G*
31-Jan-92																		
28-Feb-92																		
27-Mar-92																		
24-Apr-92																		
29-May-92																		
26-Jun-92																		
31-Jul-92						0.0000			0.0000									
28-Aug-92						2.1761			1.6857									
25-Sep-92						10.1341			10.8012									
30-Oct-92						8.4725			8.8628									
27-Nov-92						-1.8033		0.3992	-2.4531									
30-Dec-92						2.8538		1.4830	2.7757									
29-Jan-93						11.4562		4.6029	11.7604									
26-Feb-93						-0.4310		0.1873	-0.2867									
26-Mar-93						-5.8557		-2.9428	-5.9145									
30-Apr-93						2.3207		1.2446	2.1846									
28-May-93						-0.8532		0.1901	-0.8230									
25-Jun-93						1.8676		2.7168	1.7871									
30-Jul-93						2.4098		3.0537	2.4062									
27-Aug-93						2.1122		2.0466	2.4903									
24-Sep-93						1.9897		2.0957	2.0863									
29-Oct-93						21.6754		20.4026	21.1932			4.4017	5.3541					
26-Nov-93						3.8798		2.4693	3.8235			3.3870	4.2678	0.1998				
30-Dec-93			19.3921		8.2501	24.7785		20.6069	25.4169			32.3571	29.2439	28.0923	8.6178			
28-Jan-94	-4.9190		-8.1485		-6.6628	-8.8513	-7.4724	-7.3750	-8.9963		2.4693	-9.8394	-8.1173	-7.1040	-7.8210			
24-Feb-94	-4.9526		-3.2700		-6.6115	-4.4233	-5.3110	-4.5363	-4.9882		-1.9705	-3.6094	-2.5318	-1.7136	-6.5597			
25-Mar-94	-3.9397		-9.3834		-8.2148	4.7833	-5.8496	-6.6537	-6.4156		-4.3728	-9.8915	-9.0720	-8.8584	-7.9337	-0.1001		
29-Apr-94	1.3683		-0.6104		0.0000	-13.7181	-0.4831	0.8762	-0.9731		-0.3123	-1.8296	-3.0231	-2.8025	0.7995	-0.4012		
27-May-94	5.9358		8.5990		8.7392	7.9154	9.2445	6.6717	7.8180		8.6838	7.2162	7.9890	6.6182	7.8729	8.9354		
24-Jun-94	-3.1439		-5.5837		-1.6878	-5.5570	-4.6310	-2.9359	-5.4781		-5.7046	-4.9667	-5.1582	-4.5348	-4.8475	-5.0906		
29-Jul-94	4.9419		6.6084		7.2815	6.4773	6.8145	5.0473	6.0477		7.0341	6.3138	6.5200	6.5826	6.6193	6.1875		
26-Aug-94	5.3074		7.5828		8.8000	6.9416	7.2873	6.1252	7.0349		7.7136	7.3917	7.3012	7.6174	8.1313	7.3588		
30-Sep-94	1.4800		1.4499		0.1810	1.3064	1.6924	2.5896	0.8346		1.0426	1.5619	1.3322	1.0676	1.4185	1.0920	-0.1001	
28-Oct-94	1.7700		3.4127		3.2031	2.6823	3.3013	2.1394	3.3128		3.3152	2.8941	3.2550	3.3075	3.6871	3.3679	4.3102	
25-Nov-94	-9.3947		-10.5179		-10.3222	-10.7907	-9.9330	-2.7427	-10.6160		-10.2948	-9.9041	-10.1897	-10.2700	-10.1847	-10.2851	-9.2342	
30-Dec-94	1.8038		0.8172		1.2359	1.0305	1.2579	0.5687	1.1696		1.3059	0.1916	1.0441	1.1006	1.0278	1.0552	0.8377	
27-Jan-95	-11.3455	0.5793	-8.7204		-9.6642	-10.1163	-9.4998	-2.8386	-10.0720	0.0000	-9.9611	-7.1686	-10.0233	-10.0398	-10.1053	-10.2396	-9.0525	
24-Feb-95	5.8336	2.6045	4.6954		6.8617	6.6255	5.1351	4.8874	6.8581	0.8504	6.8184	4.2745	6.8575	6.8039	6.8842	6.6453	7.1577	
31-Mar-95	-4.6626	-1.0203	-4.4792		-5.7406	-5.7567	-6.0557	-2.5368	-5.5803	-0.2353	-5.9402	-3.6279	-5.5097	-5.6010	-5.4243	-5.2804	-5.1237	
28-Apr-95	-0.2466	1.2574	-0.1042		-0.1115	0.0000	0.2217	0.6768	0.2536	1.5190	-0.4381	-0.4135	0.1029	0.0000	0.2227	0.1042	0.5577	
26-May-95	10.5361	7.7584	8.3108		9.4458	8.9898	5.7904	5.8625	9.1434	5.3971	8.9536	6.8503	9.7926	9.9747	9.4045	8.5489	9.6038	
30-Jun-95	0.0000	0.0983	-0.3311		-0.6490	-0.6057	-0.3686	0.4359	-0.7611	0.0297	-0.4537	0.1990	-0.3336	-0.2246	-0.4373	-0.8432	-0.5035	
28-Jul-95	-1.5678	0.6380	-1.1014		-0.8406	-0.8679	-0.8923	-0.9309	-7.2239	-0.4041	-0.5226	-0.6663	5.6549	1.8173	1.9786	-0.3846	-0.7933	
25-Aug-95	-2.3987	-1.9105	-1.8374		-1.9767	-2.2340	-1.9470	-1.6961	-2.3817	-2.2034	-1.8804	-1.9256	-2.2601	-2.1734	-2.2178	-2.4769	-2.1188	0.1349
29-Sep-95	-2.5763	-2.6692	-2.0589		-2.7941	-3.1375	-2.5721	-2.9655	-3.2311	-2.6805	-2.9631	-2.5081	-2.9501	-2.9223	-3.0567	-3.0638	-2.9057	0.2752
27-Oct-95	-0.3565	0.5256	0.5002		0.3453	0.0586	0.5762	0.0804	0.0371	0.1180	-0.2876	0.2993	0.4481	0.3457	0.3569	-0.0630	0.3009	-0.1555
24-Nov-95	-3.6368	-3.3559	-3.2010		-4.2251	-4.7571	-3.4059	-3.6833	-4.8102	-4.1240	-4.1387	-3.4121	-4.2832	-4.2619	-4.3353	-4.0280	-4.3540	-2.6583
29-Dec-95	4.3485	5.2309	4.6858		5.0512	5.6510	5.1441	4.7852	5.4383	4.9723	5.3265	5.0148	4.8380	4.7209	5.0239	4.7186	5.0172	4.3202
26-Jan-96	7.5121	7.4964	8.3195		8.6539	9.0921	8.5859	8.9256	9.0198	9.2046	8.4663	8.8128	8.6731	8.6404	8.7119	8.1469	8.9771	7.6518
23-Feb-96	-2.4419	-2.8686	-3.2470		-3.1253	-3.2952	-2.8004	-3.1945	-3.2295	-3.2221	-2.7399	-2.9604	-3.1287	-3.0831	-3.2155	-2.7874	-3.4705	-2.5821
29-Mar-96	-3.4289	-2.7048	-2.2125		-2.7781	-3.0022	-2.4943	-2.5099	-2.8201	-3.1141	-3.0734	4.4582	-2.7770	-2.7755	-3.0813	-3.2444	-2.7828	-2.5367
26-Apr-96	1.2710	1.7139	2.0489		1.8028	1.9155	1.8176	1.6421	1.7919	1.8858	2.0527	1.8496	1.8379	1.8058	1.7327	1.5801	1.8196	1.6985
30-May-96	0.6865	3.2282	2.0028		2.1912	2.3583	1.8872	2.1320	2.3305	2.1293	2.1001	-5.7231	-4.7932	-0.6283	-0.9300	2.4715	1.9471	3.3157
28-Jun-96	-5.5081	-4.3016	-4.4102		-4.4316	-4.5334	-4.3547	-4.3394	-4.3372	-4.3965	-4.4614	-4.6427	-4.6480	-4.4393	-4.6214	-4.5780	-4.2931	-3.8824
26-Jul-96	-11.6128	-10.3995	-10.5068		-11.2309	-11.1096	-10.6122	-10.7058	-10.8853	-10.5712	-11.1080	-10.6616	-11.4607	-11.2873	-11.0958	-11.0555	-10.8687	-11.1093
30-Aug-96	-0.4068	0.5042	0.9419		0.2910	0.0413	0.9813	0.9485	0.2024	0.6611	0.3898	0.6749	0.3714	0.4871	0.3687	0.4936	0.7621	0.4913
27-Sep-96	-5.1579	-4.2741	-4.4925		-4.5218	-4.5302	-4.2036	-3.9488	-4.5294	-4.4606	-4.5481	-4.1361	-4.6360	-4.5556	-4.8548	-4.5575	-4.6749	-3.3939
25-Oct-96	-10.7111	-8.9360	-9.0496		-9.3428	-9.0416	-9.2178	-8.5412	-8.9072	-9.1494	-9.5433	-9.1313	-9.5432	-9.3239	-9.3152	-9.5433	-9.6053	-8.1217
29-Nov-96	-0.6390	-0.9500	-0.7313		-0.5533	-0.3844	-0.5447	-0.6511	-0.3916	-0.7990	-0.6162	-0.4111	-0.8056	-0.9415	-0.5594	-0.6789	-0.6835	-0.6678
27-Dec-96	-9.5791	-10.1150	-9.1479		-9.2514	-9.3352	-9.1474	-8.8038	-9.4785	-9.3747	-9.6735	-9.1024	-9.4135	-9.4637	-9.5514	-9.3847	-9.5442	-10.0146
31-Jan-97	-4.1410	-5.5071	-5.1038		-5.3916	-4.8008	-5.3471	-5.0916	-4.7866	-5.5218	-5.5047	-5.4657	-5.5721	-5.4929	-5.4331	-5.8419	-5.2753	-4.4572
28-Feb-97	-6.4539	-8.4423	-8.3166		-8.3428	-7.4111	-8.4539	-8.6174	-7.6576	-7.4557	-8.7624	-7.7512	-8.5803	-8.4208	-8.3856	-8.6739	-8.7840	-8.0206
28-Mar-97	0.1959	-0.2438	-0.4034		-0.5313	-0.1968	-0.3924	0.1309	-0.0882	-0.3360	-0.6560	-0.5394	-0.6889	-0.7802	-0.8210	-0.5032	-0.5998	0.6199
25-Apr-97	-0.9833	0.2604	0.1757		-0.3135	0.4783	-0.0527	0.3205	0.5019	-0.0117	0.0035	0.0364	-0.0772	-0.0375	-0.1618	0.0315	0.0494	0.9798
30-May-97	-24.0085	-15.6688	-16.2642		-16.2068	-11.4066	-16.0908	-16.0666	-11.3895	-15.9705	-16.3073	-15.5521	-16.1615	-15.9737	-16.0556	-15.9199	-16.1542	-12.6319
27-Jun-97	-4.8916	-5.9273	-8.4010		-6.7490	-4.8424	-8.9484	-5.8965	-4.8745	-6.0008	-7.1792	-7.0271	-8.4507	-8.1198	-7.1669	-6.8785	-6.5530	-4.7695
25-Jul-97	16.5022	17.0006	17.2643	-0.535430876	16.0762	12.4593	19.1535	15.2303	12.4975	17.9276	16.4955	18.3940	16.6709	16.7601	16.4591	15.0573	16.1370	16.9260
29-Aug-97	-20.8156	-18.1604	-21.1466	-13.07059931	-20.5158	-15.4398	-20.9217	-17.3361	-15.2743	-20.3163	-20.4529	-20.2978	-21.3318	-21.1776	-20.5900	-20.0491	-19.8499	-18.5861
26-Sep-97	12.1754	10.2126	11.1693	11.51328422	10.1399	9.5013	11.1919	8.3810	11.5039	11.0175	10.2803	12.1133	10.4679	10.4806	10.3925	10.1453	9.6296	9.3160
31-Oct-97	-10.8074	-6.6083	-11.2632	-11.23068342	-10.0265	-6.8857	-10.7292	-7.5184	-8.7424	-8.3841	-10.7441	-12.6980	-11.0447	-10.7695	-10.8995	-11.0584	-10.0719	-5.9801
28-Nov-97	-8.5037	-1.3143	-6.1298	-10.10713221	-5.6311	-3.5651	-6.5346	-2.8148	-5.0689	-5.2202	-5.2861	-4.5685	-5.1733	-5.3254	-5.4111	-4.9964	-4.9648	-4.1737
26-Dec-97	-5.1605	-	-5.4821	-4.449600463	-5.9050	-1.0960	-6.0465	-1.8828	-4.3689	-3.6892	-5.9900	-3.6783	-5.5637	-6.1438	-6.0436	-5.7532	-4.6491	-6.3416
30-Jan-98	27.1192	-	23.6004	36.67117603	23.3475	23.7250	26.4445	18.1105	23.7987	23.9156	23.9630	27.5023	24.4839	24.2144	24.2649	24.2258	23.3388	22.2599
27-Feb-98	-1.6767	-	-3.1911	10.25283852	-1.2405	-2.4516	-2.4979	-2.0055	-3.6143	-3.5707	-0.8327	-9.0892	-0.9096	-0.8851	-1.0118	-0.4626	-0.0199	0.6393
27-Mar-98	-9.0972	-	-9.9397	-3.607072578	-10.5779	-9.5501	-11.2445	-10.4233	-10.0400	-10.2641	-10.1721	-10.6498	-9.8939	-10.0628	-10.0038	-10.2943	-10.2293	-9.0231
24-Apr-98	-6.5597	-	-4.9016	-8.566296911	-6.0336	-6.1905	-5.3926	-9.8032	-5.6169	-5.1686	-5.4653	-5.8190	-5.9402	-5.9098	-5.6605	-5.8436	-5.3250	-5.5116
29-May-98	-16.8853	-	-20.8597	-19.62314304	-19.2027	-21.1163	-22.0041	-21.7726	-26.2179	-20.1449	-18.4954	-24.8725	-18.9457	-18.7377	-16.7235	-16.8315	-18.4162	-19.4746
26-Jun-98	-6.9232	-	-9.4770	-18.56647514	-10.2161	-9.3540	-10.7591	-10.5938	-10.3040	-9.9868	-10.0420	-10.1393	-10.1673	-10.1901	-9.1394	-9.0202	-10.2783	-9.7363
31-Jul-98	2.4780	-	5.7434	5.273526556	5.5274	6.3077	5.8621	5.7838	6.3604	5.7733	5.0382	6.8565	5.4321	5.4066	4.8485	4.7033	4.6974	5.3072
28-Aug-98	-8.3838	-	-10.2529	-16.7730204	-11.1618	-11.0250	-11.3980	-10.5869	-11.5658	-10.5681	-11.2532	-11.4430	-10.9063	-10.8486	-10.4512	-10.6289	-11.1560	-11.0261
25-Sep-98	4.8247	-	8.9357	11.62798289	8.9096	10.4054	9.3565	9.0849	10.8749	8.7561	9.0831	10.6241	8.5587	8.5867	8.4205	8.4831	8.9695	10.1149
30-Oct-98	9.9911	-	13.5049	21.12570532	13.1492	14.1188	14.0409	7.6587	14.0807	10.9937	12.5870	14.7417	12.2354	12.3521	12.5130	12.5862	12.4117	12.7080
27-Nov-98	4.1740	-	6.0866	7.518800011	8.2924	6.7053	5.4017	10.0418	5.8855	3.3403	7.9196	5.9820	7.4751	7.1729	7.0998	7.2505	6.7566	6.9136
25-Dec-98	-4.5024	-	-1.4490	-3.534010442	-2.0365	-1.4530	-1.4919	-1.7301	-1.4863	-1.9997	-1.8853	-1.4106	-1.8558	-1.8350	-2.2373	-1.8477	-1.8800	-1.9644
29-Jan-99	-0.7263	-	0.6674	1.783137901	1.7890	0.9023	0.6005	1.1979	1.2143	0.5972	0.8327	2.0425	1.6805	1.3628	-1.7234	1.0080	0.9494	0.3978
26-Feb-99	-6.0157	-	-6.7842	-7.643296379	-7.1261	-6.9122	-6.8985	-3.4251	-6.8889	-6.5586	-7.4133	-6.7027	-6.9091	-6.7882	-7.1699	-6.7038	-6.7222	-6.5377
26-Mar-99	5.9361	-	6.1745	7.281450783	6.2525	6.4679	6.4861	5.9856	6.3484	7.0690	6.2647	6.5194	6.5753	6.4961	6.7297	5.5167	6.2827	6.3877
30-Apr-99	25.3967	-	19.0505	23.51903842	19.2020	19.0219	19.4327	18.1363	19.1232	18.6637	20.2071	19.7343	19.4836	19.9772	19.3732	18.9428	18.0629	18.4592
28-May-99	6.8374	-	-2.3730	-1.627165299	-2.2248	-2.3873	-2.7535	-1.9842	-2.9150	-2.1849	-2.7040	-3.0627	-2.3831	-1.7831	-1.1406	-1.8490	-3.0372	-2.2570
25-Jun-99	22.6836	-	18.6576	23.15537168	20.2437	18.6609	19.3136	19.6692	18.9427	17.8654	21.4702	18.9615	19.6559	19.6904	20.6948	19.0854	19.0952	19.5278
30-Jul-99	-12.6942	-	-9.8484	-12.73360426	-9.0874	-10.2731	-9.9568	-9.6888	-10.0938	-11.0370	-9.5753	-9.9067	-9.2158	-9.4337	-9.5670	-9.3406	-9.1428	-9.7288
27-Aug-99	0.2237	-	-0.7057	1.301997733	-0.5182	-0.5459	-0.6225	-0.7390	-0.5788	-0.4178	-0.7488	-0.6604	-0.4701	-0.4994	-0.9796	-0.7518	-1.6840	-0.5336
24-Sep-99	-17.2040	-	-21.8056	-20.21981472	-21.0800	-21.9580	-22.2254	-21.2471	-22.2321	-22.1675	-21.8892	-22.6109	-21.4713	-21.6081	-22.4430	-21.2691	-	-20.0978
29-Oct-99	2.8259	-	7.1421	5.145272454	6.6879	7.0951	7.2924	6.7466	7.3720	6.9764	7.1769	8.1184	6.8489	6.7603	6.9852	6.6656	-	6.1998
26-Nov-99	-0.8243	-	1.2001	3.195784027	1.3999	1.7445	1.2513	1.5863	1.6535	1.2031	1.6582	1.4378	1.5032	1.6077	0.9553	1.6806	-	1.6964
30-Dec-99	17.3241	-	11.1979	17.21142163	11.7201	11.4673	11.5803	12.0541	11.7262	12.0633	12.3153	11.2682	11.6954	11.7682	11.5563	11.7077	-	11.7469
28-Jan-00	-2.5416	-	-3.4569	-1.33964544	-3.0592	-3.2432	-3.3285	-3.5877	-3.2918	-4.0571	-3.7340	-3.5471	-3.0666	-3.2685	-3.8676	-3.7244	-	-3.0626
25-Feb-00	-13.4988	-	-14.1652	-16.9839631	-13.7976	-13.8793	-14.0696	-13.9361	-14.1771	-14.7403	-14.2470	-14.2097	-14.3629	-14.4644	-14.6175	-14.9699	-	-13.5411
31-Mar-00	-4.0675	-	0.3145	-0.58048491	1.1138	0.2874	0.9617	0.2855	0.3066	1.7360	1.0361	0.5333	0.9268	0.8499	0.9598	0.9425	-	0.2996
28-Apr-00	-1.3233	-	-1.1871	-3.168895885	-1.4197	-1.2457	-1.3597	-1.2793	-1.3117	-1.0223	-1.5172	-1.2325	-1.5045	-1.4867	-1.3721	-1.3706	-	-1.5210
26-May-00	-19.7226	-	-21.4812	-24.87373367	-21.5766	-21.5088	-21.9196	-21.5697	-21.8655	-21.0299	-22.1185	-21.5463	-22.2878	-22.3463	-22.4476	-22.5626	-	-21.7851
30-Jun-00	3.6021	-	5.7836	3.70965723	6.3265	5.9922	6.2069	-	6.1524	5.5685	6.5234	5.7150	6.6288	6.6196	6.3206	6.6664	-	14.7474
28-Jul-00	-5.9611	-	-9.5671	-12.85429728	-9.4243	-9.4795	-9.7801	-	-9.6961	-9.3765	-9.7134	-9.6939	-9.8390	-9.8703	-10.0019	-9.8775	-	-
25-Aug-00	4.7178	-	4.9761	5.448799686	4.9491	4.8247	5.0890	-	5.0098	5.1607	5.0506	4.9658	5.2810	5.3296	5.2671	5.0871	-	-
29-Sep-00	-10.4069	-	-12.2220	-7.245698526	-11.9785	-12.1584	-12.4204	-	-12.3289	-12.1402	-12.3191	-12.5555	-12.5619	-12.5861	-12.3666	-12.5382	-	-
27-Oct-00	-3.5852	-	-1.1496	-1.126876503	-1.0788	-1.1908	-1.1742	-	-1.1570	-1.0683	-1.2300	-1.4090	-1.1322	-1.1703	-1.1659	-1.0422	-	-
24-Nov-00	2.3653	-	3.8781	4.376896302	3.8607	3.8820	3.9289	-	3.8760	3.9397	4.0152	3.9602	3.9924	4.0501	3.9687	4.0535	-	-
29-Dec-00	-3.7710	-	-5.9903	-6.711410882	-5.9291	-6.0645	-5.9110	-	-6.0145	-5.2771	-5.7370	-5.8747	-6.0754	-6.0519	-5.9545	-6.0476	-	-
average	-1.4595	-1.6077	-1.3126	-0.6443	-1.3153	-0.2606	-1.5380	-0.4157	-0.4258	-1.5429	-1.3022	-1.0677	-1.0658	-1.1675	-1.4293	-1.3438	-1.1205	-1.0635

Appendix E (continued)

Date	ONE-WE	OSA	PISD	PPSD	RKEC	RKEDC	RKF	RKF2	RKF3	RKF4	RKF-HI	RRF1	RRF2	SAN	SCRDA	SCRMF	SCRMF2	SCRMF3	SCRMF4
31-Jan-92													7.7812						
28-Feb-92													0.0924						
27-Mar-92													7.8123	0.0000					
24-Apr-92													-3.4756	-3.2523					
29-May-92													-11.6127	-9.4174					
26-Jun-92							0.3992						7.2759	5.8419					
31-Jul-92							-1.4042						-0.9277	0.4274					
28-Aug-92							2.7890						2.3032	3.9713		1.0940			
25-Sep-92							12.1922						12.8853	14.3852		8.8000			
30-Oct-92							8.4181						7.7020	8.8268		8.3382			
27-Nov-92							-1.9371						-3.3927	-3.9773		-2.6173			
30-Dec-92				16.6362			1.8571						1.8845	1.8426		3.4472			
29-Jan-93				0.0000			11.4043						9.9581	11.5845		11.0225			
26-Feb-93				10.8235			-0.2144					0.2996	-0.9598	0.0000		0.2956			
26-Mar-93				-5.3856			-6.5016					-7.4492	-7.3081	-6.0948		-6.8424			
30-Apr-93				2.4556			2.7110					2.0203	-0.8013	0.7825		1.8597			
28-May-93	-0.3005			-0.9434			-2.1022					-2.7750	-1.7039	-2.4459		-0.9255			
25-Jun-93	1.1964			3.5690			5.9642					8.0043	6.9538	5.8178		6.7019			
30-Jul-93	3.5057			2.4841			3.1659					5.5381	2.1149	3.1890		5.6104			
27-Aug-93	3.1091			2.3513			3.5378	1.1929				3.7110	4.1718	3.6550		3.5246			
24-Sep-93	2.9253			2.5997			3.2888	2.1506				2.1622	3.1054	9.3158		2.0016	0.4988		
29-Oct-93	21.9895			23.4339			27.7520	27.1842				33.4688	27.5270	23.2688		32.2879	33.2199	21.5918	
26-Nov-93	5.2134			10.2015			6.6799	6.4216	-0.2002			10.1783	8.0083	6.2437		5.4764	6.2931	8.4187	
30-Dec-93	25.8785			18.9589			29.5985	32.1152	21.4691		4.5929	36.0297	32.3339	31.8877		31.6266	31.3322	31.4540	
28-Jan-94	-9.5142			-9.4332			-10.2780	-10.6754	-11.1939		-9.4069	-15.2478	-10.1531	-12.7372		-10.6800	-10.7486	-11.3264	
24-Feb-94	-4.0873			-4.3963			-4.6602	-5.3850	-4.9107		-7.1770	-34.6631	-7.1992	-7.7234		-7.0204	-7.2389	-7.0248	-0.5013
25-Mar-94	-6.7023			-7.7658			-6.9411	-6.2539	-6.6757		-7.0040	-14.3508	-9.3457	-9.2775		-7.0570	-6.9661	-7.0533	-0.9086
29-Apr-94	-0.7681			1.4467			2.5716	3.5566	2.8030		2.3896	4.7006	0.4355	2.3519		1.0986	0.2668	-0.1493	-0.7125
27-May-94	6.8530			6.6556			12.0756	12.5286	7.9663		8.2673	8.7194	7.2624	8.5279		6.7882	6.5745	6.6450	4.2985
24-Jun-94	-5.3987			-3.8236			-6.4539	-6.2321	-6.0112		-6.7441	-6.3426	-7.0694	-7.2991		-4.8304	-4.9227	-4.5755	-2.1761
29-Jul-94	5.8298			6.2573			6.6204	8.0043	7.6387	0.6976	7.8252	9.8863	10.2078	10.3405		7.1371	6.9604	6.8554	6.6724
26-Aug-94	7.5234			6.0432			9.4690	3.7449	3.7840	1.9666	8.1530	8.1678	6.5680	11.7489		6.6625	6.7342	6.3209	5.1948
30-Sep-94	0.6775			1.9874			4.0787	10.3550	9.0746	3.1627	3.7924	4.1891	1.1748	3.4256	0.0210	3.0786	2.8205	2.6487	2.1960
28-Oct-94	3.1749			3.6304			4.4489	4.8764	4.7494	5.2378	4.6607	2.0863	2.7018	-11.0622	1.2608	3.1676	3.1453	3.0365	3.1640
25-Nov-94	-10.5684			-9.6519			-9.5961	-9.7110	-9.5625	-9.7730	-9.8503	-12.2117	-10.9245	0.8678	-4.9264	-9.9703	-9.9390	-10.2619	-9.7164
30-Dec-94	1.1116	0.0000		0.9455	-0.0290		-0.2689	-0.7018	-0.3466	-0.1976	-0.7060	0.2519	1.4745	-11.6079	2.2804	1.7323	1.6332	1.6435	2.2019
27-Jan-95	-10.1024	0.3992		-5.2152	-4.6236		-11.0962	-10.9019	-10.9032	-10.7451	-11.3491	-13.1557	-12.6139	0.0000	-9.5113	-11.3682	-11.3354	-11.4776	-10.9199
24-Feb-95	6.8177	1.2865		-11.9189	4.5275		5.9385	5.9700	6.3370	5.6730	6.2623	-14.9023	7.0313	7.6658	6.6568	5.7158	5.6965	5.7158	5.3215
31-Mar-95	-5.4165	-1.1870		21.0103	-4.0061		-4.4452	-4.7342	-5.3039	-4.3601	-5.0451	-7.6994	-6.3906	-14.0448	-8.4624	-7.5467	-7.5275	-7.5611	-7.5733
28-Apr-95	0.3704	-0.4988		-2.6686	2.2098		1.5200	1.7809	1.5299	1.6713	1.6707	0.5381	0.8479	1.4591	-0.1204	-0.3080	-0.2298	-0.3530	-0.4630
26-May-95	8.9242	9.3490		0.2635	10.9493		12.1722	12.4324	11.9132	12.0603	11.8177	15.3895	13.9647	12.9634	13.5090	13.0519	12.7281	12.8434	12.4207
30-Jun-95	-0.9257	0.9066		-0.1317	0.9828		0.3870	0.7168	0.7162	0.3910	0.4197	0.4591	-0.0459	0.4232	-0.7525	0.1623	0.0000	0.1554	0.5110
28-Jul-95	-0.7373	0.4502		1.3089	-1.6916		-1.3829	-1.4389	-1.2567	-1.4742	-1.3706	-1.1516	-0.4602	-0.2820	0.1879	1.2356	1.1413	0.7734	1.0142
25-Aug-95	-2.5056	-1.8133		-3.3050	-1.4589		-1.9777	-1.7667	-1.8922	-1.6975	-1.8212	-1.8707	-1.9563	-1.9483	-2.4810	-2.3772	-2.2958	-2.4962	0.5033
29-Sep-95	-3.5246	-3.3492	0.0000	-2.8812	-1.9650		-2.0946	-2.3004	-2.2212	-2.2404	-2.0754	-2.4693	-2.1874	-2.4391	-3.4237	-2.9406	-2.9108	-3.1290	-5.5742
27-Oct-95	0.2831	-0.3791	-1.0050	0.0000	0.2957		0.2063	0.3407	0.2925	0.1061	0.1103	0.3221	0.0481	0.2680	-1.8939	-1.7370	-1.8390	-1.9735	-1.4974
24-Nov-95	-4.1700	-4.0703	-3.1814	-3.8421	-2.6456		-3.4595	-3.5310	-3.2660	-3.4523	-3.4776	-3.4345	-3.3719	-3.8193	-4.2271	-4.0874	-3.8597	-4.0678	-3.9566
29-Dec-95	5.0048	4.5440	4.7846	4.6847	4.3401		4.5865	4.4789	4.3314	4.2971	4.3558	5.5030	5.8407	5.5705	3.7185	4.3998	4.1562	4.6725	3.9566
26-Jan-96	8.3064	9.0314	8.6597	9.1071	7.9264		8.3993	8.3355	8.1376	7.6883	7.9790	10.3863	8.7340	8.8063	5.2926	7.8554	7.4848	7.7057	7.2722
23-Feb-96	-2.9430	-4.5653	-4.5696	-4.3408	-2.4459		-2.1303	-2.3841	-2.3361	-2.0660	-2.0388	-8.2056	-2.1015	-2.5367	-2.4408	-1.5693	-1.6621	-1.8512	-1.7181
29-Mar-96	-3.2686	-1.1505	-1.2482	-0.9500	-1.4392		-1.6402	-2.1175	-1.9275	-2.1096	-2.0812	-3.6082	-2.4300	-2.8566	-3.9208	-4.1304	-3.7542	-4.4216	-3.6330
26-Apr-96	1.7640	0.3850	0.5780	0.7893	1.5823		1.4486	1.4687	1.4720	1.3112	1.1500	0.4781	1.0353	0.9613	1.4384	2.0537	1.6692	1.6144	1.7811
31-May-96	1.7243	1.9030	0.8608	2.2543	3.9204		3.2542	3.2597	3.1463	3.2531	3.1716	0.3175	0.7927	0.4521	-0.2620	0.3927	0.3755	0.2665	1.7499
28-Jun-96	-5.0937	-4.8272	-5.1795	-4.8829	-4.8129		-4.0725	-4.4598	-4.4331	-4.4628	-4.6376	-6.0427	-4.8047	-5.3538	-6.0532	-5.5738	-5.4692	-5.8464	-5.1293
26-Jul-96	-11.3472	-12.1872	-12.3693	-15.1330	-12.1790		-11.0799	-11.0516	-10.6286	-10.6939	-10.6768	-13.3051	-12.2179	-12.9084	-13.2860	-10.7465	-10.5528	-10.8501	-13.2666
30-Aug-96	0.3142	-0.6726	-0.5692	3.9582	0.3042		-0.4871	-0.5257	-0.5438	-0.6795	-0.8250	-1.0633	-0.2757	-0.3617	-2.4766	-0.6519	-0.6497	-0.6712	2.1381
27-Sep-96	-4.2582	-5.3130	-4.9133	-5.8540	-3.5586		-4.6465	-4.1512	-4.3461	-4.0585	-3.9836	-5.2880	-3.8845	-4.8658	-3.7877	-5.1342	-4.9451	-5.3088	-5.0690
25-Oct-96	-9.3267	-10.3649	-11.1508	-7.2518	-8.7111		-9.6591	-9.4745	-9.3035	-9.2946	-9.4202	-13.4703	-10.5233	-11.7437	-12.3336	-11.9940	-11.3267	-11.8048	-5.0617
29-Nov-96	-0.5298	-1.1913	-1.3495	-0.9580	-0.3713	-1.2700	-0.6739	-0.3556	-0.3757	-0.5208	-0.5427	-0.3523	-0.1915	-0.3447	-0.2252	-1.5399	-1.6742	-1.6410	-1.0162
27-Dec-96	-9.7131	-9.0528	-8.8000	-6.5180	-8.6716	-7.7027	-8.9042	-9.3264	-9.0554	-9.1531	-9.2593	-10.5361	-8.7930	-9.0077	-10.9762	-11.9286	-11.3924	-11.9269	-7.0759
31-Jan-97	-5.4897	-5.2368	-6.4341	-1.9597	-5.1034	-4.3027	-4.5359	-4.6008	-4.4951	-4.3867	-4.4248	-7.4611	-5.4394	-5.7310	-7.4899	-7.3697	-7.0723	-7.5538	-4.3470
28-Feb-97	-8.8530	-7.8252	-7.8988	-1.8802	-9.4371	-7.4713	-8.7222	-8.6546	-8.5445	-8.2537	-8.4603	-10.6927	-8.1662	-7.6344	-10.7253	-7.1500	-6.6132	-7.1314	-10.3714
28-Mar-97	0.0826	-1.1696	-1.7272	-1.0734	-0.8589	-0.8540	-0.9326	-0.8969	-1.1015	-0.9788	-1.0239	-3.0233	-1.5280	-0.8854	-0.4794	-3.2542	-3.0937	-3.3657	-1.6440
25-Apr-97	0.1267	-0.3367	-0.8749	0.5977	-1.0578	-1.4099	-1.0274	-1.0187	-1.1138	-0.9885	-0.8613	0.1614	-0.8591	-0.0989	2.0486	-0.1026	-0.2005	-0.3482	2.9456
30-May-97	-16.4691	-13.3291	-12.7274	-1.9255	-13.2381	-12.6027	-13.6240	-13.6298	-12.9653	-13.0697	-13.1063	-17.3969	-17.4929	-17.4636	-15.8415	-12.8231	-12.6076	-12.6956	-18.6498
27-Jun-97	-7.1671	-3.5298	-3.6589	0.7264	-4.5956	-5.1911	-4.7460	-4.6706	-4.2797	-4.2396	-4.6426	-5.3215	-5.2755	-5.1975	-4.0760	-7.1328	-6.6111	-6.7739	-3.6530
25-Jul-97	15.0024	13.2533	14.0752	0.6013	15.1835	13.8437	14.6885	14.5920	14.1579	14.1130	14.2274	20.7639	19.6130	18.6243	20.0555	16.8219	16.4378	16.1008	18.8486
29-Aug-97	-20.4654	-23.7672	-24.7724	0.3746	-21.7157	-21.8561	-20.5444	-20.6459	-20.4344	-21.4633	-20.4062	-26.5989	-23.1415	-22.0315	-25.9272	-21.2936	-21.4395	-21.1913	-23.9251
26-Sep-97	10.4115	13.4639	13.5545	0.8078	12.5255	12.3878	11.9181	11.2447	11.1013	11.5898	10.8214	13.6210	12.2386	12.5314	16.2703	13.3972	13.1842	13.1826	14.3248
31-Oct-97	-10.3574	-15.4797	-15.4151	-0.0344	-12.8265	-14.1930	-12.0729	-12.4126	-12.5284	-12.8691	-12.5952	-17.7837	-18.2520	-19.3024	-23.3741	-19.6334	-18.4546	-18.6472	-21.9471
28-Nov-97	-5.6944	-6.3031	-7.0503	-1.5409	-5.9939	-7.1351	-5.9243	-5.8974	-5.9214	-6.4252	-5.9926	-10.8597	-11.7485	-10.5666	-13.6160	-9.1012	-8.9180	-8.9547	-10.2880
26-Dec-97	-5.9345	-1.4563	-1.2674	-0.3521	-3.4722	-3.0482	-3.4630	-3.4869	-3.5480	-3.7300	-3.8746	-9.6808	-7.9484	-8.1061	-15.7822	-8.8273	-9.0109	-9.6846	-11.9790
30-Jan-98	21.1701	27.0419	27.2905	10.7859	26.9508	27.9382	21.1656	20.6227	21.0879	24.3365	21.4713	21.8738	30.6374	27.6025	33.7146	11.7907	17.5038	17.3889	21.8665
27-Feb-98	-2.6931	-0.3738	0.1940	2.8545	-4.1950	-2.9634	-2.9942	-3.0649	-3.1572	-2.8331	-2.8285	-0.2586	3.0513	2.7263	-0.7912	0.1639	-2.0962	-2.1271	-1.0097
27-Mar-98	-8.7572	-7.1806	-8.0689	-5.1194	-12.2840	-12.1781	-10.6825	-9.6529	-9.4933	-10.4935	-10.5816	-10.6879	-10.9399	-9.7513	-12.6013	-5.8542	-10.1303	-10.4593	-12.8339
24-Apr-98	-4.3164	-4.3172	-4.0734	-3.3365	-4.3577	-5.2780	-4.1433	-3.0259	-3.3758	-4.3485	-4.4245	-6.2002	-7.1887	-7.4108	-7.9043	-4.5291	-8.2475	-8.6669	-9.1420
29-May-98	-12.8078	-18.4004	-19.5094	-20.8100	-16.8798	-19.4210	-16.4387	-13.1120	-13.0470	-16.3827	-16.8137	-25.5520	-26.1123	-27.9491	-27.2487	-12.3949	-22.1789	-23.2450	-29.3211
26-Jun-98	-6.2490	-15.5414	-18.0196	-20.5553	-11.0346	-13.3047	-14.5875	-8.3991	-8.6789	-12.2375	-11.0066	-17.7455	-18.9444	-20.3661	-20.3606	-6.3967	-15.2434	-16.2601	-23.4524
31-Jul-98	4.2082	2.9077	1.2658	0.6759	3.0196	5.9547	6.2132	4.1051	4.1782	3.7740	2.1774	3.4273	2.6925	3.0130	7.3089	2.7777	6.5839	6.9836	8.0439
28-Aug-98	-8.8898	-15.7978	-16.7340	-18.5044	-12.9496	-12.3973	-12.3257	-9.7974	-7.4305	-10.5044	-13.1336	-20.9389	-16.6882	-19.3341	-11.1711	-3.5230	-8.8760	-9.8667	-10.8054
25-Sep-98	9.0093	13.1852	10.5732	10.7475	17.1600	15.8896	15.8764	15.7604	9.4559	13.8661	17.0557	16.4964	12.4239	12.7279	13.2479	7.2287	11.2422	11.8014	13.1296
30-Oct-98	12.7916	13.7201	14.3101	12.0516	7.3856	5.8022	7.2861	5.8388	3.6905	5.8841	7.4108	18.2825	18.3970	22.4119	12.1446	8.8894	9.4217	10.5168	12.4406
27-Nov-98	7.1025	5.4877	4.8100	0.7744	1.5119	0.6996	1.3423	0.6397	1.9139	1.2903	2.4425	5.5540	6.9981	11.5832	0.8728	1.9254	0.9004	0.6733	1.2240
25-Dec-98	-1.4292	-1.7136	-1.6713	-1.3504	-1.8397	-1.9637	-1.7485	-2.0896	-1.3263	-1.8112	-1.8945	-1.5916	-1.3921	-2.2828	-0.5870	0.2553	0.1815	0.0937	-0.3905
29-Jan-99	0.7940	1.6116	1.3171	2.1318	0.0266	-0.3314	0.0868	0.0148	-0.1634	-0.1097	-0.1887	0.0229	2.3096	1.6698	-3.3420	-4.4470	-4.8343	-5.2082	-4.7722
26-Feb-99	-6.9478	-6.3700	-7.0188	-6.6445	-5.8401	-6.2576	-6.0365	-6.2112	-5.3021	-6.2140	-3.2976	-6.9980	-5.7965	-7.9727	-8.8161	-9.6576	-9.0382	-9.3832	-9.4771
26-Mar-99	6.5504	5.6458	5.8055	6.4802	7.8381	7.8165	7.9618	7.6869	7.3990	7.7804	7.7832	7.9603	5.6441	7.0373	2.3886	2.2789	2.2815	2.1395	2.1196
30-Apr-99	19.3721	15.0196	15.0138	15.3222	15.3890	15.6054	15.4755	15.7238	15.5781	15.3114	15.3142	14.9081	14.8473	19.8080	10.4317	9.9121	9.0322	9.3790	9.5270
28-May-99	-2.5581	-1.8514	-1.7000	-1.1023	1.4561	1.5115	1.5632	1.5696	1.3394	1.4271	1.4227	-1.8568	-4.1589	-2.4288	-3.3196	-3.3852	-3.7688	-3.7341	-3.6100
25-Jun-99	18.6311	10.7326	36.3307	10.4121	9.6342	9.8276	9.8327	9.7974	10.0732	9.6906	9.6945	14.8084	11.3818	12.8722	11.1929	9.1904	8.5284	8.8607	9.7083
30-Jul-99	-10.6716	-12.9956	-38.9512	-12.7116	-11.4001	-11.6836	-11.1092	-11.6630	-11.3501	-11.3675	-11.3555	-10.7163	-13.0393	-11.2436	-6.9429	-8.1278	-7.7557	-8.1775	-7.5571
27-Aug-99	-0.7574	-1.0589	-1.0927	-1.0471	1.5619	1.3810	1.8145	1.4645	1.4399	1.4307	1.5721	-3.2776	-0.8392	-0.8257	0.0351	-26.6439	-0.2073	-0.2831	-0.3588
24-Sep-99	-22.4498	-19.6316	-19.6493	-19.6780	-16.3285	-17.1344	-16.4881	-17.1151	-17.3730	-16.9901	-16.8421	-21.4066	-21.0236	-21.1601	-19.2030	6.7922	-18.2811	-18.7518	-18.9419
29-Oct-99	7.2368	4.1914	4.4214	4.1792	5.2142	5.4929	5.4598	5.5587	5.9517	5.3227	5.3183	5.6003	5.8890	6.5746	4.4098	5.4827	7.3709	5.2131	4.5959
26-Nov-99	1.6053	2.4694	1.6604	2.1486	1.3829	1.3654	1.5658	1.5415	1.4254	1.4798	1.4531	1.3402	2.2618	3.5030	3.1547	2.5031	2.3556	2.5192	1.8660
30-Dec-99	11.9084	13.5612	12.1012	14.9865	10.1519	10.0765	10.4118	10.1820	10.2636	9.9232	9.9680	9.9229	18.3386	17.0584	11.5112	11.1630	14.0680	13.3481	11.0109
28-Jan-00	-3.0331	-4.3737	-4.7601	-2.8008	-0.9317	-1.6251	-0.3919	-1.5997	-1.5848	-1.7748	-0.8920	-6.2607	-5.7471	-4.5151	-4.5203	-4.6678	-4.2576	-3.9875	-4.4360
25-Feb-00	-14.8896	-16.9473	-17.7148	-16.6940	-16.1038	-16.3206	-16.0793	-15.8683	-16.2474	-14.8784	-18.0136	-16.1325	-18.3449	-17.3043	-17.4574	-17.5178	-18.6410	-18.5094	-17.6553
31-Mar-00	1.0819	-3.3321	-3.4230	-2.8935	-3.3996	-3.4699	-3.2815	-3.3797	-3.2522	-3.3546	-3.4539	0.0774	0.3378	0.2357	-1.6556	-1.5589	-1.9689	-1.5509	-1.6236
28-Apr-00	-1.1392	-2.5603	-2.3569	-2.0732	-0.9375	-0.9841	-0.8165	-1.0189	-0.9705	-1.0747	-0.9408	-1.3726	-0.8467	-1.2954	-1.7854	-1.7337	-1.8092	-1.8074	-1.9263
26-May-00	-21.9948	-21.5072	-22.4887	-22.0140	-21.2191	-21.8635	-21.6559	-21.1404	-21.4938	-20.1764	-21.1675	-18.0351	-17.6218	-19.7600	-20.1458	-21.5175	-21.8018	-21.7501	-18.8364
30-Jun-00	5.8851	5.6444	4.6387	5.0048	4.1687	4.1822	4.4954	4.1744	4.1137	3.8356	4.0102	4.7183	5.7158	6.1651	4.6637	4.7091	4.7318	4.6982	4.7515
28-Jul-00	-9.9845	-9.3104	-9.0575	-8.9804	-10.5827	-10.9076	-10.8482	-10.3682	-10.7703	-10.0670	-10.8139	-8.6275	-10.1812	-10.2389	-12.3520	-12.8006	-13.0300	-12.9619	-12.0844
25-Aug-00	5.5169	3.6875	3.7116	3.9551	3.7495	3.8064	3.9753	3.8099	3.8916	3.4740	3.7630	4.9682	2.3954	5.3280	5.4744	5.8686	5.9578	6.0925	5.8635
29-Sep-00	-12.5026	-10.4245	-10.1814	-9.8184	-11.3850	-11.5701	-11.4034	-11.5097	-11.5657	-11.2784	-9.4529	-10.2551	-6.7611	-10.6082	-18.5415	-12.3227	-12.9563	-12.4331	-12.3700
27-Oct-00	-1.2096	-0.7354	1.1007	0.1789	0.9609	1.1554	1.1598	1.1065	1.2358	0.8328	0.7437	-0.2357	1.0820	-0.0256	1.0012	1.4674	1.5083	1.3427	1.3430
24-Nov-00	3.9506	4.1067	4.3262	4.3698	4.5884	4.7004	4.7755	4.8537	4.8523	4.4695	3.3051	3.8810	3.2582	4.1191	6.0520	6.1556	6.2323	6.2268	6.2206
29-Dec-00	-5.9448	-4.8921	-4.7965	-4.7861	-5.7530	-5.8311	-5.7246	-5.8725	-5.7882	-5.8601	-4.3762	-4.1468	-4.8934	-4.3220	-4.1620	-3.6974	-3.8248	-3.7621	-3.6453
average	-0.7163	-1.8409	-2.4382	-0.3393	-1.6087	-2.2617	-0.1668	-0.5284	-1.2266	-1.6320	-1.5269	-1.6791	-0.4440	-0.4807	-2.7821	-0.7489	-1.5222	-1.7945	-2.2506

Appendix E (continued)

Date	SCBMPS	SCBPC	SCBPMO	SCBRT	SCBTS	SCBTS2	SCBTS3	SCDF	SCIF	SCIF2	SF4	SF5	SF7	SF8	SPF	SPT	SRT	SSB	STD
31-Jan-92											0.9773	7.9664						7.5355	
28-Feb-92											7.2566	-1.1093						-1.4397	
27-Mar-92											7.0433	6.7242						9.4750	
24-Apr-92											-4.6840	-4.1333						-7.3764	
29-May-92											-11.7508	-12.4439						-7.6722	
26-Jun-92											7.2516	6.7205						5.4144	
31-Jul-92											-0.5538	0.1353						-1.9881	
28-Aug-92											3.9025	2.8659						-0.0240	
25-Sep-92											13.3921	13.6729						10.2748	
30-Oct-92											4.9735	3.8780						8.5175	
27-Nov-92											-1.3423	-9.2338						-5.9148	
30-Dec-92											0.9712	11.0907						2.0262	
29-Jan-93											0.5191	11.2629						10.6241	
26-Feb-93											10.3547	-1.6026						1.3075	
26-Mar-93											-7.2696	-7.3735						-8.5571	
30-Apr-93											-2.5731	-1.3423						1.6225	
28-May-93											-1.2490	-1.8980						-2.0804	
25-Jun-93											7.2701	6.4351						6.1701	
30-Jul-93											2.3485	2.0012						4.2452	
27-Aug-93											5.2263	4.3087						4.7552	
24-Sep-93											2.0376	2.0867						0.7582	
29-Oct-93											25.5317	24.7521						26.2619	
26-Nov-93					-0.1001				0.5982		4.7118	5.1837						7.8194	-3.1491
30-Dec-93					9.9034	7.2321			20.6707		30.4473	29.2550						30.8314	32.0422
28-Jan-94		1.9803			-4.8292	-4.8604			-11.7379	1.5873	-11.7976	-12.6305						-9.2346	-10.9949
24-Feb-94		-4.5120			-5.4755	-5.8308	-3.0459		-7.5508	-4.6333	-7.7352	-5.8220						-8.5643	-7.3722
25-Mar-94		-3.4432			-5.3676	-4.9878	-2.9291		-10.7542	-7.1574	-11.6674	-9.0797						-9.4456	-10.6261
29-Apr-94		-0.9600			-0.3186	-0.2179	-0.3190		0.3270	0.7722	-1.1601	-1.4196			1.7840			1.9249	-0.8040
27-May-94		6.1318			5.6863	5.9277	5.4908		7.2397	7.5128	8.0843	7.0190			6.2818			6.4462	7.3892
24-Jun-94		-3.3832			-3.3728	-3.4504	-3.2790		-7.5666	-7.0742	-7.4869	-7.9630	-2.5318		-4.9159			-6.8795	-6.9864
29-Jul-94	0.4988	6.7532			7.5073	7.5778	7.3289	0.1000	8.7739	9.9875	6.8742	7.0449	8.6413		8.9834			8.9156	8.0120
26-Aug-94	5.7987	6.2343			5.7158	5.9348	5.4628	1.6840	6.1191	5.3359	6.3495	4.6188	6.6418		7.4234			5.4093	5.1525
30-Sep-94	0.6551	1.9048			2.6956	2.8403	2.5341	1.7527	2.4840	3.4686	2.7095	1.9263	3.1198		2.9974			2.6386	1.7468
28-Oct-94	2.0315	3.2703			2.7111	2.6740	2.8196	-2.8392	0.0000	0.2837	0.3469	1.1809	2.0271		2.0538			0.0531	1.1893
25-Nov-94	-9.4853	-8.6221			-9.9720	-9.9806	-9.0889	-6.2488	-12.3072	-12.2397	-11.2370	-11.2859	-12.3548		-12.2093			-10.7036	-11.8029
30-Dec-94	2.9705	1.0417			1.9823	2.1300	2.1842	2.2990	-0.1110	0.7443	1.5380	0.7143	0.7540		0.0000			1.2451	-0.3331
27-Jan-95	-10.5903	-10.7089		0.0000	-11.7138	-11.8442	-11.7783	-11.9463	-12.0286	-11.5535	-10.6111	-10.3690	-12.6980		-13.5047			-11.5949	-12.2941
24-Feb-95	5.4866	6.5835		0.8444	5.7545	5.8739	5.7351	6.6428	6.5478	7.0023	7.1470	6.3210	7.1973		7.5912		-0.4008	5.2453	5.3869
31-Mar-95	-7.5689	-8.4462		1.8558	-8.7011	-8.7622	-8.5522	-7.2266	-7.3025	-6.8835	-7.9218	-7.2356	-7.3040		-6.8859		-1.7175	-5.4431	-7.1636
28-Apr-95	-0.7059	-0.2353		1.0043	-1.0824	-1.1050	-1.0772	0.1170	-0.1263	0.2372	-0.2591	-0.4092	0.3197	0.3992	0.2006		2.3430	0.3633	0.0000
26-May-95	11.7914	14.0427	4.0182	2.6943	13.8657	13.8150	13.8034	15.7653	17.0452	15.1439	16.8450	16.4567	15.8094	1.3848	15.1284	-0.7025	8.3471	13.1540	15.8349
30-Jun-95	0.6276	-0.3075	-0.0961	0.8853	1.1512	1.1759	1.0428	0.6969	0.7435	0.8114	0.9352	0.9520	0.1815	0.5877	0.0000	-0.4036	1.0954	0.0524	0.7621
28-Jul-95	0.4162	0.6141	-0.7722	-1.4488	1.7535	1.7905	1.8500	0.4948	-0.2119	-0.4049	1.0494	0.5583	-1.3385	-1.2777	-0.5540	-0.4053	-0.6056	-0.5555	0.2167
25-Aug-95	-2.5238	-2.7938	-3.5507	-2.1607	-2.5895	-2.5371	-2.5788	-1.0918	-2.2651	-2.1599	-3.0551	-2.5592	-2.4356	-1.9981	-2.5318	-0.3050	-1.9069	-1.1079	-2.0777
29-Sep-95	-2.8080	-3.8507	-5.1505	-3.1908	-3.6329	-3.7082	-3.7258	-3.2457	-3.0235	-2.9919	-4.0703	-4.4931	-2.4964	-2.2450	-2.7927	-2.4744	-3.0003	-1.8967	-3.8293
27-Oct-95	-1.4341	-1.6493	-1.5983	-1.1678	-1.0941	-1.1173	-0.9809	-0.7243	-0.9490	-0.7905	-1.7965	-1.5282	-0.1012	-0.1033	-0.2934	-0.3136	-0.6525	-0.1562	-2.4815
24-Nov-95	-3.9665	-4.4200	-3.2754	-3.9746	-4.8460	-4.9521	-4.9393	-3.9179	-4.6350	-4.2855	-4.4269	-4.2418	-3.3971	-3.7899	-3.9965	-4.2787	-2.9853	-3.0476	-4.1031
29-Dec-95	4.1885	3.0807	3.9178	3.5927	4.4050	4.5016	4.5002	5.4635	5.3476	5.3008	5.1960	5.2169	5.6984	5.2258	6.1446	4.8009	4.9416	5.2694	5.5994
26-Jan-96	6.4400	6.1021	6.0059	6.0761	8.7748	8.8515	8.6369	8.2400	8.2861	8.4952	7.1034	7.2411	10.3281	9.5125	9.2552	10.3797	6.9359	8.7894	7.1630
23-Feb-96	-1.8888	-2.2449	-1.5190	-2.3167	-1.9418	-1.9823	-1.9359	-3.0595	-2.6492	-3.0353	-2.9599	-2.6023	-2.7126	-2.4369	-2.6121	-4.7101	-2.6153	-2.2343	-2.5672
29-Mar-96	-3.9984	-3.4088	-3.4253	-4.1773	-3.2515	-3.3211	-3.2413	-4.2644	-3.8773	-3.6801	-4.2093	-3.6265	-3.3554	-3.3771	-3.6578	-1.2878	-3.2488	-2.5765	-4.2251
26-Apr-96	1.7487	2.1030	1.5715	1.0266	0.6376	0.7596	0.6356	1.4085	0.2323	0.8782	0.1746	0.5739	0.4728	0.2940	1.1696	0.7944	2.1317	0.3987	-0.1234
30-May-96	1.5054	0.2188	0.2077	-0.2439	0.5283	0.3238	0.6316	0.3988	-0.8154	-0.8782	-0.9465	-0.8621	0.3766	0.3906	0.2903	0.7882	2.4986	0.5747	-0.6192
28-Jun-96	-5.1462	-4.6989	-4.5631	-6.0414	-5.5239	-5.7666	-5.3892	-6.0500	-5.6539	-6.0211	-5.8008	-6.4058	-6.2035	-6.0259	-6.1767	-6.2774	-5.2411	-3.9498	-5.8841
26-Jul-96	-13.2646	-10.5399	-9.6580	-13.1048	-11.2002	-10.7850	-10.9219	-13.7365	-10.8390	-11.3985	-12.0867	-12.7251	-14.4605	-13.1678	-12.1570	-10.9199	-10.8436	-12.6866	-11.1381
30-Aug-96	1.9754	-1.2114	-1.8223	-3.1315	-1.0669	-0.3554	0.5273	-0.7712	-1.0197	-0.9675	-0.2108	-0.2332	-1.1357	-0.7435	-0.7344	0.3490	0.2025	0.5021	-1.0363
27-Sep-96	-5.1175	-2.6382	-2.5146	-4.2664	-6.0872	-4.8071	-4.8487	-4.8919	-5.7245	-5.5689	-5.9570	-5.7055	-5.4772	-5.6281	-4.9097	-5.8594	-4.6643	-4.4170	-5.3489
25-Oct-96	-5.0462	-9.2989	-10.4470	-11.6715	-13.3872	-10.2809	-8.5703	-10.1154	-12.7129	-11.6682	-13.7122	-12.4216	-12.8565	-13.3531	-10.4644	-11.6091	-9.8342	-9.4890	-12.1715
29-Nov-96	-1.0048	0.0305	0.3239	-0.6361	-1.3133	-0.3493	0.4556	-2.1213	-1.4185	-0.6623	0.1027	-0.0700	-0.1526	-0.3012	0.2861	-0.9729	-1.1384	-2.7393	-0.3552
27-Dec-96	-7.0171	-7.6471	-7.1852	-10.5568	-11.3497	-8.5822	-6.6209	-9.4698	-8.9612	-8.4899	-9.9219	-9.6221	-10.4513	-9.6518	-8.1830	-8.5814	-8.9377	-10.7104	-9.1226
31-Jan-97	-4.3321	-4.6281	-4.4093	-4.8444	-5.2335	-3.8134	-4.0038	-5.0054	-5.8308	-5.0057	-6.3783	-5.5482	-7.5674	-7.4108	-5.7432	-5.8776	-4.7094	-6.0175	-5.6127
28-Feb-97	-10.4521	-5.9385	-6.0268	-8.1421	-5.2947	-4.6632	-6.8633	-6.5837	-8.8707	-8.1152	-7.7227	-9.1243	-10.1913	-10.9543	-8.2097	-7.7524	-5.7470	-7.8211	-7.9336
28-Mar-97	-1.5636	-0.4992	-0.1039	-1.2348	0.1002	-0.9618	-0.4408	-0.9497	-5.3439	-5.9466	-3.1341	-3.3594	-2.6668	-3.2457	-1.7986	-1.7789	0.5387	-3.7523	-1.8019
25-Apr-97	2.8929	0.8034	0.9475	0.3394	0.9283	0.4750	1.5410	-0.5742	-0.7186	-0.2191	-0.3624	1.1019	0.0000	0.0000	-0.8036	-0.9507	-0.0415	-1.0075	-0.4556
30-May-97	-16.3608	-12.0893	-13.2425	-13.7501	-12.4137	-12.2879	-11.9032	-15.7676	-16.1388	-16.6655	-16.5053	-15.0504	-19.4453	-19.5187	-17.8797	-12.8538	-13.5842	-16.1528	-16.3325
27-Jun-97	-6.3422	-5.0583	-6.9470	-7.5011	-3.8604	-4.3116	-2.9805	-2.0432	-3.1566	-4.5041	-3.6085	-4.2283	-5.1825	-4.0926	-4.5495	-3.0544	-2.4903	-3.1950	-4.6776
25-Jul-97	19.1023	14.5147	16.4310	16.3725	15.8320	14.9555	16.0338	14.0958	17.1083	17.3703	17.5373	20.5491	22.3144	21.7383	17.5633	14.0121	15.2985	16.5542	17.5254
29-Aug-97	-23.9711	-17.1749	-16.8499	-16.9981	-18.1133	-18.5842	-19.9395	-20.8682	-22.1916	-22.6566	-19.2705	-16.5334	-26.9410	-27.3774	-15.9959	-23.5448	-21.2194	-21.2557	-21.8427
26-Sep-97	14.0706	10.2428	9.0477	10.4414	9.8856	9.5545	10.9332	11.4831	10.7505	11.5876	11.9053	9.6528	14.2544	14.3837	7.7830	13.7583	11.2540	-22.4873	10.8591
31-Oct-97	-21.5498	-16.5690	-18.6617	-19.9696	-13.7803	-12.7777	-14.7845	-14.9058	-16.4303	-17.4717	-15.6239	-16.6106	-19.1055	-19.4840	-11.7228	-15.0565	-14.2638	-20.3034	-17.2345
28-Nov-97	-10.0563	-9.0222	-11.2666	-9.4739	-10.5366	-9.0290	-10.0689	-5.3416	-9.5310	-8.5360	-7.2196	-11.8714	-10.4711	-11.3794	-5.4169	-6.8367	-10.7048	29.1704	-9.1868
26-Dec-97	-11.5645	-8.8877	-14.3223	-11.5063	-8.1622	-8.0294	-10.8122	-6.3285	-8.5714	-8.9715	-7.9371	-12.6243	-11.6972	-10.6447	-7.6804	-1.0080	-4.3446	-8.8670	-8.2336
30-Jan-98	20.5565	18.3260	17.7330	17.2821	11.7223	9.4340	17.1118	26.6765	25.0017	26.2087	25.5012	27.4257	30.0375	29.0396	25.9150	27.4860	25.8904	26.8367	27.5481
27-Feb-98	-0.4369	0.8695	2.5783	3.6345	3.6924	2.9865	3.7590	5.4924	3.2790	3.2790	0.1344	4.7413	2.1391	2.4098	2.7422	-0.2254	3.3635	3.1704	5.7788
27-Mar-98	-12.7699	-7.7936	-7.0089	-6.6297	-5.1636	-4.7946	-5.9108	-9.4791	-9.2090	-9.5848	-10.0581	-8.8021	-10.5949	-10.3012	-9.0041	-7.3113	-6.0400	-7.7875	-9.5310
24-Apr-98	-8.7312	-4.4900	-4.5104	-5.2917	-2.2563	-2.9043	-3.5781	-6.7003	-7.3366	-6.0995	-4.5658	-4.7309	-6.3755	-6.3561	-7.1744	-4.6088	-5.7672	-9.5306	-7.3203
29-May-98	-29.1917	-14.6339	-15.5464	-21.3850	-14.0853	-10.3647	-12.7305	-28.3927	-26.8264	-25.2663	-22.2742	-19.8891	-28.0394	-26.7063	-27.4853	-18.6545	-17.6214	-32.9924	-25.8574
26-Jun-98	-22.7770	-10.3905	-12.3417	-12.4280	-7.0328	-5.2333	-7.2513	-19.3146	-17.7807	-16.7054	-15.6822	-11.4656	-20.1593	-19.2991	-17.6964	-16.3806	-19.7487	-20.2958	-17.9048
31-Jul-98	7.7418	3.1212	3.0469	4.2469	1.9647	1.4870	1.9947	1.3199	5.2644	5.1293	2.2800	0.4474	2.5064	2.9270	2.8608	3.3333	4.9392	4.2129	3.3738
28-Aug-98	-10.0609	-6.6706	-8.6049	-10.1621	-5.3455	-4.2360	-4.8662	-18.7775	-14.3101	-14.1354	-14.2396	-17.7638	-19.6280	-19.0044	-16.7172	-15.7951	-11.2610	-15.1752	-14.7851
25-Sep-98	12.9003	6.8021	7.6243	10.7253	1.5944	0.7837	1.2065	12.3682	11.7125	11.8365	12.2856	12.5811	14.0286	13.5709	11.4367	12.3013	9.2039	7.9633	10.4261
30-Oct-98	11.8524	7.3706	8.8971	17.2141	4.3933	3.8665	4.7931	19.7073	14.2048	13.8750	11.2639	14.7983	19.8765	18.9067	13.5187	10.7696	13.5234	23.8656	10.7833
27-Nov-98	1.3788	-1.7443	0.6484	3.4046	-0.9163	-1.0446	-0.2235	5.0707	4.4650	4.7440	2.1821	0.0209	7.0422	7.2907	4.0659	7.4975	6.5804	17.2954	-1.7938
25-Dec-98	-0.2660	-1.8355	-0.5834	-1.5313	-0.4370	-0.8804	-0.2591	-2.2329	-3.5559	-3.5367	-2.1019	-0.8956	-0.8032	-1.1788	-2.4960	-1.9751	-0.8157	-2.4375	-0.7221
29-Jan-99	-3.7370	-3.3787	-2.9245	1.2364	-4.2173	-4.5500	-3.7393	4.4832	2.2638	2.2348	0.8205	0.5915	-1.4745	-1.4051	2.5756	0.6671	-1.8474	0.4911	-0.2236
26-Feb-99	-9.1442	-7.1975	-6.5876	-7.0706	-5.4124	-4.4743	-4.7311	-6.9762	-7.1552	-6.0964	-5.3014	-3.5915	-7.4174	-7.1223	-7.0123	-7.1426	-7.1039	-5.0925	-3.8508
26-Mar-99	2.2039	1.4096	5.2398	5.9818	3.7714	3.6322	5.0001	6.4682	6.3469	6.0730	6.4268	0.7052	7.5891	7.1423	7.5930	6.1654	7.3765	7.2173	4.3793
30-Apr-99	9.6309	8.8438	8.6397	15.9558	7.2564	7.2879	9.5264	18.1150	14.1211	13.4548	14.5501	12.9230	16.4086	16.1009	18.2053	15.2585	16.7172	15.6500	14.6684
28-May-99	-3.5494	-0.9046	-0.5200	-4.5703	-1.9707	-2.0592	-2.2875	-3.1720	-0.3996	-0.6588	-1.4880	-2.9419	-4.7752	-4.5473	-3.3359	-2.1868	-3.8976	-3.2600	-3.5262
25-Jun-99	10.0198	7.8552	8.2613	10.2263	8.1633	7.9254	8.8351	10.7086	14.3935	14.6290	14.0311	11.1528	8.8813	10.3302	10.2466	11.0223	10.6573	8.5989	10.2556
30-Jul-99	-7.8759	-8.3474	-6.8327	-4.5333	-7.7888	-8.3095	-9.5324	-13.6697	-10.6169	-10.6571	-11.2490	-13.2946	-15.9706	-14.4149	-13.7287	-12.7537	-13.2991	-11.6495	-13.4355
27-Aug-99	-0.2313	-0.5161	0.6061	0.6604	-0.7439	-0.5865	-1.0168	-1.0040	-3.7727	-3.6146	-3.6016	-0.9527	-1.3717	-1.2839	-0.8336	-1.0871	-0.7344	-3.4654	-0.8258
24-Sep-99	-19.0794	-18.2691	-16.5413	-16.4979	-15.7387	-16.3579	-17.2625	-23.1397	-19.9061	-20.4478	-21.4982	-22.1224	-23.3307	-21.8830	-22.5110	-19.2558	-22.5268	-21.1598	-22.4774
29-Oct-99	4.7994	4.6631	5.2888	5.7121	4.7640	4.6714	4.9150	6.3864	5.0054	5.3108	5.1851	6.5340	6.4492	5.8861	5.4878	4.7154	6.6245	4.2557	6.0780
26-Nov-99	1.9762	1.1265	-0.3141	1.9845	1.1338	1.0770	1.2000	1.8759	0.6028	0.6801	1.3406	1.5631	2.1324	1.4135	1.2878	2.1908	1.7251	-0.9160	1.5433
30-Dec-99	11.2202	10.0256	12.3776	15.9499	13.0378	11.5712	11.6045	16.7282	9.5938	9.7585	10.4979	16.5859	17.2504	16.4940	16.1162	12.5324	16.4856	9.9804	16.5717
28-Jan-00	-4.7096	-4.1705	-3.4912	-3.6297	-3.4526	-3.6383	-3.8830	-6.3880	-6.2810	-6.2417	-6.0484	-6.5414	-6.9771	-6.1901	-6.4610	-4.6213	-6.1175	-8.0028	-6.2154
25-Feb-00	-17.6495	-17.7273	-18.8028	-19.4691	-16.9852	-17.6175	-17.6726	-18.8994	-15.9560	-15.8043	-16.1590	-18.6754	-18.0387	-19.2915	-18.2080	-18.2848	-19.1214	-15.8340	-19.1873
31-Mar-00	-2.0811	-1.9442	-1.8663	-2.0471	-1.7268	-1.7954	-1.7381	-0.0968	0.7454	0.8124	0.0434	-0.1719	1.4321	0.8642	-0.3272	-3.3666	-0.0075	0.2746	1.3156
28-Apr-00	-2.1253	-1.9909	-2.0485	-2.2622	-1.8216	-1.9274	-1.8536	-0.5539	-1.5323	-1.5096	-1.2635	-0.7546	-0.6618	-1.1603	-0.1859	-2.3470	-0.4205	0.6456	-0.6583
26-May-00	-20.2393	-21.3413	-22.3755	-22.5752	-21.3814	-22.5044	-22.0098	-17.6697	-18.6207	-18.5540	-18.7391	-17.7802	-17.4424	-15.1706	-17.7379	-23.6799	-17.5853	-17.8498	-17.9258
30-Jun-00	4.1270	4.4674	5.5965	5.2548	4.8053	5.0916	4.8879	5.7041	5.6873	5.6307	5.9474	5.5860	5.3864	5.0895	6.0886	3.9967	5.2621	5.0714	5.3292
28-Jul-00	-12.5598	-12.5024	-12.4582	-13.0934	-12.3629	-12.9943	-12.7722	-11.0609	-9.1325	-8.9845	-9.1870	-10.7927	-10.9494	-10.4051	-11.4581	-10.7803	-10.4704	-11.4082	-10.8440
25-Aug-00	5.6698	5.3689	5.8160	5.5089	5.5964	6.0993	5.8878	3.2167	5.5245	5.4827	5.7038	3.0981	3.0126	3.4956	3.5228	3.8024	3.2612	4.4575	3.3309
29-Sep-00	-12.3581	-12.4862	-13.0370	-12.7396	-12.3278	-12.9487	-12.7199	-11.3281	-11.0539	-10.9091	-11.0409	-11.9867	-12.0520	-13.0160	-11.4256	-9.7258	-11.2098	-11.9663	-11.2813
27-Oct-00	1.2725	0.9375	0.4002	0.3839	1.0940	1.1181	0.9497	0.6821	-0.5763	-0.4996	-0.4107	0.8648	0.8435	1.2129	0.6496	0.0591	0.7384	0.5130	0.7843
24-Nov-00	5.8731	5.6961	5.9958	6.1670	6.0618	6.4528	6.3475	3.2335	3.4153	3.4341	3.6962	3.7873	3.7588	4.0564	2.8408	4.3280	3.4317	3.3850	3.3504
29-Dec-00	-4.1399	-4.1566	-4.4801	-4.1389	-3.9480	-3.9913	-3.9765	-4.2856	-4.9431	-4.8390	-4.8690	-4.2413	-4.2641	-4.3887	-4.5859	-6.1057	-4.1701	-6.0935	-4.2806
average	-2.5391	-1.9624	-2.4568	-2.1517	-1.8821	-1.8514	-1.7526	-1.9789	-2.0475	-1.9725	-0.7793	-0.8511	-2.2550	-2.6259	-1.7861	-2.2514	-1.7366	-0.7410	-2.0718

Appendix E (continued)

Date	STD2	SW2	TDF	THANAI	THOR	THOR2	THOR3*	THOR4	TNP	TS	TVF	UNF	USD	USD2
31-Jan-92		7.2799							0.1833					
28-Feb-92		0.2125							0.0915					
27-Mar-92		8.3467							8.8383					
24-Apr-92		-7.1332							-3.6678					
29-May-92		-6.2199							-12.3774					
26-Jun-92		4.8471							6.7484					
31-Jul-92		-1.9866			-3.2523				-7.3401					
28-Aug-92		1.8270			-0.4141				7.8901					
25-Sep-92		13.2466			9.6818				12.4992					
30-Oct-92		9.0891			7.6124				9.8735					
27-Nov-92		-5.3807			-1.6718				-5.3463					
30-Dec-92		3.1847			2.0203	-2.6344			1.7872					
29-Jan-93		10.7622			8.9761	7.4181			10.2458					
26-Feb-93		-1.6555			-0.8782	0.7597			-2.2044					
26-Mar-93		-7.5087			-5.4379	-4.9453			-7.6397					
30-Apr-93		-0.3004			0.0000	0.5946			-0.8860					
28-May-93		-2.3479			-0.5945	-0.4953			-2.3742					
25-Jun-93		7.0488			3.3504	3.3206			7.1916					
30-Jul-93		2.5103			0.6568	1.2411			1.2261					
27-Aug-93		3.6125			1.9450	1.2259			3.7374					
24-Sep-93		1.1884			1.9078	1.9490			2.2100					
29-Oct-93		26.7277			13.7363	15.7820			26.2785					
26-Nov-93		4.5339			3.4869	5.0508			3.7696					
30-Dec-93	0.1000	29.9805			22.9355	24.9655			32.6931				40.4131	40.7463
28-Jan-94	-5.0190	-12.9262		0.9950	-8.9322	-10.4715	0.1000		-13.8367				-10.2546	-10.3662
24-Feb-94	-7.6373	-12.3707		-1.2955	-4.9976	-5.1667	-4.2864		-8.4360				-5.0826	-5.2265
25-Mar-94	-9.1350	-3.8785	0.0000	-4.3039	-8.6947	-8.5838	-9.9699		-9.6717			-1.8164	-7.6805	-7.6743
29-Apr-94	0.1241	2.4045	1.1929	0.2092	0.2326	0.8115	2.3906	2.3717	1.0274	3.0529		1.7163	1.0034	0.9194
27-May-94	6.8331	9.1030	2.1148	8.8925	8.8882	8.5847	8.8229	6.8863	9.2156	7.0221		7.7035	6.3654	6.2873
24-Jun-94	-7.0815	-8.0289	-4.0938	-5.0991	-5.3123	-4.6231	-5.8310	-5.5283	-7.0807	-5.6733		-8.5075	-5.5369	-4.3919
29-Jul-94	8.1190	9.5213	4.8782	6.1453	5.0284	4.9597	5.6248	6.4358	9.8892	9.2261		9.2462	7.2397	7.4691
26-Aug-94	6.2242	7.7986	7.6951	7.7346	5.1258	4.9814	6.0078	6.2164	6.3877	7.1549		7.1015	7.2517	6.3828
30-Sep-94	1.0718	3.1615	0.4583	1.1319	3.2550	2.9608	3.0624	4.1569	3.2335	3.4335		3.1213	2.5371	2.5957
28-Oct-94	-0.8107	3.0013	2.5902	3.6553	0.9756	1.2951	0.0000	0.5684	1.7026	2.4807		2.6231	-11.1021	-10.9679
25-Nov-94	-11.1841	-11.3016	-7.9429	-10.2767	-13.2087	-12.1697	-12.2152	-12.0317	-12.3509	-11.4248		-11.7480	5.7418	5.6342
30-Dec-94	-0.2604	0.6599	1.3031	1.2036	-0.2668	0.4833	1.4799	1.2704	1.5608	0.5991		1.8035	1.1976	1.0213
27-Jan-95	-11.4529	-12.0429	-9.1805	-9.8406	-11.9008	-11.4431	-11.4379	-11.5531	-12.2843	-12.4244	0.1000	-13.0599	-10.9526	-11.0927
24-Feb-95	5.4067	7.2801	5.2628	6.8039	6.5979	6.7189	5.9378	6.5613	6.7700	6.6490	0.9456	5.4496	5.7158	5.6107
31-Mar-95	-7.4747	-5.7550	-2.5718	-5.8187	-5.2035	-5.1863	-5.2344	-6.3742	-7.0204	-6.5449	-1.0625	-8.3424	-4.8656	-4.8567
28-Apr-95	-0.4488	1.4508	0.5882	0.3263	-0.0990	0.5309	0.4662	-0.1062	-0.3140	0.7258	1.7607	-0.4734	1.1226	1.1205
26-May-95	16.4167	13.0279	8.4290	9.2265	12.9812	11.2896	11.4159	12.3787	15.1992	14.9417	9.3970	15.8716	11.4159	11.3959
30-Jun-95	1.8904	0.0451	0.1933	-0.2637	0.6069	0.6734	0.1037	0.0939	-0.3789	0.3552	0.6998	-0.4057	0.3314	0.2482
28-Jul-95	2.2223	-0.4524	-1.6385	-1.1492	-0.2596	-0.5384	-1.7774	0.0000	0.0000	0.4423	-1.6517	-0.4073	-0.4144	-0.4141
25-Aug-95	-1.6000	-1.8765	0.4902	-2.1005	-1.7483	-1.7013	-2.4561	-2.1812	-2.6932	-2.5024	-2.0714	-0.5115	-1.8441	-1.9272
29-Sep-95	-4.0512	-2.4317	-4.9827	-3.0349	-2.8624	-2.7132	-4.0052	-3.1161	-3.2749	-3.0319	-2.6734	-3.5494	-2.9069	-2.9069
27-Oct-95	-2.4659	0.0000	-0.1480	0.3272	-1.3705	-1.4920	-2.0644	-1.4948	-1.0736	-0.6551	-0.1174	-1.4990	-0.2859	-0.2859
24-Nov-95	-4.9762	-3.7868	-3.4240	-4.0203	-3.2721	-3.1264	-3.6231	-3.3694	-4.0822	-4.1213	-3.4647	-4.2982	-3.6933	-3.6933
29-Dec-95	4.9762	5.8714	4.0794	5.3080	5.7337	5.8102	5.3263	4.9630	5.3440	5.3346	4.7261	5.2644	5.2409	5.2409
26-Jan-96	7.3513	9.0155	7.5955	8.4338	8.3544	8.1596	8.6609	9.0628	8.2980	9.4588	8.0020	6.8138	9.3732	9.3732
23-Feb-96	-3.5414	-2.0977	-2.6123	-3.2551	-1.8815	-1.6187	-1.7858	-1.7297	-2.9870	-2.5596	-2.4172	-3.0397	-3.4809	-3.4809
29-Mar-96	-4.2269	-2.6078	-3.2293	-3.3850	-1.1461	-1.1159	-1.2465	-0.7373	-3.1404	-3.4860	-1.6795	-3.3476	-0.7293	-0.7293
26-Apr-96	0.2782	0.9282	1.6313	1.7018	1.3359	1.3115	1.1338	1.5152	0.6726	0.6689	1.4111	0.8801	0.6384	0.6384
30-May-96	-0.9770	0.6359	0.7516	1.7425	2.1567	2.1908	2.2297	1.8623	0.3650	-0.1907	3.0752	0.0000	1.5336	1.5336
28-Jun-96	-6.6691	-5.1811	-5.4060	-4.7793	-4.8466	-4.8312	-4.7413	-5.0129	-6.1346	-5.6934	-4.0605	-5.9803	-4.1134	-4.1134
26-Jul-96	-10.2533	-12.5409	-11.7371	-11.2413	-12.2052	-12.1469	-12.4162	-12.4840	-11.5526	-12.9212	-11.2421	-9.5078	-12.5749	-12.5749
30-Aug-96	-1.3378	-0.6808	-0.2739	0.4848	0.7671	0.6775	0.3919	0.5479	-0.5085	-0.8079	-0.0437	-0.3844	-0.2217	-0.2217
27-Sep-96	-6.6111	-4.1578	-5.2306	-4.4510	-4.4650	-4.5270	-4.3978	-4.7082	-5.7755	-5.2331	-4.2222	-5.5423	-4.7736	-4.7736
25-Oct-96	-12.6363	-10.8683	-10.9897	-9.3697	-9.0754	-9.2880	-9.1231	-9.4569	-11.0789	-12.0534	-9.0751	-11.6427	-11.1979	-11.1979
29-Nov-96	-0.6141	-0.4897	-0.4215	-0.6845	-0.6270	-0.5181	-0.7491	-1.5058	-1.4870	-1.2474	-0.6402	-2.6236	-1.9725	-1.9725
27-Dec-96	-8.5706	-8.9833	-9.7537	-9.6381	-6.9653	-6.8993	-6.8456	-7.8894	-9.5217	-9.6566	-8.8836	-9.8602	-9.6107	-9.6107
31-Jan-97	-5.7553	-3.0251	-4.1510	-5.5993	-3.6001	-3.5887	3.1698	-4.4248	-7.0392	-6.1777	-4.6626	-6.9733	-4.3323	-4.3323
28-Feb-97	-6.1069	-7.3212	-6.3142	-8.6379	-6.8260	-7.5885	-15.4931	-7.7835	-7.6917	-7.9907	-8.1007	-7.4963	-7.7755	-7.7755
28-Mar-97	-1.0127	-1.0307	0.0663	-0.5588	0.6260	0.5173	0.3636	0.3367	-0.8388	-1.4260	-1.2391	-1.6097	-1.1618	-0.9950
25-Apr-97	-1.0230	0.0767	-1.0800	-0.0377	1.7015	1.6377	1.2624	1.3356	-1.2107	-0.1168	-1.4996	0.6409	0.0000	-0.1668
30-May-97	-15.2438	-17.1036	-22.0604	-15.7771	-6.8226	-10.1420	-11.7783	-11.5919	-20.3245	-19.0019	-13.5947	-20.2266	-14.5286	-14.5286
27-Jun-97	-4.5950	-3.6132	-4.6112	-6.9781	-1.9901	-2.6182	-3.4875	-3.4094	-3.0305	-4.5718	-4.2918	-5.5626	-2.1464	-1.9494
25-Jul-97	19.0646	18.2322	17.4399	15.7935	9.7288	14.5712	14.7268	14.8354	20.1370	20.6297	15.3225	21.4288	14.6514	14.6246
29-Aug-97	-22.2496	-22.2751	-21.1549	-20.0092	-5.4658	-13.3104	-14.3101	-14.0676	-24.7011	-23.8811	-21.2478	-24.8488	-24.8156	-24.9858
26-Sep-97	10.7300	12.6693	12.3920	10.1488	4.8209	8.7201	8.5624	8.6055	11.9749	13.8356	11.7105	15.4247	13.6529	13.6529
31-Oct-97	-18.8152	-16.6779	-10.7195	-10.3996	-5.7481	-8.6063	-8.5624	-8.6055	-20.0195	-17.5858	-12.2928	-22.6138	-15.6375	-15.4151
28-Nov-97	-12.3060	-9.5412	-7.2516	-5.0695	-7.5384	-5.6155	-6.6620	-5.9072	-11.4516	-7.4132	-6.8009	-12.1411	-7.1541	-7.3766
26-Dec-97	-8.2692	-6.6265	-4.9334	-6.3395	-4.6521	-3.8018	-5.4808	-6.0625	-9.2184	-7.1566	-3.4610	-7.5618	-2.4214	-2.1766
30-Jan-98	25.3706	23.8411	24.5729	24.0157	29.4417	36.2036	28.7682	29.6266	31.1013	28.1914	29.1376	29.8781	20.3341	20.2891
27-Feb-98	5.2129	4.1276	-1.2096	-1.0636	-5.4393	0.3475	-1.5972	-1.7785	9.1587	4.0973	-4.1659	3.4021	-0.2002	-0.1998
27-Mar-98	-9.3090	-7.7925	-8.9007	-10.6145	-11.4384	-10.3147	-9.1739	-9.7597	-8.8447	-10.2700	-12.4973	-9.5693	-4.9291	-5.1293
24-Apr-98	-7.5986	-6.8607	-21.6134	-5.5724	-3.5486	-2.3347	-3.1875	-3.6634	-7.6522	-6.5983	-4.6535	-9.9960	-2.3430	-2.1277
29-May-98	-26.0486	-23.0933	-19.1529	-18.4834	-13.7697	-13.8041	-11.5761	-12.7155	-26.8134	-28.9741	-15.6341	-27.2453	-10.2014	-10.1783
26-Jun-98	-18.1346	-11.2084	-8.7256	-9.9540	-14.2831	-12.8861	-10.7889	-11.4346	-21.6528	-19.9360	-8.9013	-19.2188	-7.1724	-7.1547
31-Jul-98	4.5722	-4.0814	3.7767	4.8873	2.2352	4.0308	3.4829	3.9586	0.8208	5.4445	4.5129	4.4332	2.5318	2.5254
28-Aug-98	-13.1140	-16.5979	-11.3161	-11.5084	-23.4739	-12.1958	-11.1082	-11.8640	-20.4918	-15.5728	-10.1925	-17.7934	-6.4539	-6.4372
25-Sep-98	9.7046	12.1783	9.1720	9.2134	14.5509	9.6957	7.8781	8.8510	12.8502	13.3395	13.9269	12.8935	5.7010	5.9372
30-Oct-98	11.4567	16.3241	13.7628	12.4244	3.5918	5.5399	2.4939	3.2410	19.9333	15.6947	5.1278	17.6223	5.7722	7.7147
27-Nov-98	0.5141	-0.0432	4.0220	8.1241	-6.7515	-4.0323	-1.4889	-1.6074	8.5404	5.1189	0.1539	8.8060	3.8915	4.1093
25-Dec-98	-1.0309	-0.0247	-4.3169	-1.8539	-3.9796	-1.2547	-1.7655	-2.1053	-1.1124	-3.1813	-1.9386	0.0680	-1.9373	-1.1805
29-Jan-99	-0.9422	0.6005	1.3592	0.9492	2.0432	-1.1390	-	-0.6499	3.3006	2.5743	-0.0809	1.8155	1.0714	1.7002
26-Feb-99	-3.8767	-3.6363	-5.8972	-6.4908	-5.2306	-4.6035	-	-3.6271	-6.0219	-7.2637	-6.1170	-6.9263	-6.3888	-6.2052
26-Mar-99	4.2890	3.2619	5.4771	7.0796	6.7287	5.2680	-	5.2134	7.0983	6.6970	7.7875	4.3106	6.4165	6.2096
30-Apr-99	14.6232	14.0124	24.9736	20.3941	13.9482	13.6926	-	11.3585	16.7219	15.4904	15.5744	16.5122	15.8329	15.3239
28-May-99	-4.3693	-3.5307	6.7923	-2.5571	-0.2372	0.1912	-	-0.3434	-2.5689	-2.3070	1.5216	-3.8435	-2.0443	-2.0195
25-Jun-99	10.4156	12.1192	22.9232	20.4553	6.4675	6.2314	-	8.7672	11.0736	11.7538	9.7575	12.0459	10.5497	10.9649
30-Jul-99	-13.7570	-10.8734	-12.8160	-10.0205	-7.7919	-8.1005	-	-8.7714	-11.2932	-13.3322	-11.2357	-13.6523	-12.7393	-13.0755
27-Aug-99	-0.9573	-0.8079	0.1501	-0.7162	1.4100	1.0286	-	1.1597	-0.6372	-1.4248	1.5169	-1.7539	-0.9015	-0.8972
24-Sep-99	-22.8544	-21.6758	-16.7002	-22.2451	-16.7272	-16.4118	-	-17.9679	-19.0722	-22.8005	-16.8337	-22.2415	-19.8865	-19.6888
29-Oct-99	6.8701	6.3436	2.8468	7.1962	5.7038	6.2138	-	5.0900	4.4179	6.8755	5.4184	5.2218	4.6119	4.5218
26-Nov-99	1.9728	1.0021	-0.9829	1.3711	1.7319	1.0975	-	0.6442	2.4295	1.1309	1.5793	1.6480	2.7384	2.7571
30-Dec-99	16.7371	15.3660	16.7117	11.7647	14.2434	12.1436	-	13.7116	17.1626	15.4949	9.8726	16.7465	13.5526	13.8344
28-Jan-00	-6.5268	-5.9734	-2.4192	-3.6872	-3.3342	-3.7270	-	-3.4972	-5.1593	-7.0525	-1.2651	-7.4390	-4.4674	-4.4269
25-Feb-00	-18.9731	-18.5976	-13.6278	-14.1826	-17.6174	-17.4431	-	-17.7770	-13.3813	-19.1533	-14.9653	-18.9053	-17.2274	-16.7888
31-Mar-00	1.0423	6.3657	-4.0952	0.9097	-1.6873	-2.2079	-	-1.2744	1.7016	-0.0732	-3.1891	-0.0980	-3.4557	-3.4973
28-Apr-00	-1.1039	-0.9053	-1.3570	-1.5089	-1.5347	-1.0866	-	-1.6078	-1.3436	-1.0382	-0.9440	-0.9810	-2.1301	-2.1416
26-May-00	-17.3945	-16.8828	-19.9886	-22.0735	-19.4215	-21.8070	-	-19.6422	-20.3834	-17.9328	-19.8869	-16.9796	-22.1347	-22.1090
30-Jun-00	5.3855	4.7119	3.5553	6.6272	4.9886	5.4877	-	5.5696	8.6281	5.4079	3.9339	5.9039	5.0193	5.0554
28-Jul-00	-10.5044	-10.4022	-6.0982	-9.5854	-8.6767	-10.0473	-	-8.8066	-9.3576	-10.9564	-9.7652	-11.4144	-8.7145	-8.6856
25-Aug-00	3.2673	3.1560	4.6289	5.2656	4.7333	4.6557	-	4.5986	5.6101	3.2917	3.5581	3.2008	4.0844	4.1017
29-Sep-00	-10.9798	-10.6498	-10.6699	-12.3713	-12.0796	-11.0797	-	-12.2205	-10.4239	-11.2172	-10.8493	-11.9368	-9.8245	-9.8261
27-Oct-00	0.7315	0.5170	-3.6812	-1.1565	1.2220	1.5089	-	1.2626	0.0000	0.7219	1.0370	0.8392	0.2657	0.2750
24-Nov-00	3.2271	3.0655	2.7946	3.9603	6.3493	4.5625	-	6.3233	4.1509	3.3340	4.5298	3.1642	4.3835	4.3939
29-Dec-00	-4.1842	-4.8226	-3.8849	-5.7458	-2.8575	-3.1151	-	-2.5849	-4.7546	-4.1623	-5.4768	-4.3917	-4.7527	-4.7677
average	-2.3514	-0.5221	-1.4231	-1.3084	-0.6813	-0.6392	-1.4467	-1.3019	-0.6599	-1.8287	-1.5693	-2.0289	-1.1646	-1.1119

Appendix F Durbin-Watson (D.W.) results

Name	1992-2000 D.W.	1992-2000 n (months)	Expansionary market environment (Jan 92-Jan 96) D.W.	Expansionary n (months)	Expansionary Serial correlation	Contractionary market environment (Feb 96-Dec 00) D.W.	Contractionary n (months)	Contractionary Serial correlation
AGF	2.280	84	1.138	25	second order (new D.W. = 1.792, n = 23)	2.662	59	
AJFSCAP	2.277	42	**	-		2.277	42	
APF	1.979	70	0.710	11	third order (new D.W. = 2.042, n = 8)	1.955	59	
BCAP	2.354	49	**	-		2.354	49	
BKA	2.408	85	1.935	26		2.689	59	
BKA2	2.499	82	1.389	23	D.W. falls into inconclusive area	2.666	59	
BKD	2.668	78	2.510	19		2.672	59	
BMBF	2.682	69	1.801	10		2.699	59	
BMF	1.708	68	1.872	39		1.472	29*	D.W. falls into inconclusive area
B-SUB	2.489	70	0.931	11	D.W. falls into inconclusive area	2.618	59	
BTP	2.577	75	1.475	16		2.688	59	
CMICRK	2.363	82	1.010	23	first order (new D.W. = 1.709, n = 22)	2.613	59	
DE-1	2.638	77	2.056	18		2.640	59	
INGTEF	1.991	20	**	-		1.991	20	
KKF	2.006	78	1.564	19		2.000	59	
KPLUS	1.775	84	2.063	25		1.768	59	
KPLUS2	1.776	84	2.140	25		1.763	59	
N_SAFETY	1.283	35	1.489	13		0.821	22*	first order (new D.W. = 1.807, n = 21)
NPAT-PRO	2.285	85	1.933	26		2.353	59	
NSG	2.081	42	**	-		2.081	42	
ONE+1	2.266	85	1.561	26		2.389	59	
ONE-D	2.352	102	2.663	43		2.247	59	
ONE-FAS	2.318	84	1.838	25		2.371	59	
ONE-FF	2.159	91	1.921	39		2.251	52*	
ONE-G	2.187	102	1.751	43		2.341	59	
ONE-PF	2.268	72	1.407	13		2.256	59	
ONE-PR	2.206	84	1.271	25	first order (new D.W. = 1.930, n = 24)	2.395	59	
ONE-PRO	2.136	87	1.596	28		2.321	59	
ONE-UB	2.162	87	1.563	28		2.388	59	
ONE-UB2	2.264	86	1.806	27		2.364	59	
ONE-UB3	2.209	85	1.571	26		2.301	59	
ONE-UB4	2.250	82	1.547	23		2.343	59	
ONE-UB5	2.422	60	2.070	17		2.400	43*	
ONEUB-G	2.276	59	1.294	6	D.W. falls into inconclusive area	2.292	53*	
ONE-WE	2.108	92	2.079	33		2.266	59	
OSA	2.542	73	1.744	14		2.603	59	
PISD	2.658	64	2.853	5		2.667	59	
PPSD	2.444	97	2.617	38		2.453	59	
RKEC	2.511	73	1.720	14		2.569	59	
RKEDC	2.547	50	**	-		2.547	50	
RKF	2.103	103	1.431	44	first order (new D.W. = 2.350, n = 43)	2.576	59	
RKF2	2.035	89	1.653	30		2.435	59	
RKF3	2.166	86	1.509	27		2.333	59	
RKF4	2.417	78	1.187	19	D.W. falls into inconclusive area	2.512	59	
RKF-HI	2.320	85	1.105	26	first order (new D.W. = 2.040, n = 25)	2.638	59	
RPF2	2.295	108	1.875	49		2.663	59	
RRF1	1.877	95	1.912	36		2.786	59	
SAN	2.810	106	2.952	47		2.945	59	
SCBDA	2.319	76	1.865	17		2.375	59	
SCBMF	2.203	101	1.857	42		2.577	59	
SCBMF2	1.939	88	1.986	29		2.362	59	
SCBMF3	1.942	87	1.836	28		2.341	59	
SCBMF4	2.133	83	1.775	24		2.278	59	
SCBMF5	2.240	78	2.021	19		2.281	59	
SCBPG	2.064	84	1.622	25		2.283	59	
SCBPMO	2.368	68	0.966	9	D.W. falls into inconclusive area	2.400	59	
SCBRT	2.275	72	1.593	13		2.239	59	
SCBTS	2.041	86	2.001	27		2.196	59	
SCBTS2	2.109	85	1.873	26		2.295	59	
SCBTS3	2.049	83	1.706	24		2.218	59	
SCDF	2.397	78	1.485	19		2.488	59	
SCIF	2.321	86	1.092	27	first order (new D.W. = 2.042, n = 26)	2.504	59	
SCIF2	2.299	84	1.272	25	first order (new D.W. =1.833, n = 24)	2.597	59	
SF4	2.266	108	2.575	49		2.502	59	
SF5	2.140	108	1.854	49		2.448	59	
SF7	2.538	79	0.912	20	first order (new D.W. =1.709, n = 19)	2.740	59	
SF8	2.717	69	1.340	10		2.779	59	
SPF	2.348	81	2.077	22		2.496	59	
SPT	2.486	68	0.888	9	D.W. falls into inconclusive area	2.631	59	
SRT	2.460	71	1.334	12		2.488	59	
SSB	2.053	108	2.323	49		2.060	59	
STD	2.252	86	2.013	27		2.351	59	
STD2	2.092	85	1.518	26		2.332	59	
SW2	2.364	108	2.583	49		2.690	59	
TDF	1.904	82	2.721	23		1.853	59	
THANA1	2.247	84	1.282	25	first order (new D.W. = 2.130, n = 24)	2.420	59	
THOR	2.352	102	1.684	43		2.489	59	
THOR 4	2.193	81	1.734	22		2.285	59	
THOR2	2.044	97	1.815	38		2.147	59	
THOR3	2.306	60	1.211	25	first order (new D.W. = 2.105, n = 24)	2.496	35*	
TNP	2.550	108	1.931	49		2.788	59	
TS	2.397	81	1.980	22		2.558	59	
TVF	2.337	72	1.653	13		2.378	59	
UNF	2.518	82	1.119	23	first order (new D.W. = 1.805, n = 22)	2.733	59	
USD	1.936	85	2.392	26		2.216	59	
USD2	1.926	85	2.389	26		2.201	59	

* funds terminated before December 2000

** funds started operation after January 1996

Note: 1. None has got positive serial correlation during 1992-2000.

2. Serial correlation column shows iterative level of the Cochrane-Orcutt iterative method when tested for positive serial correlation.

3. Positive serial correlation is tested at the 5 % significant level (1-tail test)

Appendix G Annual performance rankings, 1992-2000

1992

rank	name	Treynor	name	Sharpe	name	Jensen	name	M squared	name	rate of return
1	SF4	2.1170	RPF2	0.2399	SF4	0.0062	RPF2	2.6434	RPF2	2.1520
2	SW2	2.0089	SF4	0.2350	RPF2	0.0057	SF4	2.6046	SF4	2.0879
3	RPF2	1.9502	SW2	0.2328	SW2	0.0057	SW2	2.5871	SW2	2.0809
4	SF5	1.5861	SF5	0.1815	SF5	0.0029	SF5	2.1808	SF5	1.8894
5	SSB	1.0774	SSB	0.1249	SSB	-0.0014	SSB	1.7318	SSB	1.3699
6	TNP	1.0089	TNP	0.1105	TNP	-0.0021	TNP	1.6176	TNP	1.3225

1993

rank	name	Treynor	name	Sharpe	name	Jensen	name	M squared	name	rate of return
1	PPSD	7.9586	PPSD	0.6186	PPSD	0.0219	PPSD	7.0765	SCBMF	7.1401
2	SAN	6.6140	SAN	0.6109	SAN	0.0200	SAN	6.9965	SAN	6.7979
3	RKF	6.1688	RKF	0.5844	SCBMF	0.0172	RKF	6.7214	RKF	6.6200
4	SCBMF	6.1050	SCBMF	0.5810	RKF	0.0162	SCBMF	6.6863	SSB	6.4694
5	SF4	6.0597	SSB	0.5618	SSB	0.0143	SSB	6.4875	RPF2	6.3974
6	SSB	5.9651	RPF2	0.5340	SF4	0.0138	RPF2	6.1998	SF4	5.9479
7	ONE-FF	5.7044	ONE-FF	0.5339	RPF2	0.0112	ONE-FF	6.1984	SW2	5.6922
8	ONE-G	5.6413	ONE-G	0.5233	ONE-G	0.0088	ONE-G	6.0889	TNP	5.6208
9	RPF2	5.6166	SF4	0.5200	ONE-D	0.0083	SF4	6.0540	SF5	5.6068
10	ONE-D	5.5847	ONE-D	0.5195	ONE-FF	0.0078	ONE-D	6.0489	PPSD	5.5835
11	THOR2	5.4898	THOR2	0.5014	THOR2	0.0065	THOR2	5.8616	BMF	5.3189
12	BMF	5.2443	SF5	0.4976	SF5	0.0062	SF5	5.8222	ONE-G	5.1590
13	SF5	5.2132	BMF	0.4892	BMF	0.0061	BMF	5.7348	ONE-D	5.0983
14	SW2	5.1060	SW2	0.4882	SW2	0.0053	SW2	5.7244	ONE-FF	4.4859
15	THOR	4.9939	TNP	0.4638	TNP	0.0030	TNP	5.4712	THOR2	4.4681
16	TNP	4.8764	THOR	0.4574	THOR	0.0027	THOR	5.4048	THOR	3.9285

1994

rank	name	Treynor	name	Sharpe	name	Jensen	name	M squared	name	rate of return
1	THANA1	0.1687	THANA1	0.0206	RKF2	0.0225	THANA1	0.7803	THANA1	0.6071
2	ONE-PR	0.1601	ONE-PR	0.0188	RKF	0.0198	ONE-PR	0.7676	ONE-PR	0.5916
3	SCBTS3	0.0085	SCBTS3	0.0012	THANA1	0.0175	SCBTS3	0.6434	SCBTS3	0.5408
4	SCBPG	-0.1802	SCBPG	-0.0211	ONE-PR	0.0172	SCBPG	0.4861	SCBPG	0.4252
5	RKF2	-0.2771	RKF2	-0.0369	SCBTS3	0.0166	RKF2	0.3748	RKF2	0.0544
6	RKF	-0.5202	RKF	-0.0721	RKF3	0.0146	RKF	0.1266	ONE-FF	-0.1257
7	RKF3	-0.8936	SCIF2	-0.1148	THOR 3	0.0129	SCIF2	-0.1748	RKF	-0.1743
8	SCIF2	-0.9582	RKF3	-0.1193	SCBPG	0.0126	RKF3	-0.2064	SCIF2	-0.3180
9	ONE-FF	-0.9990	ONE-FF	-0.1357	RKF-HI	0.0126	ONE-FF	-0.3223	SCBTS2	-0.3307
10	ONE+1	-1.0860	ONE+1	-0.1470	BKA	0.0120	ONE+1	-0.4017	KPLUS	-0.3649
11	SCBTS2	-1.0902	SCBTS2	-0.1476	ONE+1	0.0119	SCBTS2	-0.4060	SCBTS	-0.3932
12	THOR 3	-1.1052	BKA	-0.1530	ONE-FAS	0.0114	BKA	-0.4440	KPLUS2	-0.4217
13	ONE-FAS	-1.1106	AGF	-0.1539	SCIF2	0.0114	AGF	-0.4503	RKF3	-0.4642
14	RKF-HI	-1.1335	ONE-FAS	-0.1546	SCBTS2	0.0099	ONE-FAS	-0.4556	ONE-FAS	-0.5232
15	BKA	-1.1593	RKF-HI	-0.1558	SW2	0.0095	RKF-HI	-0.4636	ONE+1	-0.5403
16	SCBTS	-1.1912	THOR 3	-0.1607	ONE-FF	0.0092	THOR 3	-0.4982	THOR 3	-0.5990
17	ONE-UB3	-1.4041	SCBTS	-0.1616	ONE-UB3	0.0092	SCBTS	-0.5049	AGF	-0.6202
18	KPLUS2	-1.4406	USD	-0.1922	SCBTS	0.0091	USD	-0.7206	BKA	-0.7203
19	KPLUS	-1.4673	BMF	-0.1944	NPAT-PRO	0.0086	BMF	-0.7360	RKF-HI	-0.7219
20	NPAT-PRO	-1.4892	ONE-UB3	-0.1947	BMF	0.0084	ONE-UB3	-0.7383	PPSD	-0.8501
21	AGF	-1.5068	KPLUS2	-0.1950	SCBMF	0.0078	KPLUS2	-0.7401	ONE-UB3	-0.8507
22	BMF	-1.5332	USD2	-0.1962	PPSD	0.0075	USD2	-0.7490	USD2	-0.9077
23	PPSD	-1.5361	KPLUS	-0.1985	TNP	0.0066	KPLUS	-0.7650	USD	-0.9168
24	SW2	-1.5480	SW2	-0.2035	KPLUS2	0.0064	SW2	-0.8005	ONE-UB2	-0.9255
25	SCBMF	-1.5690	NPAT-PRO	-0.2081	ONE-UB2	0.0063	NPAT-PRO	-0.8325	NPAT-PRO	-0.9605
26	ONE-UB2	-1.6526	PPSD	-0.2144	ONE-UB	0.0063	PPSD	-0.8770	SCBMF	-1.0341
27	ONE-UB	-1.7082	SCBMF	-0.2180	AGF	0.0062	SCBMF	-0.9028	ONE-UB	-1.0807
28	SCBMF2	-1.7435	ONE-D	-0.2225	SCBMF2	0.0061	ONE-D	-0.9340	BMF	-1.0969
29	ONE-G	-1.7873	ONE-UB2	-0.2247	RPF2	0.0061	ONE-UB2	-0.9497	ONE-G	-1.1235
30	RPF2	-1.8207	ONE-UB	-0.2360	KPLUS	0.0058	ONE-UB	-1.0296	ONE-WE	-1.1718
31	TNP	-1.8472	SCBMF2	-0.2420	ONE-G	0.0055	SCBMF2	-1.0722	SCBMF2	-1.1800
32	ONE-WE	-1.8734	ONE-G	-0.2485	SCBMF3	0.0049	ONE-G	-1.1181	ONE-D	-1.2780
33	SCBMF3	-1.8768	RPF2	-0.2528	ONE-WE	0.0046	RPF2	-1.1483	SCBMF3	-1.3122
34	ONE-PRO	-2.0111	TNP	-0.2586	ONE-PRO	0.0036	TNP	-1.1888	SW2	-1.4021
35	THOR2	-2.1899	ONE-WE	-0.2594	THOR2	0.0021	ONE-WE	-1.1947	ONE-PRO	-1.4070
36	SSB	-2.2235	SCBMF3	-0.2607	SSB	0.0018	SCBMF3	-1.2039	RPF2	-1.4942
37	THOR	-2.2687	SAN	-0.2751	THOR	0.0013	SAN	-1.3057	THOR2	-1.6215
38	USD	-2.3222	ONE-PRO	-0.2805	USD	0.0005	ONE-PRO	-1.3436	THOR	-1.7057
39	USD2	-2.3830	SSB	-0.3057	USD2	0.0001	SSB	-1.5213	SSB	-1.7475
40	ONE-D	-2.3911	THOR2	-0.3066	ONE-D	0.0001	THOR2	-1.5277	STD2	-1.7601
41	STD2	-2.5147	THOR	-0.3160	STD2	-0.0009	THOR	-1.5937	TNP	-1.8596
42	SCIF	-2.5517	RRF1	-0.3285	SCIF	-0.0015	RRF1	-1.6818	SAN	-2.2535
43	SF4	-2.5626	STD2	-0.3377	SF4	-0.0016	STD2	-1.7466	SCIF	-2.3639
44	STD	-2.7100	SCIF	-0.3573	STD	-0.0031	SCIF	-1.8854	STD	-2.3640
45	SF5	-2.8185	SF4	-0.3616	SF5	-0.0040	SF4	-1.9152	SF4	-2.3678
46	SAN	-2.9424	STD	-0.3816	SAN	-0.0045	STD	-2.0567	SF5	-2.3732
47	RRF1	-2.9446	SF5	-0.3965	RRF1	-0.0079	SF5	-2.1613	RRF1	-4.6803

Appendix G Annual performance rankings, 1992-2000 (continued)

1995

rank	name	Treynor	name	Sharpe	name	Jensen	name	M squared	name	rate of return
1	PPSD	6.5003	NPAT SAFTY	-0.0132	SAN	0.0071	NPAT SAFTY	0.7667	NPAT SAFTY	0.7657
2	NPAT SAFTY	-0.1077	SAN	-0.0559	SCDF	0.0067	SAN	0.4865	TVF	0.4931
3	RKEC	-0.4296	RKEC	-0.0628	RKEC	0.0060	RKEC	0.4410	RKEC	0.4897
4	SAN	-0.4618	TVF	-0.0857	SCIF	0.0058	TVF	0.2905	OSD	0.4128
5	TVF	-0.7163	OSD	-0.1071	RPF2	0.0058	OSD	0.1499	ONEUB-G	0.3585
6	SCDF	-0.7211	SCDF	-0.1090	SW2	0.0057	SCDF	0.1375	SAN	0.2827
7	BTP	-0.7528	BTP	-0.1109	SF7	0.0057	BTP	0.1253	ONE-PF	0.2348
8	SW2	-0.7636	SW2	-0.1147	SF4	0.0056	SW2	0.1003	BTP	0.1751
9	RPF2	-0.7844	ONE-UB	-0.1150	SPF	0.0051	ONE-UB	0.0981	ONE-FF	0.1230
10	ONE-UB	-0.7994	RPF2	-0.1180	SCIF2	0.0051	RPF2	0.0789	ONE-UB	0.0441
11	ONEUB-G	-0.8161	SF7	-0.1246	TS	0.0050	SF7	0.0350	RKF2	-0.0691
12	SF7	-0.8276	SCIF	-0.1255	AGF	0.0049	SCIF	0.0290	SW2	-0.0803
13	SCIF	-0.8295	SF4	-0.1278	NPAT SAFT	0.0049	SF4	0.0142	BKA	-0.0867
14	SF4	-0.8440	RKF2	-0.1307	SF5	0.0048	RKF2	-0.0049	SCBRT	-0.1140
15	SCIF2	-0.8643	SCIF2	-0.1310	STD2	0.0048	SCIF2	-0.0069	RKF	-0.1245
16	RKF2	-0.8745	TS	-0.1334	ONE-UB	0.0046	TS	-0.0223	RKF4	-0.1279
17	TS	-0.8799	SPF	-0.1342	BTP	0.0045	SPF	-0.0277	RKF3	-0.1310
18	OSD	-0.8833	SSB	-0.1365	RKF2	0.0042	SSB	-0.0427	SCDF	-0.1373
19	SPF	-0.8886	STD2	-0.1367	SSB	0.0041	STD2	-0.0445	SSB	-0.1447
20	SF5	-0.9039	SF5	-0.1369	THOR	0.0037	SF5	-0.0454	RPF2	-0.1479
21	SSB	-0.9100	PPSD	-0.1376	RKF	0.0035	PPSD	-0.0505	BKA2	-0.1603
22	STD2	-0.9102	AGF	-0.1402	RKF3	0.0035	AGF	-0.0669	CMICRK	-0.1974
23	AGF	-0.9244	RKF	-0.1417	RKF4	0.0032	RKF	-0.0771	RKF-HI	-0.1985
24	RKF	-0.9479	RKF3	-0.1429	ONEUB-G	0.0031	RKF3	-0.0850	USD	-0.2447
25	RKF3	-0.9552	THOR	-0.1458	BKA	0.0030	THOR	-0.1041	THOR	-0.2475
26	THOR	-0.9644	RKF4	-0.1468	RKF-HI	0.0029	RKF4	-0.1105	THOR2	-0.2594
27	RKF4	-0.9828	BKA	-0.1471	CMICRK	0.0028	BKA	-0.1128	SCIF2	-0.2605
28	BKA	-0.9856	RKF-HI	-0.1530	TVF	0.0027	RKF-HI	-0.1515	ONE-UB2	-0.2695
29	RKF-HI	-1.0261	CMICRK	-0.1532	TNP	0.0027	CMICRK	-0.1523	BMF	-0.2769
30	CMICRK	-1.0273	THOR2	-0.1604	THOR2	0.0026	THOR2	-0.1998	ONE-UB3	-0.2798
31	THOR2	-1.0674	BKA2	-0.1609	STD	0.0026	BKA2	-0.2029	KKF	-0.2809
32	BKA2	-1.0784	USD	-0.1655	BKA2	0.0022	USD	-0.2335	USD2	-0.2809
33	USD	-1.0996	TNP	-0.1671	USD	0.0022	TNP	-0.2436	SF7	-0.2823
34	TNP	-1.1011	STD	-0.1689	OSD	0.0020	STD	-0.2557	TS	-0.2859
35	STD	-1.1163	USD2	-0.1713	USD2	0.0019	USD2	-0.2716	ONE-UB5	-0.3125
36	USD2	-1.1388	BMF	-0.1760	DE-1	0.0018	BMF	-0.3026	SCIF	-0.3134
37	KKF	-1.1728	KKF	-0.1767	KKF	0.0015	KKF	-0.3068	SF4	-0.3176
38	DE-1	-1.1823	ONE-UB2	-0.1783	BMF	0.0013	ONE-UB2	-0.3172	ONE-PRO	-0.3304
39	BMF	-1.1923	DE-1	-0.1784	ONE-UB2	0.0013	DE-1	-0.3179	SF5	-0.3309
40	ONE-UB2	-1.1943	ONE-UB3	-0.1819	UNF	0.0012	ONE-UB3	-0.3410	TDF	-0.3446
41	ONE-UB3	-1.2264	UNF	-0.1859	ONE-UB3	0.0010	UNF	-0.3671	STD2	-0.3609
42	UNF	-1.2409	ONEUB-G	-0.1873	THOR 4	0.0007	ONEUB-G	-0.3765	SPF	-0.3659
43	THOR 4	-1.2838	THOR 4	-0.1944	ONE-UB5	0.0003	THOR 4	-0.4231	NPAT-PRO	-0.3982
44	ONE-UB5	-1.3162	ONE-PF	-0.1948	ONE-PF	-0.0002	ONE-PF	-0.4258	AGF	-0.4635
45	SCBTS3	-1.3875	ONE-UB5	-0.1957	SCBTS3	-0.0003	ONE-UB5	-0.4316	THANA1	-0.4863
46	SCBTS	-1.3894	ONE-FF	-0.2043	SCBTS	-0.0004	ONE-FF	-0.4883	PPSD	-0.4883
47	SCBTS2	-1.3922	SCBTS3	-0.2087	SCBTS2	-0.0004	SCBTS3	-0.5174	ONE+1	-0.4900
48	SCBMF	-1.3967	SCBTS	-0.2089	SCBMF	-0.0004	SCBTS	-0.5187	THOR 4	-0.5245
49	ONE-PF	-1.4034	SCBTS2	-0.2093	ONE-FF	-0.0006	SCBTS2	-0.5212	TNP	-0.5386
50	SCBMF2	-1.4636	SCBMF	-0.2110	SCBMF2	-0.0010	SCBMF	-0.5325	SPT	-0.5391
51	ONE-FF	-1.4748	SCBMF2	-0.2210	THANA1	-0.0012	SCBMF2	-0.5976	STD	-0.5723
52	SCBMF3	-1.4899	SCBMF4	-0.2219	SCBMF3	-0.0013	SCBMF4	-0.6040	KPLUS	-0.5791
53	SCBMF4	-1.4975	THANA1	-0.2236	ONE+1	-0.0013	THANA1	-0.6153	ONE-PR	-0.5895
54	SCBDA	-1.4978	SCBDA	-0.2249	SCBMF4	-0.0013	SCBDA	-0.6234	DE-1	-0.6059
55	THANA1	-1.5084	SCBMF3	-0.2254	SCBDA	-0.0014	SCBMF3	-0.6271	ONE-WE	-0.6309
56	ONE+1	-1.5179	ONE+1	-0.2256	TDF	-0.0017	ONE+1	-0.6279	KPLUS2	-0.6479
57	SCBPG	-1.5422	TDF	-0.2319	SCBPG	-0.0019	TDF	-0.6695	ONE-D	-0.6492
58	TDF	-1.6093	SCBPG	-0.2323	KPLUS	-0.0021	SCBPG	-0.6718	ONE-UB4	-0.6563
59	SCBMF5	-1.6163	KPLUS	-0.2426	ONE-PR	-0.0023	KPLUS	-0.7398	SCBMF	-0.6659
60	KPLUS	-1.6178	SCBMF5	-0.2441	KPLUS2	-0.0023	SCBMF5	-0.7496	SCBMF4	-0.6968
61	KPLUS2	-1.6335	ONE-PR	-0.2441	SCBMF5	-0.0023	ONE-PR	-0.7497	SCBMF2	-0.6998
62	THOR 3	-1.6352	KPLUS2	-0.2447	NPAT-PRO	-0.0024	KPLUS2	-0.7536	UNF	-0.7354
63	ONE-PR	-1.6434	THOR 3	-0.2460	THOR 3	-0.0025	THOR 3	-0.7624	SCBDA	-0.7459
64	ONE-D	-1.6913	ONE-D	-0.2503	ONE-D	-0.0027	ONE-D	-0.7907	SCBMF5	-0.7503
65	ONE-WE	-1.6996	ONE-WE	-0.2518	ONE-WE	-0.0027	ONE-WE	-0.7999	ONE-FAS	-0.7540
66	NPAT-PRO	-1.7095	NPAT-PRO	-0.2544	ONE-PRO	-0.0031	NPAT-PRO	-0.8174	SCBMF3	-0.7576
67	ONE-UB4	-1.7820	ONE-UB4	-0.2643	ONE-UB4	-0.0033	ONE-UB4	-0.8825	SCBTS3	-0.7668
68	ONE-PRO	-1.8747	BKD	-0.2763	BKD	-0.0058	BKD	-0.9612	SCBTS	-0.7694
69	BKD	-1.9600	ONE-PRO	-0.2773	SCBRT	-0.0061	ONE-PRO	-0.9675	THOR 3	-0.7746
70	ONE-FAS	-2.3071	ONE-G	-0.3234	ONE-FAS	-0.0062	ONE-G	-1.2704	SCBTS2	-0.7839
71	ONE-G	-2.3424	ONE-FAS	-0.3292	ONE-G	-0.0079	ONE-FAS	-1.3083	SCBPG	-0.8692
72	RRF1	-3.5578	RRF1	-0.3411	SPT	-0.0114	RRF1	-1.3866	ONE-G	-1.1827
73	SCBRT	-3.7345	SCBRT	-0.3915	PPSD	-0.0130	SCBRT	-1.7178	BKD	-1.2313
74	SPT	-7.7806	SPT	-0.5337	RRF1	-0.0169	SPT	-2.6519	RRF1	-2.1685

Appendix G Annual performance rankings, 1992-2000 (continued)

1996

rank	name	Treynor	name	Sharpe	name	Jensen	name	M squared	name	rate of return
1	RKEC	-3.1233	PPSD	-0.5174	PPSD	0.0123	PPSD	-2.1206	BTP	-1.7630
2	PPSD	-3.1342	BTP	-0.5445	RKEC	0.0121	BTP	-2.2720	RKEC	-2.5242
3	BTP	-3.2169	RKEC	-0.5508	THOR 4	0.0111	RKEC	-2.3071	THOR2	-2.5272
4	THOR 3	-3.2337	THOR 3	-0.5680	THOR 3	0.0107	THOR 3	-2.4029	THOR	-2.5274
5	THOR	-3.2344	ONE-PRO	-0.5681	THOR	0.0106	ONE-PRO	-2.4034	THOR 3	-2.5541
6	THOR 4	-3.2412	THOR	-0.5687	RKF	0.0105	THOR	-2.4069	SCBMF4	-2.5546
7	THOR2	-3.2456	THOR 4	-0.5699	ONE-FF	0.0105	THOR 4	-2.4134	ONE-FF	-2.5618
8	ONE-FF	-3.2543	THOR2	-0.5709	THOR2	0.0105	THOR2	-2.4190	ONEUB-G	-2.5712
9	RKF	-3.2744	ONE-FF	-0.5782	RKF2	0.0102	ONE-FF	-2.4601	TVF	-2.6233
10	ONEUB-G	-3.2841	ONEUB-G	-0.5818	ONEUB-G	0.0101	ONEUB-G	-2.4800	ONE-FAS	-2.6523
11	ONE-FAS	-3.3086	RKF	-0.5828	ONE-PF	0.0101	RKF	-2.4855	RKF3	-2.6575
12	RKF2	-3.3134	ONE-FAS	-0.5904	ONE-FAS	0.0100	ONE-FAS	-2.5278	RKF	-2.6646
13	TVF	-3.3182	TVF	-0.5904	ONE-G	0.0100	TVF	-2.5280	PPSD	-2.6685
14	ONE-PF	-3.3261	RKF2	-0.5906	ONE-D	0.0099	RKF2	-2.5288	SCBTS3	-2.6807
15	ONE-G	-3.3338	ONE-PF	-0.5922	TVF	0.0098	ONE-PF	-2.5379	NPAT-PRO	-2.6816
16	ONE-D	-3.3518	ONE-G	-0.5935	ONE-UB5	0.0095	ONE-G	-2.5453	SCBMF5	-2.6957
17	RKF3	-3.3530	SCBMF4	-0.5957	RKF3	0.0095	SCBMF4	-2.5575	THOR 4	-2.7031
18	NPAT-PRO	-3.3814	ONE-D	-0.5966	NPAT-PRO	0.0092	ONE-D	-2.5626	RKF4	-2.7033
19	ONE-UB5	-3.3898	RKF3	-0.5973	ONE+1	0.0091	RKF3	-2.5666	RKF2	-2.7143
20	ONE+1	-3.4210	NPAT-PRO	-0.6013	ONE-PR	0.0091	NPAT-PRO	-2.5889	RKF-HI	-2.7375
21	ONE-PR	-3.4328	ONE-UB5	-0.6037	CMICRK	0.0086	ONE-UB5	-2.6023	ONE-PRO	-2.7424
22	RKF-HI	-3.4497	ONE+1	-0.6102	RKF-HI	0.0085	ONE+1	-2.6385	ONE-PF	-2.7509
23	CMICRK	-3.4517	ONE-PR	-0.6135	RKF4	0.0084	ONE-PR	-2.6567	ONE-G	-2.7530
24	RKF4	-3.4518	RKF-HI	-0.6144	BTP	0.0084	RKF-HI	-2.6620	NPAT SAFTY	-2.7749
25	NPAT SAFTY	-3.4926	CMICRK	-0.6149	NPAT SAFTY	0.0081	CMICRK	-2.6643	CMICRK	-2.7790
26	ONE-UB4	-3.5214	RKF4	-0.6149	ONE-UB4	0.0080	RKF4	-2.6646	ONE-D	-2.8050
27	SCBMF4	-3.5593	NPAT SAFTY	-0.6205	USD	0.0078	NPAT SAFTY	-2.6961	BKA	-2.8132
28	RPF2	-3.5696	ONE-UB4	-0.6292	USD2	0.0078	ONE-UB4	-2.7446	BKD	-2.8283
29	USD	-3.6002	USD	-0.6338	RPF2	0.0077	USD	-2.7700	ONE+1	-2.8415
30	USD2	-3.6002	USD2	-0.6338	ONE-WE	0.0073	USD2	-2.7700	ONE-UB5	-2.8554
31	ONE-WE	-3.6036	SCBTS3	-0.6344	THANA1	0.0072	SCBTS3	-2.7735	SCBPMO	-2.8581
32	THANA1	-3.6105	RPF2	-0.6353	SPT	0.0070	RPF2	-2.7785	BKA2	-2.8678
33	SCBTS3	-3.6197	SPT	-0.6385	SCBMF4	0.0068	SPT	-2.7961	SCBPG	-2.8781
34	SPT	-3.6726	ONE-WE	-0.6430	SW2	0.0067	ONE-WE	-2.8213	ONE-PR	-2.8818
35	SW2	-3.6825	SCBMF5	-0.6432	SCBTS3	0.0065	SCBMF5	-2.8222	ONE-UB4	-2.9088
36	SF7	-3.7939	THANA1	-0.6439	SF7	0.0064	THANA1	-2.8263	BMF	-2.9441
37	ONE-PRO	-3.7984	SW2	-0.6549	SAN	0.0053	SW2	-2.8875	B-SUB	-2.9812
38	SPF	-3.8077	OSA	-0.6705	SPF	0.0053	OSA	-2.9745	ONE-WE	-3.0139
39	SRT	-3.8095	SPF	-0.6721	OSA	0.0052	SPF	-2.9838	THANA1	-3.0195
40	OSA	-3.8206	SF7	-0.6738	SRT	0.0049	SF7	-2.9929	SRT	-3.0334
41	ONE-UB2	-3.8210	ONE-UB2	-0.6751	ONE-UB2	0.0049	ONE-UB2	-3.0007	RPF2	-3.0443
42	SAN	-3.8255	BMBF	-0.6770	SF8	0.0047	BMBF	-3.0111	ONE-UB2	-3.1065
43	SCBTS2	-3.8575	SRT	-0.6785	SSB	0.0047	SRT	-3.0193	SCBTS2	-3.1674
44	SSB	-3.8656	SAN	-0.6803	BMBF	0.0047	SAN	-3.0295	ONE-UB3	-3.1768
45	SCBMF5	-3.8669	SSB	-0.6819	ONE-PRO	0.0046	SSB	-3.0382	SW2	-3.2487
46	ONE-UB3	-3.9015	SCBTS2	-0.6853	SCBTS2	0.0046	SCBTS2	-3.0570	USD	-3.2689
47	SF8	-3.9105	ONE-UB3	-0.6879	KKF	0.0041	ONE-UB3	-3.0719	USD2	-3.2689
48	BMBF	-3.9336	BKA	-0.6930	ONE-UB3	0.0041	BKA	-3.1004	SPF	-3.3173
49	KKF	-3.9348	SF8	-0.6942	SCBMF5	0.0039	SF8	-3.1070	ASD	-3.3285
50	APF	-3.9636	BMF	-0.6979	APF	0.0038	BMF	-3.1277	SPT	-3.3344
51	TDF	-3.9980	KKF	-0.7019	TDF	0.0033	KKF	-3.1501	SSB	-3.3721
52	BMF	-4.0000	PISD	-0.7049	TS	0.0032	PISD	-3.1664	TDF	-3.4602
53	BKA	-4.0026	BKA2	-0.7053	PISD	0.0032	BKA2	-3.1688	KPLUS	-3.4728
54	PISD	-4.0152	APF	-0.7081	BMF	0.0029	APF	-3.1846	KPLUS2	-3.4816
55	TS	-4.0286	BKD	-0.7111	BKA	0.0028	BKD	-3.2013	PISD	-3.4973
56	BKA2	-4.0785	TDF	-0.7142	SCBTS	0.0025	TDF	-3.2187	SAN	-3.5017
57	SCBMF	-4.0920	TS	-0.7162	SCBMF	0.0025	TS	-3.2296	ONE-UB	-3.5039
58	SCBTS	-4.0975	SCBMF	-0.7265	KPLUS	0.0022	SCBMF	-3.2872	APF	-3.5346
59	BKD	-4.0979	SCBTS	-0.7282	BKA2	0.0021	SCBTS	-3.2964	KKF	-3.5658
60	KPLUS	-4.0991	KPLUS	-0.7329	KPLUS2	0.0021	KPLUS	-3.3226	SCBMF2	-3.6452
61	KPLUS2	-4.1147	RRF1	-0.7330	BKD	0.0019	RRF1	-3.3236	TNP	-3.7230
62	SCBPG	-4.1840	KPLUS2	-0.7357	SCBMF2	0.0012	KPLUS2	-3.3384	SCIF2	-3.7322
63	SCBMF2	-4.2029	SCBPG	-0.7373	SCBPG	0.0012	SCBPG	-3.3472	SCBMF	-3.7506
64	RRF1	-4.2430	SCBPMO	-0.7433	RRF1	0.0009	SCBPMO	-3.3808	UNF	-3.8159
65	SCBPMO	-4.2469	ONE-UB	-0.7437	SCBPMO	0.0006	ONE-UB	-3.3833	TS	-3.8222
66	AGF	-4.2798	SCBMF2	-0.7477	AGF	0.0005	SCBMF2	-3.4053	SCDF	-3.8662
67	SCBMF3	-4.2823	B-SUB	-0.7502	SCBMF3	0.0004	B-SUB	-3.4194	SCBMF3	-3.8934
68	TNP	-4.2827	AGF	-0.7518	TNP	0.0004	AGF	-3.4282	SF8	-3.9042
69	SCDF	-4.2959	SCDF	-0.7608	SCDF	0.0003	SCDF	-3.4786	SCIF	-3.9124
70	B-SUB	-4.3244	SCBMF3	-0.7614	B-SUB	0.0000	SCBMF3	-3.4818	STD	-3.9256
71	SCIF2	-4.3743	TNP	-0.7627	SCIF2	-0.0005	TNP	-3.4892	SCBTS	-3.9489
72	ONE-UB	-4.4390	SCIF2	-0.7718	ONE-UB	-0.0011	SCIF2	-3.5397	AGF	-3.9560
73	SF5	-4.4843	SF5	-0.7931	SF5	-0.0017	SF5	-3.6587	SF7	-4.0201
74	SCIF	-4.5536	SCIF	-0.8042	SCIF	-0.0023	SCIF	-3.7207	SF5	-4.0349
75	SF4	-4.6059	SF4	-0.8123	SF4	-0.0029	SF4	-3.7659	DE-1	-4.0977
76	DE-1	-4.6618	DE-1	-0.8279	DE-1	-0.0034	DE-1	-3.8527	STD2	-4.1231
77	STD	-4.7294	STD	-0.8385	STD	-0.0039	STD	-3.9121	BMBF	-4.2006
78	UNF	-4.8094	UNF	-0.8507	UNF	-0.0045	UNF	-3.9797	SF4	-4.2029
79	SCBDA	-4.8524	SCBDA	-0.8511	SCBDA	-0.0053	SCBDA	-3.9820	SCBRT	-4.2376
80	SCBRT	-4.9133	SCBRT	-0.8668	SCBRT	-0.0058	SCBRT	-4.0697	SCBDA	-4.2433
81	STD2	-5.0051	STD2	-0.8756	STD2	-0.0065	STD2	-4.1189	RRF1	-4.4423

Appendix G Annual performance rankings, 1992-2000 (continued)

1997

rank	name	Treynor	name	Sharpe	name	Jensen	name	M squared	name	rate of return
1	KKF	-5.3809	SSB	-0.4035	KKF	0.0212	SSB	-4.4158	PPSD	-0.4774
2	APF	-5.3928	THOR2	-0.4109	APF	0.0212	THOR2	-4.5108	THOR	-2.2780
3	THOR2	-5.4428	APF	-0.4115	TS	0.0184	APF	-4.5185	THOR2	-2.7716
4	ONEUB-G	-5.6401	KKF	-0.4116	UNF	0.0174	KKF	-4.5196	ONE-D	-3.0551
5	ONE-PRO	-5.7446	ONEUB-G	-0.4134	ONE-PRO	0.0173	ONEUB-G	-4.5439	THOR 4	-3.3726
6	ONE-PF	-5.7709	THOR 3	-0.4270	ONE-PF	0.0161	THOR 3	-4.7189	ONE-G	-3.4617
7	TS	-5.9837	ONE-PF	-0.4284	USD2	0.0157	ONE-PF	-4.7370	ONEUB-G	-3.4972
8	USD2	-6.0017	ONE-PRO	-0.4339	USD	0.0155	ONE-PRO	-4.8078	THOR 3	-3.5319
9	USD	-6.0243	ONE-D	-0.4494	TDF	0.0154	ONE-D	-5.0067	ONE-FF	-3.8221
10	TDF	-6.0512	USD2	-0.4496	ONEUB-G	0.0153	USD2	-5.0091	ONE-PF	-4.1618
11	ONE-D	-6.1626	TDF	-0.4505	SW2	0.0146	TDF	-5.0204	KKF	-4.3968
12	THOR 4	-6.1676	USD	-0.4520	THOR2	0.0145	USD	-5.0405	APF	-4.4345
13	THOR 3	-6.1838	ONE-FF	-0.4596	SCBMF4	0.0131	ONE-FF	-5.1384	ONE-PRO	-4.4604
14	SRT	-6.2336	TS	-0.4599	SRT	0.0129	TS	-5.1424	SCBTS2	-4.5332
15	SW2	-6.2454	THOR 4	-0.4642	KPLUS	0.0129	THOR 4	-5.1968	RKF3	-4.5763
16	UNF	-6.2503	SPT	-0.4674	AGF	0.0127	SPT	-5.2383	RKF	-4.5934
17	SPT	-6.2847	KPLUS	-0.4720	ONE-FAS	0.0127	KPLUS	-5.2979	RKF2	-4.6272
18	ONE-FAS	-6.3226	ONE-G	-0.4723	SPT	0.0126	ONE-G	-5.3023	RKF-HI	-4.6311
19	ONE-G	-6.3380	ONE-FAS	-0.4742	SF7	0.0122	ONE-FAS	-5.3268	TVF	-4.6562
20	ONE-FF	-6.3735	OSA	-0.4754	SCBMF5	0.0121	OSA	-5.3414	SCBTS	-4.6642
21	KPLUS	-6.3749	SRT	-0.4765	OSA	0.0117	SRT	-5.3561	SRT	-4.6765
22	OSA	-6.3897	KPLUS2	-0.4792	KPLUS2	0.0115	KPLUS2	-5.3902	RKF4	-4.6887
23	RKEC	-6.4359	SW2	-0.4815	SCBDA	0.0113	SW2	-5.4205	BMF	-4.6930
24	TVF	-6.4933	UNF	-0.4820	SF8	0.0111	UNF	-5.4261	RKEC	-4.7159
25	KPLUS2	-6.5065	PISD	-0.4830	RKEC	0.0111	PISD	-5.4391	ONE-UB5	-4.7187
26	PISD	-6.5069	BCAP	-0.4836	PISD	0.0110	BCAP	-5.4474	CMICRK	-4.7625
27	AGF	-6.5317	RKEC	-0.4840	SF4	0.0108	RKEC	-5.4528	SPT	-4.7972
28	SF4	-6.5728	TVF	-0.4920	SAN	0.0107	TVF	-5.5559	RKEDC	-4.8029
29	NPAT-PRO	-6.5746	NPAT-PRO	-0.4939	THOR 3	0.0107	NPAT-PRO	-5.5801	OSA	-4.8609
30	SCBMF4	-6.5767	AGF	-0.5004	THOR 4	0.0106	AGF	-5.6637	SCDF	-4.8942
31	SCBTS3	-6.5824	SCBMF4	-0.5014	TVF	0.0105	SCBMF4	-5.6764	USD2	-4.8981
32	SCBMF5	-6.6463	SCBTS3	-0.5017	NPAT-PRO	0.0103	SCBTS3	-5.6808	USD	-4.9160
33	SCBTS	-6.6485	RKF	-0.5022	SCBTS3	0.0102	RKF	-5.6867	THANA1	-4.9188
34	RKF	-6.6503	RKF2	-0.5038	RPF2	0.0101	RKF2	-5.7069	ONE+1	-4.9257
35	SCDF	-6.6618	SF4	-0.5045	TNP	0.0099	SF4	-5.7165	SCBTS3	-4.9447
36	RKF2	-6.6652	RKEDC	-0.5046	ONE-FF	0.0098	RKEDC	-5.7170	SCBPG	-4.9606
37	RKEDC	-6.6675	RKF4	-0.5053	ONE-D	0.0098	RKF4	-5.7272	SPF	-4.9754
38	RKF4	-6.6795	ONE-UB5	-0.5068	BCAP	0.0097	ONE-UB5	-5.7454	TDF	-4.9850
39	SAN	-6.7178	SCDF	-0.5071	DE-1	0.0096	SCDF	-5.7502	ONE-FAS	-4.9861
40	SF7	-6.7224	SCBMF5	-0.5075	RRF1	0.0095	SCBMF5	-5.7548	ONE-UB4	-4.9950
41	CMICRK	-6.7258	CMICRK	-0.5098	ONE-G	0.0095	CMICRK	-5.7843	ONE-UB3	-4.9988
42	RKF3	-6.7452	RKF3	-0.5102	SCDF	0.0093	RKF3	-5.7902	ONE-PR	-4.9991
43	SCBTS2	-6.7714	SCBTS	-0.5104	RKEDC	0.0092	SCBTS	-5.7928	NPAT-PRO	-5.0222
44	BCAP	-6.7817	SCBDA	-0.5152	SCBTS	0.0091	SCBDA	-5.8535	ONE-WE	-5.0409
45	ONE-UB5	-6.7945	ONE-UB2	-0.5152	STD2	0.0090	ONE-UB2	-5.8537	ONE-UB2	-5.0894
46	RPF2	-6.7988	ONE-PR	-0.5158	RKF	0.0090	ONE-PR	-5.8612	PISD	-5.0951
47	RKF-HI	-6.8125	SF7	-0.5164	RKF2	0.0089	SF7	-5.8693	ONE-UB	-5.1374
48	SCBDA	-6.8134	RKF-HI	-0.5164	RKF4	0.0089	RKF-HI	-5.8699	SF4	-5.2552
49	DE-1	-6.8178	ONE-UB3	-0.5166	CMICRK	0.0086	ONE-UB3	-5.8721	KPLUS2	-5.3800
50	SF8	-6.8199	ONE-UB	-0.5168	RKF3	0.0082	ONE-UB	-5.8744	KPLUS	-5.4194
51	STD2	-6.8738	ONE+1	-0.5185	ONE-UB5	0.0079	ONE+1	-5.8964	SW2	-5.4940
52	ONE-UB3	-6.8743	SAN	-0.5194	SCBTS2	0.0079	SAN	-5.9087	TS	-5.8278
53	TNP	-6.8765	SCBTS2	-0.5213	RKF-HI	0.0077	SCBTS2	-5.9328	SF5	-5.8781
54	ONE-UB2	-6.8823	SF8	-0.5233	ONE-UB2	0.0077	SF8	-5.9586	SCBMF2	-5.9449
55	ONE-PR	-6.8832	DE-1	-0.5251	ONE-UB3	0.0076	DE-1	-5.9815	SCBPMO	-5.9754
56	ONE-UB	-6.9159	THANA1	-0.5253	ONE-PR	0.0075	THANA1	-5.9837	STD	-6.0018
57	RRF1	-6.9186	RPF2	-0.5260	ONE-UB	0.0074	RPF2	-5.9929	SCBRT	-6.0541
58	ONE+1	-6.9251	RRF1	-0.5299	ONE+1	0.0071	RRF1	-6.0433	BCAP	-6.0724
59	THANA1	-7.0189	TNP	-0.5304	STD	0.0063	TNP	-6.0501	STD2	-6.1095
60	STD	-7.1336	STD2	-0.5321	THANA1	0.0063	STD2	-6.0717	SCBMF	-6.1426
61	SCBPG	-7.1381	ONE-WE	-0.5327	SF5	0.0060	ONE-WE	-6.0798	DE-1	-6.1437
62	ONE-WE	-7.1449	ONE-UB4	-0.5377	SCBMF2	0.0055	ONE-UB4	-6.1435	SCBMF3	-6.1623
63	SF5	-7.1571	SF5	-0.5395	BTP	0.0054	SF5	-6.1676	SAN	-6.1706
64	ONE-UB4	-7.1799	SPF	-0.5447	SCBPG	0.0054	SPF	-6.2340	AGF	-6.1713
65	SCBMF2	-7.2135	THOR	-0.5449	ONE-WE	0.0054	THOR	-6.2367	SCIF	-6.3192
66	SPF	-7.2587	BTP	-0.5471	SCBMF	0.0052	BTP	-6.2650	BMBF	-6.3604
67	BTP	-7.2664	SCBPG	-0.5485	ONE-UB4	0.0051	SCBPG	-6.2827	RPF2	-6.3683
68	SCBMF	-7.2666	STD	-0.5513	SPF	0.0044	STD	-6.3195	SCIF2	-6.3732
69	SCIF2	-7.4769	SCBMF2	-0.5517	SCIF2	0.0034	SCBMF2	-6.3235	SSB	-6.4872
70	SCBMF3	-7.5195	SCBMF	-0.5551	SCBMF3	0.0029	SCBMF	-6.3677	BTP	-6.5295
71	BMBF	-7.5649	SCIF2	-0.5729	BMBF	0.0026	SCIF2	-6.5964	SCBMF5	-6.6463
72	BKD	-7.6705	SCBMF3	-0.5737	BKD	0.0017	SCBMF3	-6.6070	BKD	-6.6799
73	SCIF	-7.6858	BKD	-0.5794	SCIF	0.0015	BKD	-6.6803	SCBMF4	-6.7291
74	SCBRT	-7.7433	BMBF	-0.5845	SCBRT	0.0010	BMBF	-6.7462	UNF	-6.8829
75	BKA	-7.7756	SCBPMO	-0.5868	BKA	0.0008	SCBPMO	-6.7757	TNP	-6.9196
76	SCBPMO	-7.7983	BKA	-0.5869	SCBPMO	0.0005	BKA	-6.7779	BKA	-6.9700
77	THOR	-7.8372	SCIF	-0.5885	THOR	0.0001	SCIF	-6.7985	RRF1	-7.0010
78	BKA2	-7.8981	SCBRT	-0.5893	BKA2	-0.0003	SCBRT	-6.8086	B-SUB	-7.1438
79	B-SUB	-7.9023	BKA2	-0.5956	B-SUB	-0.0003	BKA2	-6.8899	BKA2	-7.1622
80	BMF	-9.9936	B-SUB	-0.5957	PPSD	-0.0102	B-SUB	-6.8901	SF7	-7.2945
81	SSB	-14.2754	BMF	-0.6306	BMF	-0.0110	BMF	-7.3402	SF8	-7.4096
82	PPSD	-43.2106	PPSD	-1.1047	SSB	-0.0279	PPSD	-13.4446	SCBDA	-7.5411

Appendix G Annual performance rankings, 1992-2000 (continued)

1998

rank	name	Treynor	name	Sharpe	name	Jensen	name	M squared	name	rate of return
1	NSG	1.4239	NSG	0.0616	NSG	0.0163	NSG	2.0688	NSG	0.5504
2	ONE-WE	-0.0081	ONE-WE	-0.0003	BCAP	0.0042	ONE-WE	0.7579	USD2	0.3822
3	BCAP	-0.1900	BCAP	-0.0080	B-SUB	0.0038	BCAP	0.5966	ONE-WE	0.3034
4	B-SUB	-0.2476	USD2	-0.0102	ONE-WE	0.0033	USD2	0.5493	USD	0.1274
5	USD2	-0.2489	B-SUB	-0.0105	BKD	0.0029	B-SUB	0.5434	SCBMF	-0.1990
6	BKD	-0.3617	BKD	-0.0153	BKA	0.0022	BKD	0.4418	ONE-UB4	-0.4198
7	BKA	-0.4640	BKA	-0.0196	BKA2	0.0021	BKA	0.3494	ONE-UB3	-0.4471
8	BKA2	-0.4787	BKA2	-0.0202	USD2	0.0018	BKA2	0.3383	SRT	-0.6070
9	BTP	-1.0292	USD	-0.0428	USD	-0.0009	USD	-0.1413	ONE-PR	-0.6224
10	SRT	-1.0342	BTP	-0.0437	SRT	-0.0014	BTP	-0.1588	BCAP	-0.6428
11	USD	-1.0814	SRT	-0.0438	BTP	-0.0016	SRT	-0.1615	RKF2	-0.6534
12	ONE-UB4	-1.1532	ONE-UB4	-0.0487	ONE-UB4	-0.0018	ONE-UB4	-0.2661	B-SUB	-0.6740
13	ONE-UB3	-1.2278	ONE-UB3	-0.0518	ONE-UB3	-0.0022	ONE-UB3	-0.3309	THANA1	-0.6986
14	ONE-PR	-1.4282	ONE-D	-0.0599	ONE-PR	-0.0033	ONE-D	-0.5017	ONE-UB	-0.7017
15	ONE-D	-1.4347	ONE-PR	-0.0602	ONE-D	-0.0034	ONE-PR	-0.5076	BKD	-0.7019
16	TNP	-1.4521	THOR2	-0.0616	THANA1	-0.0039	THOR2	-0.5385	ONE-D	-0.7136
17	SSB	-1.4704	OSA	-0.0623	ONE-UB	-0.0040	OSA	-0.5522	ONE-UB2	-0.7188
18	OSA	-1.5014	TNP	-0.0630	OSA	-0.0040	TNP	-0.5666	BKA	-0.7202
19	THANA1	-1.5613	SSB	-0.0651	ONE-UB2	-0.0043	SSB	-0.6109	SCBRT	-0.7305
20	ONE-UB	-1.5679	THANA1	-0.0655	SCBRT	-0.0044	THANA1	-0.6213	ONE-UB5	-0.7319
21	ONE-UB2	-1.6249	ONE-UB	-0.0659	ONE+1	-0.0046	ONE-UB	-0.6286	BKA2	-0.7423
22	SCBRT	-1.6426	ONE-UB2	-0.0684	ONE-UB5	-0.0046	ONE-UB2	-0.6816	SCBTS3	-0.7481
23	APF	-1.6547	APF	-0.0693	THOR2	-0.0047	APF	-0.7010	ONE+1	-0.7824
24	ONE+1	-1.6784	ONE+1	-0.0710	APF	-0.0047	ONE+1	-0.7359	THOR2	-0.8663
25	ONE-UB5	-1.7107	SCBRT	-0.0711	TNP	-0.0051	SCBRT	-0.7387	NPAT-PRO	-0.8678
26	THOR2	-1.7504	ONE-UB5	-0.0723	SCBMF	-0.0051	ONE-UB5	-0.7648	KPLUS	-0.8681
27	SAN	-1.7718	SF5	-0.0768	SSB	-0.0054	SF5	-0.8590	APF	-0.8816
28	UNF	-1.8467	NPAT-PRO	-0.0773	NPAT-PRO	-0.0054	NPAT-PRO	-0.8709	RKF3	-0.9083
29	SF5	-1.8507	SAN	-0.0780	SF5	-0.0061	SAN	-0.8852	OSA	-0.9127
30	NPAT-PRO	-1.8513	SPT	-0.0781	SPT	-0.0063	SPT	-0.8871	AJFSCAP	-0.9218
31	RPF2	-1.9023	UNF	-0.0790	ONE-FAS	-0.0063	UNF	-0.9060	BTP	-0.9792
32	SPT	-1.9220	ONE-FAS	-0.0807	RKF2	-0.0067	ONE-FAS	-0.9422	KPLUS2	-1.0180
33	ONE-FAS	-1.9303	RPF2	-0.0822	KPLUS	-0.0071	RPF2	-0.9732	SCBTS2	-1.0307
34	SF8	-2.0825	SF8	-0.0896	SAN	-0.0075	SF8	-1.1307	SCBPMO	-1.0894
35	SF7	-2.1472	RKF2	-0.0914	UNF	-0.0076	RKF2	-1.1682	TVF	-1.0959
36	KPLUS	-2.3265	SF7	-0.0925	RPF2	-0.0079	SF7	-1.1905	ONE-FAS	-1.1052
37	ONE-PRO	-2.4561	KPLUS	-0.0953	KPLUS2	-0.0085	KPLUS	-1.2514	SPT	-1.1300
38	DE-1	-2.5033	TVF	-0.0955	TVF	-0.0085	TVF	-1.2550	SF5	-1.1503
39	SCBMF	-2.5423	ONE-PRO	-0.0985	AJFSCAP	-0.0089	ONE-PRO	-1.3182	CMICRK	-1.1705
40	ONE-G	-2.5501	ONE-G	-0.1045	SF8	-0.0093	ONE-G	-1.4453	SCBTS	-1.1906
41	KKF	-2.5664	SCBMF	-0.1049	CMICRK	-0.0093	SCBMF	-1.4535	THOR 3	-1.2005
42	KPLUS2	-2.6047	CMICRK	-0.1053	ONE-PRO	-0.0096	CMICRK	-1.4613	SCBPG	-1.2881
43	PISD	-2.6459	KPLUS2	-0.1068	ONE-G	-0.0098	KPLUS2	-1.4940	THOR 4	-1.3585
44	RKF2	-2.6511	RKEC	-0.1073	KKF	-0.0099	RKEC	-1.5055	RKEC	-1.3616
45	SCIF2	-2.6546	KKF	-0.1080	SF7	-0.0101	KKF	-1.5198	RKF4	-1.3907
46	TS	-2.6653	DE-1	-0.1082	RKF3	-0.0101	DE-1	-1.5230	ONE-PF	-1.3914
47	SCDF	-2.7366	SCIF2	-0.1113	RKEC	-0.0102	SCIF2	-1.5894	KKF	-1.4431
48	TVF	-2.7551	TS	-0.1117	SCBTS3	-0.0102	TS	-1.5976	RKF-HI	-1.4663
49	CMICRK	-2.8808	PISD	-0.1122	PISD	-0.0110	PISD	-1.6080	ONE-G	-1.5200
50	SCBDA	-2.8830	SCBDA	-0.1138	ONE-PF	-0.0113	SCBDA	-1.6413	RKF	-1.5615
51	RKEC	-2.9893	AJFSCAP	-0.1138	SCBPMO	-0.0113	AJFSCAP	-1.6421	ONE-PRO	-1.5759
52	ONE-PF	-3.1009	SCDF	-0.1190	THOR 3	-0.0113	SCDF	-1.7518	PISD	-1.6887
53	AGF	-3.2136	ONE-PF	-0.1261	SCIF2	-0.0114	ONE-PF	-1.9033	RKEDC	-1.7348
54	AJFSCAP	-3.2288	RKEDC	-0.1264	THOR 4	-0.0121	RKEDC	-1.9096	TNP	-1.7976
55	SW2	-3.2576	THOR 3	-0.1284	RKF4	-0.0122	THOR 3	-1.9500	RPF2	-1.8348
56	SCIF	-3.2640	THOR 4	-0.1304	RKF-HI	-0.0127	THOR 4	-1.9924	SCIF2	-1.8406
57	RRF1	-3.4019	RKF4	-0.1332	TS	-0.0128	RKF4	-2.0521	UNF	-1.8692
58	RKEDC	-3.5329	AGF	-0.1340	DE-1	-0.0132	AGF	-2.0704	SW2	-1.9564
59	SCBPMO	-3.6358	RKF3	-0.1357	RKEDC	-0.0132	RKF3	-2.1046	SSB	-1.9583
60	RKF4	-3.6500	RKF-HI	-0.1365	RKF	-0.0134	RKF-HI	-2.1219	SAN	-1.9892
61	THOR 3	-3.7114	SW2	-0.1370	SCBDA	-0.0137	SW2	-2.1327	ONE-FF	-1.9906
62	THOR 4	-3.7172	SCIF	-0.1371	SCDF	-0.0139	SCIF	-2.1343	SF8	-2.0105
63	SF4	-3.7180	RKF	-0.1414	SCBPG	-0.0140	RKF	-2.2259	SF4	-2.1020
64	BMBF	-3.7252	RRF1	-0.1420	SW2	-0.0142	RRF1	-2.2390	SF7	-2.2202
65	RKF-HI	-3.7456	SCBPMO	-0.1507	SCBTS2	-0.0151	SCBPMO	-2.4228	SCIF	-2.2866
66	RKF3	-3.7943	SF4	-0.1515	SCIF	-0.0153	SF4	-2.4400	TS	-2.3084
67	SPF	-3.8713	BMBF	-0.1568	SCBTS	-0.0155	BMBF	-2.5515	SCBDA	-2.3577
68	RKF	-3.8842	STD2	-0.1620	SF4	-0.0161	STD2	-2.6623	BMBF	-2.3642
69	STD2	-3.9466	SPF	-0.1624	AGF	-0.0163	SPF	-2.6710	SCBMF2	-2.3938
70	STD	-4.1213	STD	-0.1664	RRF1	-0.0170	STD	-2.7537	SCDF	-2.4616
71	SCBTS3	-4.1975	SCBTS3	-0.1682	BMBF	-0.0174	SCBTS3	-2.7926	STD2	-2.4828
72	TDF	-4.4545	TDF	-0.1794	ONE-FF	-0.0176	TDF	-3.0288	TDF	-2.5024
73	ONE-FF	-4.6276	ONE-FF	-0.1819	STD2	-0.0184	ONE-FF	-3.0823	RRF1	-2.5899
74	SCBPG	-4.6842	SCBPG	-0.1875	SPF	-0.0194	SCBPG	-3.2017	SCBMF3	-2.6436
75	SCBMF4	-5.4575	SCBMF2	-0.2144	STD	-0.0197	SCBMF2	-3.7705	AGF	-2.6475
76	SCBMF2	-5.5122	SCBMF4	-0.2149	TDF	-0.0200	SCBMF4	-3.7811	DE-1	-2.6593
77	SCBMF5	-5.5843	SCBMF5	-0.2186	SCBMF2	-0.0215	SCBMF5	-3.8593	STD	-2.6617
78	SCBMF3	-5.6255	SCBMF3	-0.2202	SCBMF3	-0.0232	SCBMF3	-3.8937	SPF	-2.7329
79	SCBTS	-6.6645	THOR	-0.2486	SCBMF5	-0.0279	THOR	-4.4929	PPSD	-3.3367
80	PPSD	-7.2262	SCBTS	-0.2672	SCBMF4	-0.0281	SCBTS	-4.8862	SCBMF5	-3.5695
81	THOR	-7.5334	PPSD	-0.2886	PPSD	-0.0304	PPSD	-5.3395	THOR	-3.6207
82	SCBTS2	-7.9248	SCBTS2	-0.3249	THOR	-0.0314	SCBTS2	-6.1069	SCBMF4	-3.6646

Appendix G Annual performance rankings, 1992-2000 (continued)

1999

rank	name	Treynor	name	Sharpe	name	Jensen	name	M squared	name	rate of return
1	AJFSCAP	3.7794	AJFSCAP	0.2884	AJFSCAP	0.0177	AJFSCAP	4.0419	AJFSCAP	3.5655
2	KKF	3.4673	TDF	0.2593	KKF	0.0137	TDF	3.6745	TDF	3.0063
3	TDF	3.4028	APF	0.2513	TDF	0.0126	APF	3.5733	APF	2.8998
4	APF	3.3035	KPLUS2	0.2484	APF	0.0115	KPLUS2	3.5365	KPLUS2	2.8934
5	KPLUS2	3.2642	KPLUS	0.2340	KPLUS2	0.0114	KPLUS	3.3540	KPLUS	2.7312
6	KPLUS	3.0937	NSG	0.2214	KPLUS	0.0098	NSG	3.1952	NSG	2.5556
7	NSG	2.8367	KKF	0.1930	NSG	0.0075	KKF	2.8357	KKF	2.3968
8	SCBRT	2.4120	SCBRT	0.1772	SCBRT	0.0020	SCBRT	2.6360	ONE-FF	1.7487
9	ONE-FF	2.2499	ONE-FF	0.1714	ONE-FF	0.0011	ONE-FF	2.5630	SCBRT	1.6684
10	THOR	2.2392	THOR	0.1660	THOR	0.0008	THOR	2.4950	ONE-UB2	1.6394
11	ONE+1	2.0913	ONE-UB2	0.1596	ONE+1	-0.0003	ONE-UB2	2.4134	ONE+1	1.6316
12	ONE-UB2	2.0888	ONE+1	0.1593	ONE-UB2	-0.0003	ONE+1	2.4096	ONE-UB	1.6024
13	ONE-UB	2.0572	ONE-UB	0.1568	ONE-UB	-0.0006	ONE-UB	2.3788	ONE-PR	1.5946
14	ONE-PR	2.0203	ONE-PR	0.1538	ONE-PR	-0.0010	ONE-PR	2.3405	THANA1	1.5663
15	THANA1	1.9939	THANA1	0.1522	THANA1	-0.0012	THANA1	2.3197	ONEUB-G	1.5045
16	ONEUB-G	1.9509	ONEUB-G	0.1496	RKF-HI	-0.0014	ONEUB-G	2.2875	THOR	1.4955
17	RKF-HI	1.9249	RKF-HI	0.1474	ONEUB-G	-0.0015	RKF-HI	2.2595	ONE-UB4	1.4351
18	ONE-UB4	1.8787	ONE-UB4	0.1434	RKF	-0.0019	ONE-UB4	2.2096	SAN	1.4182
19	RKF	1.8538	RKF	0.1421	ONE-UB4	-0.0022	RKF	2.1931	ONE-PRO	1.4137
20	ONE-PRO	1.8534	SAN	0.1414	ONE-PRO	-0.0025	SAN	2.1841	RKF-HI	1.3471
21	SAN	1.8394	ONE-PRO	0.1408	SAN	-0.0026	ONE-PRO	2.1760	TNP	1.3452
22	TNP	1.8015	TNP	0.1382	TNP	-0.0027	TNP	2.1437	RKF	1.3100
23	ONE-G	1.7312	ONE-G	0.1321	RKEC	-0.0030	ONE-G	2.0665	ONE-G	1.3075
24	ONE-D	1.7096	ONE-D	0.1308	RKF3	-0.0032	ONE-D	2.0497	ONE-D	1.2892
25	ONE-FAS	1.7079	ONE-FAS	0.1302	CMICRK	-0.0034	ONE-FAS	2.0420	ONE-FAS	1.2875
26	RKEC	1.6935	RKEC	0.1301	TVF	-0.0035	RKEC	2.0405	ONE-UB3	1.2484
27	RKF3	1.6796	RKF3	0.1287	ONE-G	-0.0036	RKF3	2.0237	NPAT-PRO	1.2416
28	ONE-UB3	1.6707	NPAT-PRO	0.1268	ONE-D	-0.0037	NPAT-PRO	1.9990	ONE-WE	1.2169
29	NPAT-PRO	1.6624	ONE-UB3	0.1265	ONE-FAS	-0.0038	ONE-UB3	1.9947	RKEC	1.1951
30	CMICRK	1.6401	CMICRK	0.1258	RKF2	-0.0039	CMICRK	1.9860	RKF3	1.1902
31	TVF	1.6396	TVF	0.1256	NPAT-PRO	-0.0041	TVF	1.9845	ONE-PF	1.1851
32	ONE-WE	1.6259	ONE-WE	0.1245	ONE-UB3	-0.0042	ONE-WE	1.9704	CMICRK	1.1581
33	ONE-PF	1.5922	ONE-PF	0.1222	THOR2	-0.0042	ONE-PF	1.9415	TVF	1.1578
34	RKF2	1.5868	RKF2	0.1217	RKF4	-0.0044	RKF2	1.9343	RKF2	1.1257
35	RKF4	1.5120	RKF4	0.1159	ONE-WE	-0.0046	RKF4	1.8606	RKF4	1.0664
36	RKEDC	1.4869	RKEDC	0.1139	RKEDC	-0.0046	RKEDC	1.8365	DE-1	1.0644
37	THOR2	1.4478	DE-1	0.1116	ONE-PF	-0.0048	DE-1	1.8064	RKEDC	1.0525
38	DE-1	1.4410	THOR2	0.1075	THOR 4	-0.0057	THOR2	1.7554	THOR2	0.9692
39	THOR 4	1.2542	THOR 4	0.0936	DE-1	-0.0062	THOR 4	1.5786	THOR 4	0.8517
40	SCDF	1.0978	SCDF	0.0836	BMBF	-0.0088	SCDF	1.4532	BMBF	0.7324
41	BMBF	1.0766	BMBF	0.0827	RPF2	-0.0090	BMBF	1.4416	RPF2	0.7157
42	RPF2	1.0739	RPF2	0.0816	PPSD	-0.0091	RPF2	1.4271	SCDF	0.7118
43	AGF	1.0055	PPSD	0.0772	AGF	-0.0093	PPSD	1.3715	PPSD	0.6848
44	PPSD	1.0004	AGF	0.0767	SCDF	-0.0094	AGF	1.3659	AGF	0.6687
45	USD2	0.8919	USD2	0.0691	USD2	-0.0100	USD2	1.2701	USD2	0.6006
46	SPF	0.8614	SPF	0.0660	USD	-0.0105	SPF	1.2299	USD	0.5481
47	USD	0.8287	USD	0.0642	SW2	-0.0108	USD	1.2071	SPF	0.5126
48	SW2	0.7765	TS	0.0588	SCBPMO	-0.0108	TS	1.1397	SW2	0.4804
49	TS	0.7720	SW2	0.0585	SPF	-0.0114	SW2	1.1353	OSA	0.4385
50	OSA	0.6847	OSA	0.0531	SCIF2	-0.0115	OSA	1.0671	TS	0.4361
51	SCIF2	0.6394	SCIF2	0.0486	OSA	-0.0115	SCIF2	1.0100	SCIF2	0.3982
52	SCIF	0.6166	SCIF	0.0470	SCIF	-0.0117	SCIF	0.9900	SCIF	0.3844
53	RRF1	0.5678	SPT	0.0437	TS	-0.0119	SPT	0.9478	SPT	0.3456
54	SPT	0.5621	RRF1	0.0432	SPT	-0.0125	RRF1	0.9422	RRF1	0.3125
55	SF4	0.5155	SF4	0.0394	RRF1	-0.0127	SF4	0.8938	SF4	0.2818
56	SRT	0.5070	SRT	0.0386	SF4	-0.0129	SRT	0.8837	SCBPMO	0.2487
57	UNF	0.4783	UNF	0.0368	STD	-0.0142	UNF	0.8608	SRT	0.1957
58	STD	0.4369	STD	0.0330	SCBTS	-0.0142	STD	0.8135	UNF	0.1820
59	STD2	0.3320	STD2	0.0250	SRT	-0.0144	STD2	0.7119	STD	0.1705
60	SCBPMO	0.2767	SCBPMO	0.0200	UNF	-0.0147	SCBPMO	0.6488	STD2	0.0626
61	SF5	0.2470	SF5	0.0184	SF5	-0.0152	SF5	0.6290	SF5	0.0314
62	PISD	0.2212	PISD	0.0159	SCBTS3	-0.0153	PISD	0.5962	SF8	-0.0803
63	SF8	0.1841	SF8	0.0141	STD2	-0.0153	SF8	0.5737	SCBTS	-0.1043
64	SF7	-0.0341	SF7	-0.0026	SCBTS2	-0.0162	SF7	0.3630	SCBTS3	-0.1288
65	SCBTS3	-0.2952	SCBTS3	-0.0221	SCBMF	-0.0164	SCBTS3	0.1167	SCBDA	-0.2728
66	SCBTS	-0.3633	SCBTS	-0.0263	SCBDA	-0.0170	SCBTS	0.0632	SCBTS2	-0.3016
67	SCBDA	-0.4035	SCBDA	-0.0296	SF8	-0.0172	SCBDA	0.0211	SF7	-0.3446
68	SSB	-0.4459	SSB	-0.0338	SCBMF2	-0.0180	SSB	-0.0319	SCBMF2	-0.4199
69	SCBMF2	-0.6384	SCBMF2	-0.0453	BKA	-0.0185	SCBMF2	-0.1767	SSB	-0.4341
70	SCBTS2	-0.7228	SCBTS2	-0.0526	BKA2	-0.0188	SCBTS2	-0.2697	BKA	-0.4548
71	BKA	-0.7960	BKA	-0.0593	BKD	-0.0189	BKA	-0.3536	BKA2	-0.4725
72	BKA2	-0.8017	BKA2	-0.0598	BCAP	-0.0189	BKA2	-0.3602	BKD	-0.4892
73	BKD	-0.8434	BCAP	-0.0622	SSB	-0.0197	BCAP	-0.3902	BCAP	-0.5009
74	BCAP	-0.8436	BKD	-0.0629	SF7	-0.0199	BKD	-0.3993	B-SUB	-0.6924
75	SCBMF5	-1.0758	SCBMF	-0.0744	SCBPG	-0.0206	SCBMF	-0.5455	SCBMF5	-0.6988
76	SCBMF3	-1.1068	SCBMF5	-0.0791	B-SUB	-0.0209	SCBMF5	-0.6041	SCBPG	-0.7104
77	B-SUB	-1.1941	SCBMF3	-0.0800	SCBMF5	-0.0211	SCBMF3	-0.6164	SCBMF3	-0.7404
78	SCBPG	-1.3104	B-SUB	-0.0890	BTP	-0.0213	B-SUB	-0.7303	BTP	-0.7627
79	BTP	-1.3554	SCBPG	-0.0965	SCBMF3	-0.0215	SCBPG	-0.8240	SCBMF4	-0.8704
80	SCBMF4	-1.3623	SCBMF4	-0.0994	SCBMF4	-0.0227	SCBMF4	-0.8618	PISD	-0.9941
81	SCBMF	-2.0467	BTP	-0.1001	PISD	-0.0250	BTP	-0.8699	SCBMF	-1.0072

Appendix G Annual performance rankings, 1992-2000 (continued)

2000

rank	name	Treynor	name	Sharpe	name	Jensen	name	M squared	name	rate of return
1	BCAP	-3.2887	BCAP	-0.3593	BCAP	0.0200	BCAP	-2.7307	BCAP	-3.6833
2	BKA2	-3.8760	BKA2	-0.4437	BKA2	0.0138	BKA2	-3.4435	TNP	-4.0831
3	B-SUB	-3.8867	B-SUB	-0.4444	B-SUB	0.0138	B-SUB	-3.4496	BTP	-4.0844
4	BKD	-3.8909	BTP	-0.4446	BKD	0.0137	BTP	-3.4516	BKA2	-4.3282
5	BKA	-3.9798	BKD	-0.4452	BKA	0.0127	BKD	-3.4563	BKD	-4.3515
6	BTP	-4.0486	BKA	-0.4541	BTP	0.0109	BKA	-3.5319	B-SUB	-4.3539
7	TNP	-4.1273	TNP	-0.4724	TNP	0.0101	TNP	-3.6864	BKA	-4.4465
8	THOR 4	-4.4139	THOR 4	-0.5085	THOR 4	0.0075	THOR 4	-3.9912	AGF	-4.5031
9	THOR	-4.4984	THOR	-0.5188	THOR	0.0066	THOR	-4.0789	THOR 4	-4.5176
10	SCBTS2	-4.6486	SW2	-0.5343	SCBTS2	0.0057	SW2	-4.2093	THOR	-4.5275
11	BMBF	-4.6825	BMBF	-0.5414	SCBMF3	0.0052	BMBF	-4.2695	SW2	-4.5520
12	ONE-UB	-4.6879	SCBTS2	-0.5423	ONE-UB	0.0048	SCBTS2	-4.2775	RRF1	-4.5832
13	SCBMF3	-4.6888	SAN	-0.5447	THOR2	0.0048	SAN	-4.2975	BMBF	-4.6011
14	THOR2	-4.6913	SCBMF3	-0.5454	SCBTS3	0.0047	SCBMF3	-4.3030	RPF2	-4.6096
15	SAN	-4.6932	THOR2	-0.5456	SCBTS	0.0047	THOR2	-4.3047	SCIF2	-4.6482
16	ONE+1	-4.7039	ONE-UB	-0.5457	ONE-UB2	0.0046	ONE-UB	-4.3058	SF4	-4.6888
17	ONE-UB2	-4.7071	ONE+1	-0.5471	BMBF	0.0046	ONE+1	-4.3180	ONE+1	-4.6932
18	SCBTS	-4.7174	ONE-UB2	-0.5478	SAN	0.0046	ONE-UB2	-4.3239	SCIF	-4.7142
19	THANA1	-4.7193	THANA1	-0.5480	ONE+1	0.0045	THANA1	-4.3252	SAN	-4.7147
20	ONE-WE	-4.7213	SCBMF4	-0.5486	ONE-WE	0.0045	SCBMF4	-4.3305	ONE-PF	-4.7163
21	SCBTS3	-4.7300	SCBTS	-0.5505	THANA1	0.0044	SCBTS	-4.3461	TVF	-4.7519
22	SCBMF	-4.7469	SCBMF	-0.5505	SCBMF	0.0044	SCBMF	-4.3464	APF	-4.7660
23	ONE-UB4	-4.7493	ONE-PF	-0.5506	ONE-UB4	0.0042	ONE-PF	-4.3471	KPLUS2	-4.7718
24	ONE-PF	-4.7514	ONE-WE	-0.5507	SCBPMO	0.0042	ONE-WE	-4.3483	KKF	-4.7999
25	ONE-PR	-4.7596	SCBTS3	-0.5513	SCBMF2	0.0042	SCBTS3	-4.3530	KPLUS	-4.8030
26	SCBMF4	-4.7687	ONE-UB4	-0.5523	ONE-PR	0.0040	ONE-UB4	-4.3613	TDF	-4.8343
27	ONE-FAS	-4.7752	ONE-PR	-0.5527	ONE-PF	0.0040	ONE-PR	-4.3650	ONE-D	-4.8343
28	SCBMF2	-4.7834	SCBMF2	-0.5550	SCBMF4	0.0040	SCBMF2	-4.3846	THANA1	-4.8404
29	SCBPMO	-4.7850	ONE-FAS	-0.5553	ONE-FAS	0.0038	ONE-FAS	-4.3872	ONE-FAS	-4.8527
30	ONE-UB3	-4.7945	ONE-UB3	-0.5575	ONE-UB3	0.0037	ONE-UB3	-4.4057	NPAT-PRO	-4.8769
31	AJFSCAP	-4.8458	SCBPMO	-0.5594	AJFSCAP	0.0034	SCBPMO	-4.4216	ONE-PR	-4.8770
32	ONE-G	-4.8610	AJFSCAP	-0.5646	SCBRT	0.0031	AJFSCAP	-4.4658	ONE-UB	-4.8879
33	SCBRT	-4.8884	ONE-G	-0.5663	ONE-G	0.0030	ONE-G	-4.4803	ONE-WE	-4.9063
34	ONE-D	-4.8931	ONE-D	-0.5698	RKF	0.0027	ONE-D	-4.5098	ONE-G	-4.9076
35	RKF	-4.8932	SCBRT	-0.5707	ONE-D	0.0026	SCBRT	-4.5172	SF8	-4.9103
36	SW2	-4.9164	SF4	-0.5712	NPAT-PRO	0.0024	SF4	-4.5215	SCBMF4	-4.9170
37	NPAT-PRO	-4.9169	NPAT-PRO	-0.5728	SW2	0.0022	NPAT-PRO	-4.5347	THOR2	-4.9194
38	ONE-PRO	-4.9487	RKF	-0.5738	ONE-PRO	0.0021	RKF	-4.5434	ONE-UB2	-4.9231
39	SF4	-4.9828	ONE-PRO	-0.5757	SF4	0.0016	ONE-PRO	-4.5591	RKF4	-4.9290
40	SCBPG	-5.0048	SCIF2	-0.5782	SCBPG	0.0016	SCIF2	-4.5802	ONE-PRO	-4.9334
41	NSG	-5.0206	SCIF	-0.5821	SCBMF5	0.0011	SCIF	-4.6133	CMICRK	-4.9633
42	SCBMF5	-5.0540	SCBPG	-0.5826	CMICRK	0.0009	SCBPG	-4.6177	ONE-UB3	-4.9953
43	SCIF2	-5.0591	SCBMF5	-0.5845	SCIF2	0.0009	SCBMF5	-4.6340	SF7	-5.0027
44	CMICRK	-5.0617	RPF2	-0.5848	RKF3	0.0006	RPF2	-4.6361	STD2	-5.0045
45	SCIF	-5.0935	SCBDA	-0.5850	PPSD	0.0006	SCBDA	-4.6383	ONE-UB4	-5.0131
46	RKF3	-5.0951	AGF	-0.5863	SCIF	0.0006	AGF	-4.6488	RKF	-5.0241
47	PPSD	-5.0955	NSG	-0.5883	RKEC	0.0006	NSG	-4.6659	SRT	-5.0407
48	RKEC	-5.1028	RRF1	-0.5904	RKF2	0.0004	RRF1	-4.6833	STD	-5.0439
49	RKF2	-5.1208	STD	-0.5930	TVF	0.0003	STD	-4.7052	SSB	-5.0608
50	TVF	-5.1229	SF8	-0.5933	AGF	0.0003	SF8	-4.7080	PPSD	-5.0696
51	AGF	-5.1257	CMICRK	-0.5945	RKEDC	0.0000	CMICRK	-4.7185	DE-1	-5.0833
52	RKEDC	-5.1560	RKF3	-0.5969	RKF-HI	0.0000	RKF3	-4.7390	RKF2	-5.0835
53	RKF-HI	-5.1606	PPSD	-0.5971	RRF1	-0.0001	PPSD	-4.7399	RKEC	-5.0937
54	RRF1	-5.1656	RKEC	-0.5982	RPF2	-0.0005	RKEC	-4.7493	SPF	-5.1140
55	SCBDA	-5.2011	SF7	-0.5992	SCBDA	-0.0005	SF7	-4.7582	SCBTS	-5.1173
56	RPF2	-5.2100	RKF2	-0.5996	INGTEF	-0.0010	RKF2	-4.7616	SCDF	-5.1299
57	INGTEF	-5.2614	TVF	-0.5999	RKF4	-0.0011	TVF	-4.7643	RKF-HI	-5.1330
58	RKF4	-5.2756	RKF-HI	-0.6033	STD	-0.0011	RKF-HI	-4.7926	SF5	-5.1463
59	STD	-5.2757	RKEDC	-0.6041	USD2	-0.0013	RKEDC	-4.7995	RKF3	-5.1653
60	USD2	-5.2886	STD2	-0.6043	USD	-0.0014	STD2	-4.8011	USD2	-5.2257
61	USD	-5.3005	SRT	-0.6060	SF7	-0.0020	SRT	-4.8158	SCBMF	-5.2303
62	SF7	-5.3759	DE-1	-0.6068	SRT	-0.0021	DE-1	-4.8225	TS	-5.2492
63	SRT	-5.3849	INGTEF	-0.6117	DE-1	-0.0022	INGTEF	-4.8636	UNF	-5.2617
64	DE-1	-5.3905	SF5	-0.6120	STD2	-0.0022	SF5	-4.8661	RKEDC	-5.2668
65	STD2	-5.3959	SPF	-0.6130	SF8	-0.0022	SPF	-4.8743	USD	-5.2756
66	SF8	-5.4061	SCDF	-0.6133	PISD	-0.0025	SCDF	-4.8776	SCBMF5	-5.3056
67	PISD	-5.4066	USD2	-0.6147	SPF	-0.0027	USD2	-4.8891	SCBMF3	-5.3173
68	SF5	-5.4447	USD	-0.6159	SF5	-0.0027	USD	-4.8989	AJFSCAP	-5.3214
69	SPF	-5.4448	SSB	-0.6175	SCDF	-0.0028	SSB	-4.9124	SCBTS3	-5.3219
70	SCDF	-5.4540	RKF4	-0.6176	SSB	-0.0035	RKF4	-4.9138	SCBTS2	-5.3473
71	ASD	-5.5276	TS	-0.6242	ASD	-0.0036	TS	-4.9694	SCBPG	-5.4002
72	SSB	-5.5393	PISD	-0.6267	TS	-0.0038	PISD	-4.9906	INGTEF	-5.4008
73	TS	-5.5658	UNF	-0.6289	UNF	-0.0047	UNF	-5.0088	ASD	-5.4019
74	UNF	-5.6714	ASD	-0.6438	APF	-0.0054	ASD	-5.1350	SCBMF2	-5.4438
75	SPT	-5.6788	SPT	-0.6636	SPT	-0.0054	SPT	-5.3023	PISD	-5.4584
76	APF	-5.8066	APF	-0.6662	KPLUS	-0.0057	APF	-5.3243	SCBPMO	-5.5250
77	KPLUS	-5.8440	KPLUS	-0.6703	TDF	-0.0057	KPLUS	-5.3587	NSG	-5.5480
78	TDF	-5.8481	TDF	-0.6711	KKF	-0.0058	TDF	-5.3657	SCBRT	-5.6924
79	KKF	-5.8631	KKF	-0.6725	KPLUS2	-0.0059	KKF	-5.3775	SCBDA	-5.7420
80	KPLUS2	-5.8800	KPLUS2	-0.6740	NSG	-0.0516	KPLUS2	-5.3900	SPT	-5.9600