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**Performance Evaluation of
Mutual Funds**



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Performance Evaluation of Mutual Funds



Submitted by
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I certify that all materials in this project which is not my
own work has been identified and that no material is
included for which a degree has previously been
conferred upon me

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Abstract



The investment performance of mutual fund managers has been extensively examined in the finance literature. Most of these studies employed methods developed by Sharpe, Treynor, and Jensen. Such investigations assume that the risk level of the portfolio under consideration is stationary through time, and they exclusively concentrate on a fund manager's security selection skills or lack thereof.

This project will discuss the theory behind these measurers, their advantages and their weakness, also we will show how to apply these measures on a real-life data to test whether mutual funds managers are able to beat the market. Our data consists of nine years return (1982-1990) of 23 mutual funds managed under the regulations of the United Kingdom

Applying the above measures and using the **Wilshire 5000** as the market portfolio, we were able to conclude that , on average , the funds were not able to beat the market during the period under consideration.

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Chapter One

Introduction

1.1 Preamble

The evaluation of portfolio performance has generated a great deal of interest in academic circles. A variety of evaluation techniques have been proposed and implemented, but to date, there is no consensus about the ability of professional portfolio managers to earn abnormal returns. Previous studies of mutual funds performance have examined the actual returns realized by investors and, with few exceptions, found either negative performance or no performance for the average mutual fund. This is not surprising from an economic perspective: if mutual funds managers have superior investment talent, they may be able to capture the rents from their talent in the form of higher fees or perquisites obtained through higher expenses. In this case, we can expect to observe abnormal performance only by examining gross returns, which do not have transaction costs, fees, or other expenses subtracted from them.

1.2 Purpose of The Study

This study reviews the performance of international mutual funds, "Through the use of three indexes (Sharpe, Treynor, Jensen) which are based on the assumptions of the Capital Asset Pricing Model".

The analysis will be based on the annual return data of 23 international funds for the period 1982 - 1990. The main objective of this study is to evaluate the growth rate of return of mutual funds, and compare it with the market portfolio return (Wilshire 5000 is taken as a reference) , to determine whether or not there are mutual fund managers who have superior stock selection abilities that generate abnormal return .

The next step will be a theoretical discussion on the ability & accuracy of these models to measure performance,also the effect of removing the assumptions of the Capital Asset Pricing Model on these indexes.

Data related to the investments and returns of international mutual funds were obtained from Credit Suisse Financial Products (London) through the Arab Banking Corporation (Bahrain).

1.3 Methodology

The study will have two parts:

(A) Theory Part: Explaining the portfolio managing process and discussing the Capital Asset Pricing Model as a prerequisite for using the performance measures.

(B) Practical Part:

Three basic performance Models will be used:

(i) The Sharpe Model

$$S_p = \frac{\overline{R_p} - \overline{RF}}{\sigma_p} \dots\dots\dots (1.1)$$

(ii) The Treynor Model :

$$T_p = \frac{\overline{R_p} - \overline{RF}}{\beta_{\Pi}} \dots\dots\dots (1.2)$$

(iii) The Jensen Model

$$ER_p = \alpha_p + \beta_p ER_m + \Delta E_p \dots\dots\dots (1.3)$$

The mathematics and a detailed discussion of these models will be dealt with in the coming chapters.

1.4 Limitation of the Study

The main limitation of the study is the ability to obtain data from banks and companies about a large number of mutual funds for long periods in order to reach more accurate results, also it was not possible to obtain data regarding the **S&P 500** and any international index for the period 1982-1990, which would make it more accurate to compare the results to .

1.5 Organization of the Study

The main part of the project will be in six chapters as follow :

- Chapter two will give an overview of mutual funds:
 - . Structure of a mutual fund
 - . Advantage of mutual fund
 - . Size of funds
 - . Types of funds
 - . monitoring the fund

- Chapter three will discuss the theory of the Capital Asset Pricing Model, Capital Market Line, Security Market Line ,and the three main indexes (Sharpe ,Treynor, and Jensen).

- Chapter four is a literature overview of three subjects related to the study:
 - . Performance Benchmark
 - . Timing and Selectivity
 - . International Investment

- Chapter five is the practical part where the three models are applied to a nine years return of 23 international mutual funds with the tabulation ,explanation,and discussion of the results.
- Chapter six is a general theoretical discussion on the CAPM where the main assumptions are lifted.
- Chapter seven is a conclusion.

Chapter Two

Mutual Funds

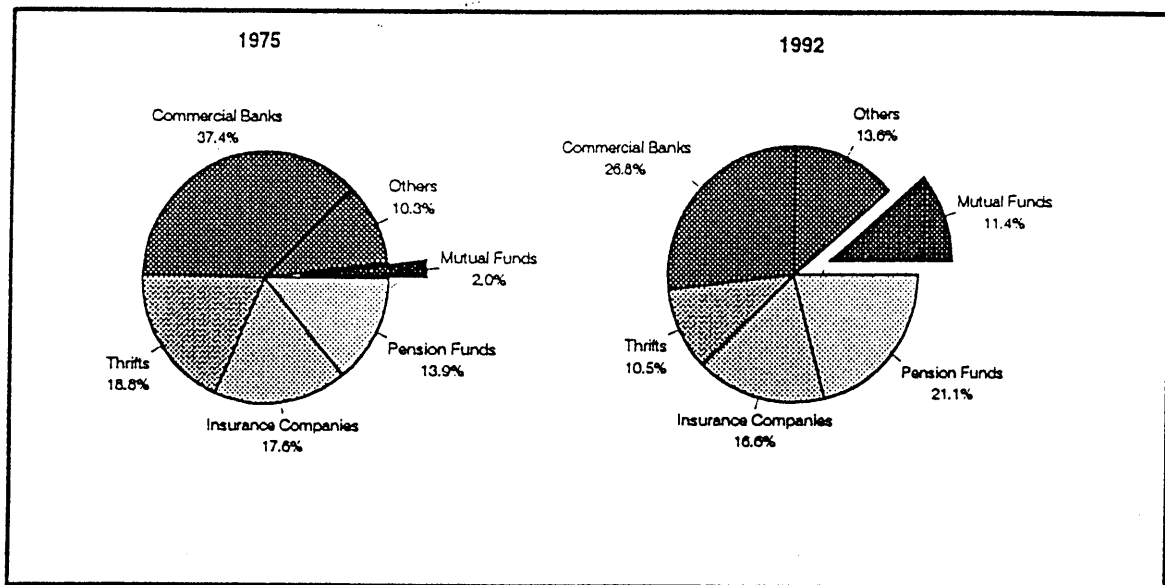
2.1 Background

It may be hard to believe, but less than 15 years ago in the USA, the mutual fund was an endangered species. Investor were pulling more money out of funds than they were putting in, and the number of funds was shrinking. It seemed only a matter of time before most of them closed up shop for good. But buoyant stock and bond markets, the development of a host of new investment products, and lots of savvy marketing have transformed mutual funds into one of the most dynamic and successful industries in the country.

People are pouring money into mutual funds to the tune of \$1 billion a day. The mountain of mutual-fund assets now (1992) stands at \$1.6 trillion compared with less than \$50 billion in 1977-and the last \$600 billion has piled up only since 1990. By some estimates, the funds could top \$4 trillion by the end of the decade. Figure(2.1) shows the dramatic change in mutual funds share of the USA market between the years 1975 and 1992 (*Business Week, January, 1993*).

But numbers tell only a small part of the story of the funds' power. Mutual funds are altering the way people save and invest, offering a menu of investments unthinkable a decade ago. Mutual funds have lowered the cost of capital for industry and government alike. During a period when bonds and other financial institutions have been pulling in their horns, mutual funds have been providing the

Figure 2.1- Mutual Funds Share of The USA Market



capital for financially strapped companies and municipalities to rebuild their tattered balance sheets. And the fund companies, through their control of billions of dollars of individual investors' assets, carry enormous clout with management as stockholders and bondholders.

2.2 Why Mutual Funds .. ?

The idea of a mutual fund is simplicity itself. Funds pool investors' money and buy stocks, bonds, or money-market securities. Individuals get greater diversification, less risk, lower transaction costs, and far more professional management than they could achieve on their own, which satisfies three of the most important rules for a successful investment program :

- 1 -Never put all your eggs in one basket.
- 2 -Don't invest in anything unless you fully understand it.

3 -Don't invest in anything that you will not be able to monitor on an ongoing basis.

2.2.1 Diversification-using More Than One Basket

No matter how careful you are when searching an investment opportunity, something unforeseen can always go wrong. If you buy a stock, the company's management may turn out to be crooks. If you buy a bond, one of the rating agencies may suddenly downgrade its credit rating. If you buy real estate, the property taxes may suddenly and unexpectedly increase.

Because there is always the chance of the unforeseen disaster befalling any investment, it's prudent to not risk all of your money in any one investment. So if you believe the stock market offers attractive investment opportunities, invest in a number of stocks, not just one. If you feel that way about the bond market, then invest in a number of different bonds. If you like the investment potential of real estate, buy property in a number of different locations.

This investment tactic of putting your money into different "baskets" is called *diversification*.

2.2.2 Understanding The Investment

You cannot decide whether a given investment is suitable for you unless you first fully understand it. If you don't really understand the intricacies of an investment, you can't make a valid judgment about whether it is inexpensive, fairly priced, or expensive. If you decide to make the investment in spite of your

lack of expertise, you will be competing against other, far more knowledgeable investors. When an expert competes against a novice, the expert almost always wins. So if you don't fully understand an investment how it works, how you can profit from it, how you can lose money in it, and so on you shouldn't risk any of your hard-earned money on it (John and Donald 1983).

2.2.3 Monitoring the Investment

Markets are constantly moving and changing. News items and other events affecting the value of your investment occur 24 hours a day, 365 a year. When something happens that influences the value of your investment, you have to respond quickly or risk suffering the adverse consequences of being the last to act. For example, suppose you own a stock and the company's management announces that, despite its earlier rosy projections, the company's earnings for the year are going to be sharply lower than expected. The market value of the stock will most likely drop-and drop quickly. If you are monitoring the news at the minute the announcement is made and react quickly, you might be able to sell the stock before its price falls too far. If you are not monitoring the news and thus do not react quickly, the stock might be down ten points before you even know what happened (Allan 1985).

2.3 Solutions for Investors

Unfortunately, many investors who want to invest in the stock, bond, real estate, or other markets lack one or more of the following:

- 1 - the resources necessary to build a properly diversified portfolio (It can take

between \$50,000 and \$1,000,000 or more to build a properly diversified portfolio, depending on the market you are considering).

2 - the expertise required to differentiate the attractive investment choices from the unattractive ones. Many intelligent people within the securities industry, who spend their working lives studying the investment markets, have difficulty discerning attractive investment opportunities from unattractive ones with any degree of certainty. If you can donate only a few hours a month to studying the market, you will be at a severe disadvantage in this very competitive environment.

3 - the time and/or facilities needed to monitor their investments. Because the markets move so fast, often just checking the values of your investments in the daily newspaper is not enough. Many news items that could have an impact on the value of your investment never make it to the news or into the newspapers. You not only need access to a continuous stream of information, you also need the capabilities to analyze, interpret, and act on it quickly before the next guy.

Of course, the last two problems can be solved by hiring a professional money manager to handle your investments and make your day-to-day investment decisions for you. You thereby free up time to do whatever you do for a living without having to worry about following the markets. Many wealthy individuals do just that-hire money managers and, in effect, manage the managers.

While this approach may be attractive, good money managers do not come cheap. Top money managers demand and get salaries and bonuses well into the hundreds of thousands (or even millions) of dollars per year. Most of them also

have a minimum account size (\$100,000 and up) and/or a minimum annual fee (45,000 per year per account and up). Because of these high minimum, most investors aren't in the position to hire personal money managers (Stuart 1987).

They can, however, obtain many of the same benefits of hiring a money manager by investing in a mutual fund. A mutual fund is, in simplest terms, little more than a collection of investors who pool their money and then collectively hire a money manager.

This "pooled account" approach is simple and straight forward for a few people to use. But it becomes incredibly complicated for thousands or even tens of thousands of investors to share the same pooled account and to be constantly buying and selling interests in the pool. For this reason, when large numbers of investors pool their money for investment securities, it makes more sense to structure the pool as a mutual fund (Stuart 1987).

2.4 Structure of a Mutual Fund

In a mutual fund, investors own not interests in the pool of securities but, rather, shares in the fund, which in turn owns the securities. If the value of the pool goes up, then the value of each share rises, If the value of the pool goes down, so does the value of the shares. New investors can buy shares and current investors can sell shares at the current value.

2.5 Advantages of Mutual funds

By investing in a mutual fund, investors benefit in a number of ways:

- 1 - *Diversification*: They can buy an interest in a well-diversified portfolio with a small investment. Most mutual funds require a minimum investment of ~~1~~ \$500 to \$1,000. With just this small investment the investor buys a proportional interest in a portfolio that may contain thousands of different securities and have a total market value in excess of a billion dollars.
- 2 - *Professional Management*: Even small investors have a manager to decide which investments to make and when to make them. They also have someone to monitor their investments on an ongoing basis.

2.6 the Management Fee

Because the money manager's fee is usually based on a percentage of the total market value of the entire fund, the fee for each investor is very small. For example, management fees generally run between 0.25% and 3.00% of the fund's total asset value, with .50% or so being the most common management fee. (For an investor who invests \$20,000 in a fund, the annual management fee is typically about \$200, well below the minimum most managers charge for handling individual accounts) (Stuart 1987).

The size of the management fee (expressed as a percentage) is based on a variety of factors, including:

- 1 - The size of the fund
- 2 - The type of investment vehicle in which the fund invests.
- 3 - The fund's investment objectives
- 4 - The manager's prior track record.

2.6.1 Size of the Fund

Generally, the larger the fund, the less the percentage the manager charges because it is almost as easy to run a \$200,000 account as it is to run a \$100,000 account. (You just buy and sell twice as much of whatever it is you're going to buy and sell). Additionally, as the fund gets larger, certain economies of scale can be obtained with regard to office space, telecommunications, and other operational expenses.

2.6.2 Type of Investment Vehicle

Certain investments are easier to manage than others. For example, real estate takes a lot of management (collecting rents, arranging for maintenance, dealing with tenants, and so on), and so the management fees for a fund that buys real estate exclusively are generally higher than those for a fund that invests exclusively in corporate bonds.

2.6.3 The fund's Investment Objectives

If an investment objective is "to significantly outperform the market", then the manager has to spend more time trying to squeeze every single extra penny of profit out of the fund's portfolio by constantly trying to buy low and sell high.

However, if the fund's investment objective is "to mirror the performance of the market", then all the manager has to do is buy a weighted average of stocks, bonds, and other vehicles and hold them with very little turnover. Presumably, this "basket" of investments will do as well as poorly as the market. Since the first strategy is more active, a higher fee is justified(Allan 1985).

2.6.4 Prior Track Record

If a portfolio manager has a proven record of above-average performance in both good markets and bad, he or she may be entitled to more compensation than an unproven newcomer.

2.7 Finding the "right" Mutual Fund

Trying to shift through the universe of available mutual funds to find the one that best suits your investment needs has become an almost overwhelming task. It was not always this way. Prior to the 1980s, mutual funds were not a particularly popular investment. Part of the reason for their lack of popularity was that most funds were very diversified and somewhat boring. These funds generally fell into one of a few categories (Stuart 1987):

1. Income funds.
2. Growth stock funds
3. Income with growth
4. Government bond funds

5. Corporate bond funds.
6. Balanced funds (combination stock and bond funds)
7. Diversified international funds

Now, however, a whole host of specialty funds is available, including funds that invest only in:

- Gold stocks
- Canadian mining companies
- Mexican companies
- Japanese companies
- Long-term bonds of European companies
- Oil companies
- Mortgage-backed securities hedged with financial futures
- Debt denominated in Australian dollars
- Health care companies
- High-tech companies
- Telecommunication companies
- Floating rate notes
- Money market preferred
- Biotechnology companies
- etc....

No matter which sector of the market appeals to investors, a mutual fund

probably invests exclusively in it. If investors like the oil sector , they can invest in a fund rather than trying to pick your own oil stocks.

2.8 Sales and Distribution of Mutual Funds

Mutual funds are distributed primarily two ways: directly to the public or through sales representatives.

2.8.1 Noload Funds

First, the fund can sell shares to the public directly, usually by advertising itself in business newspapers and/or journals or direct mail. These types of funds are called no-load funds because the investors pay no sales commissions. When investors buy shares in a no-load fund, they pay exactly the current proportional interest in the pool (John and Donald 1983).

However, all the costs associated with the advertising of the fund-including the cost of developing and placing the ads, the cost of developing and printing sales literature, and the costs associated with the prospectuses-are paid by the investors themselves as part of the annual management fee.

2.8.2 Load Funds

Alternatively, the fund can hire stockbrokers and other licensed professionals to sell fund shares to the investing public. Of course, in the case, the fund has to pay the brokers sales commissions for their efforts. Like all costs of doing business, these costs are passed on to the ultimate consumers, that is, the investors.

2.9 Open-end vs. Closed-end funds

Funds also differ in how their shares are retired.

Open-end Mutual Funds stand ready to repurchase their shares at the current net asset value any time the investor wishes to sell. To obtain funds to pay the investor, the fund liquidates some of the securities in the pool. (In practice most funds keep a small portion of their funds in cash equivalents so that they do not have to liquidate securities at an inopportune time.) Thus investors in open-end funds can always sell their shares at the current net asset value.

Closed-end funds do not repurchase their shares for a predetermined number of years after they are first offered. If closed-end fund shareholders want to "cash in" their shares, they may sell them either on one of the exchanges or in the over-the-counter market. Because these shares trade freely their price is based solely on the relative supply of and demand for the shares. Although the market value of the shares can be above or below the fund's net asset value, historically closed-end funds have often sold at a discount. So, unless shareholders are willing to accept a price lower than NAV, they must wait until the fund is redeeming its shares at NAV.

For this reason closed-end funds are not very popular. In fact, for most investors, the term "mutual fund" has come to be synonymous with an open-end fund or no-load fund. This despite the fact that several other investment structures are also considered to be mutual fund investments under the law (Stuart 1987).

2.10 Services that Mutual Funds Provide

Because the mutual fund business has become so competitive, many mutual

funds offer a number of special services designed to make the fund more attractive than its competitors to investors. These services include:

- Free switching within a family of funds: Many management companies offer a number of mutual funds, with different investment objectives, that invest in a number of different investment vehicles. For example, Fidelity Management in Boston offers over 100 different funds. By allowing investors to switch their investment from one fund to another as market expectations or investment objectives change, these "families of funds" provide a very convenient way for investors to completely swap their portfolios with just one simple phone call.
- Many mutual funds automatically withdraw the monthly installment from the investor's bank account without the investor having to remember to write a check.
- Many mutual funds automatically mail to investors a predetermined sum of money each month. This feature is particularly attractive to retirees and others who are living on their investments.
- Almost all open-end mutual funds allow investors to automatically compound dividends and capital gains into additional shares of the fund.
- Mutual funds shares can be assigned as collateral for a loan.
- Mutual funds have highly visible and readily determinable track records so that potential investors can determine a management company's past performance. All open-end mutual funds are required to provide potential purchasers with prospectuses and semiannual reports. In addition most major business publications (such as *Barrons*, *Forbes*, *Fortune*, *Financial World*, *Money Magazine*), as well as

a number of handbook, track the performance of the many, many mutual funds.(Table 2.1) shows the fifteen largest fund managers in the united states(Business Week, January18,1993).

Table 2.1- The Largest Fund Managers in The USA (*Business Week, January, 1993*)

Management Company	Assets (Billions \$)	Market Share %
Fidelity	164.3	10.2
Merrill Lynch	107.6	6.7
Vanguard	92.6	5.8
Dreyfus	75.8	4.7
Franklin	64.6	4
Capital Research	62.1	3.9
Dean Witer	52.9	3.3
Kemper	45.4	2.8
Federated	45.2	2.8
Shearson	45.1	2.8
Putnam	41.4	2.6
Prudential	34.2	2.1
IDS	27.9	1.7
Scudder	26.2	1.6
Nuveen	25.8	1.6

Chapter Three

The CAPM and Performance Evaluation

3.1 Capital Asset Pricing Model (CAPM)

The Capital Asset Pricing Model is a general model that relates the risk-return trade offs of assets to market returns. It has a number of applications in the literature of finance, three of the major applications are:

- 1 - Analysis of security pricing.
- 2 - Development of an ideal investment strategy.
- 3 - Evaluation of a portfolio's performance.

In this study our objective is to evaluate the performance of funds and portfolio managers, therefore an understanding of the Capital Asset Pricing Model and its assumptions is of great importance.

3.1.1 Assumptions of the Capital Asset Pricing Model

Although we will deal with the model's assumptions in a more detailed discussion in chapter six, it is appropriate to list them here in order to see some of the necessary conditions to create the CAPM. While at first they may appear to be severely limiting, they are similar to those often used in the standard economic theory of the firm and in other basic financial models (Robert 1987):

- 1) All investors can borrow and lend an unlimited amount of funds at a given risk-free rate.
- 2) All investors have the same one-period time horizon.
- 3) All investors wish to maximize their expected utility over this time horizon and evaluate investments on the basis of *means* and *standard deviations* of portfolio returns.
- 4) Homogeneous expectations, that is to say, all investors estimate identical probability distributions for rates of return.
- 5) All assets are perfectly divisible, so that it is possible to buy fractional shares of any asset or portfolio.
- 6) There are no taxes or transactions costs.
- 7) The market is efficient and in equilibrium or quickly adjusting to equilibrium.

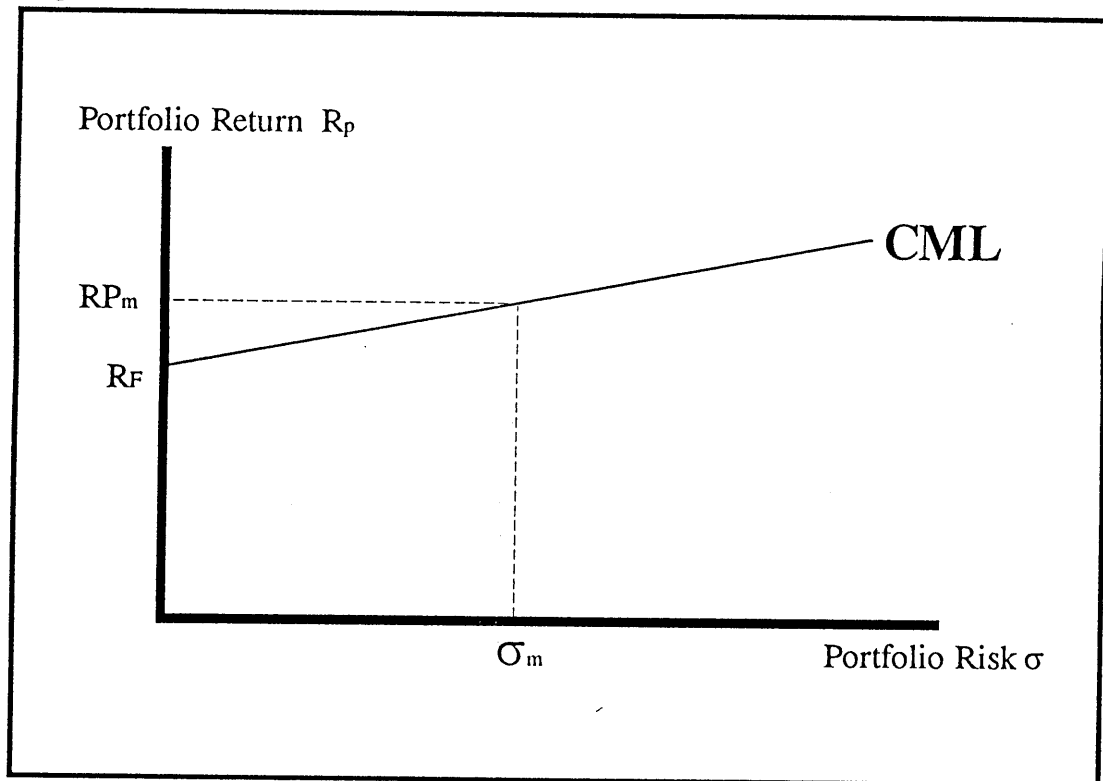
Within the Capital Asset Pricing Model there are two fundamental relationships. The first relationship, known as the capital market line, specifies the return which one should expect to receive on a portfolio. The second relationship, known as the security market line, is broader and is able to treat individual securities as well as portfolios. Because of their importance each of the two relationships will be discussed in a separate section (Robert 1987).

3.1.2 The Capital Market Line (CML)

The capital market line can be expressed as follow (Figure 3.1) :

$$E(R_p) = R_F + \sigma_p \left[\frac{RP_m}{\sigma_m} \right] \dots\dots\dots (3.1)$$

Figure 3.1



Each item in the formula is briefly explained below:

$E(R_p)$ $\Rightarrow$ The expected return on any portfolio

R_F $\Rightarrow$ The risk free rate, such as the rate on the U.S Government treasury bills or treasury bonds, where there is minimum or no

risk

$\sigma_p \Rightarrow$ The portfolio risk indicated by the portfolio standard deviation. If we are dealing with a portfolio with multiple assets, the risk of this portfolio (σ_p) can be computed using the following formula:

$$\sigma_p = \sqrt{\sum_{i=1}^N X_i^2 \sigma_i^2 + \sum_{i=1}^N \sum_{j=1}^N X_i X_j r_{ij} \sigma_i \sigma_j} \quad \text{Where, } i \neq j \quad \dots\dots\dots (3.2)$$

$N \Rightarrow$ number of securities in the portfolio

$X_i \Rightarrow$ fraction of security (i) in the portfolio

$\sigma_i^2 \Rightarrow$ variance of security i

$r_{ij} \Rightarrow$ correlation of securities i and j, which measures the joint movement between the two securities.

$RP_m \Rightarrow$ the difference between the expected return on the market portfolio and the return on the risk-free security(risk premium)

$\sigma_m \Rightarrow$ the market risk indicated by the market standard deviation. This term can be calculated using equation (3.2) above by putting N equal to the number of risky securities in the market (Robert 1987).

The correlation coefficient (r_{ij}) is measured by the following formula :

$$r_{ij} = \frac{\sum_{t=1}^M (R_{it} - \bar{R}_i) (R_{jt} - \bar{R}_j) / M}{\sigma_i \sigma_j} \quad \dots\dots\dots (3.3)$$

where R_{it} is the return on security i during the time period t , and $\bar{R}$ is the average return of the security over the period M (Robert 1987).

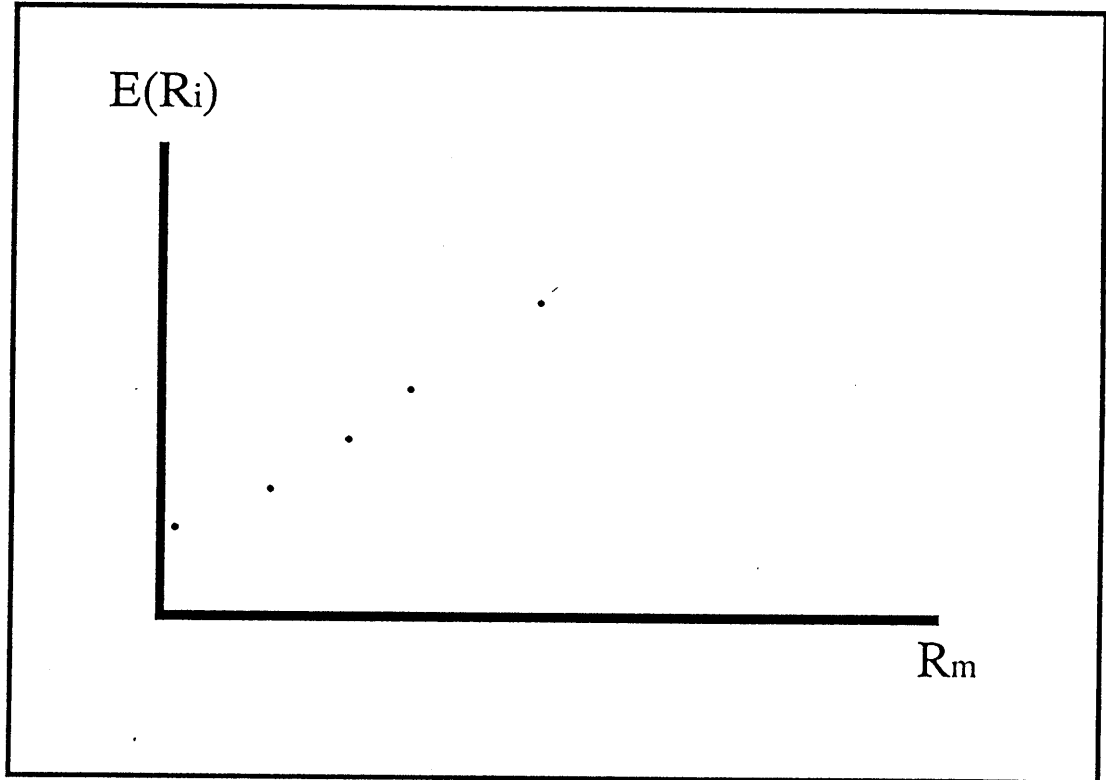
We can see from equation (3.1) that the capital market line explains the relationship between risk and return by using the risk-free rate as a minimum rate of return on an investment. Any other security that offers a rate of return that is more than the risk-free rate will be a riskier security, and the difference between its rate of return and the rate of return of a riskless security is the risk premium that is given to the investor as a compensation for assuming additional risk.

3.1.3 Security Market Line (SML)

In the previous section we discussed the risk return trade-offs for a portfolio of securities. In this section we will discuss the expected return of an individual security. The concept of risk-return trade-off is the same, however, the standard deviation that was used to measure the risk in the capital market line is divided into two components of risks, and only one of them is compensated for in the form of risk premium.

The two types of risks that make up the total risk can best be seen by examining figure (3.2) in which the return on any investment is plotted against the market return for a certain period.

Figure 3.2



The line of best fit can be written in a form of the following equation :

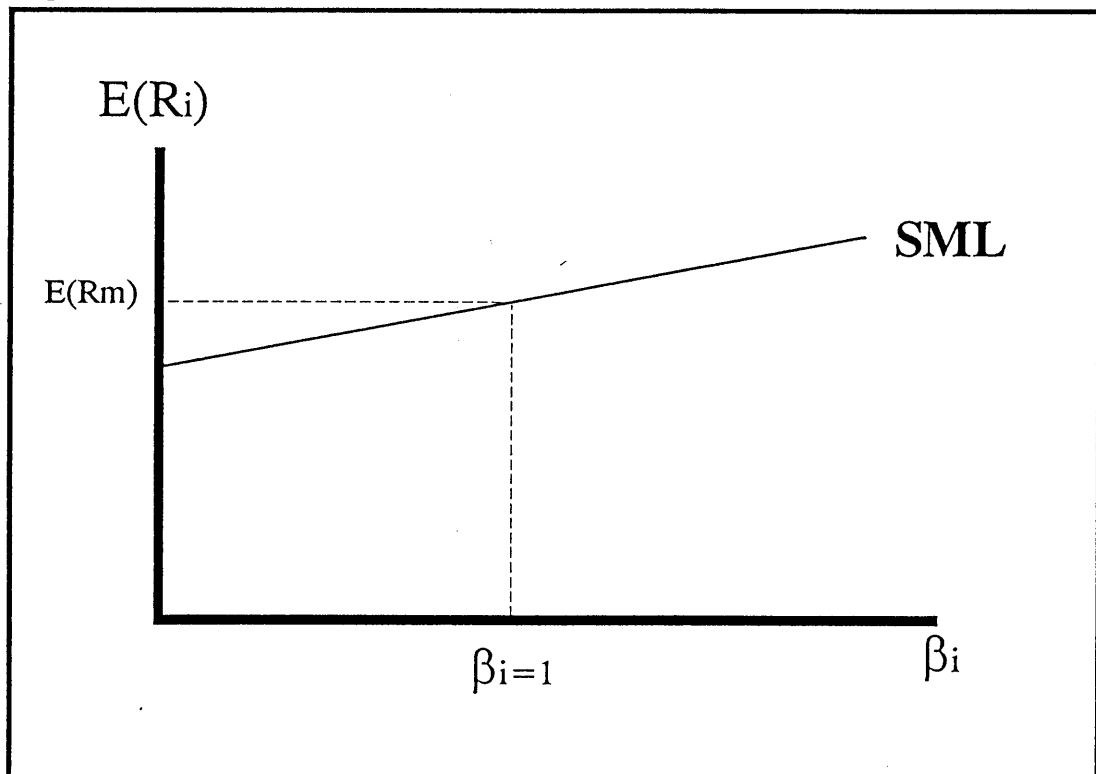
$$E(R_i) = \alpha_i + \beta_i R_m + e_i \dots\dots\dots (3.3)$$

In the above equation the first two terms represent the straight line and shows the first type of risk as the slope of the line (β_i). This is called the market risk and is measured by the beta coefficient (β_i) which is the slope of the line in the equation. In the market, beta measures the volatility of a particular security to the market movements, this means that if we have a stock's beta more than one it will be more volatile than the market and vice-versa if the stock has a beta of less than one it will be less volatile than the market. Securities that have a beta of one will move exactly with the market, so if the market goes up or down by 2% the security will move by 2% in the direction of the market movement. The beta risk is called the systematic risk and it is compensated for because it can not be eliminated by constructing large portfolios.

The e_i is the random deviation from the straight line and it describes the second type of risk that is not related to the market; rather this type of risk is related to a specific company or sector in the industry and may reflect new competitor or prices or any factor in the microeconomy of a company. This type of risk can be diversified away by constructing large portfolios, for example investing in companies that perform differently to changing economic situations.

Now we can draw the (SML) which expresses the trade-offs between risk and return using the part of total risk that is relevant to the market and derive out the equation through which we can calculate the expected return on an individual security. This is shown in Figure(3.3) and in equations (3.4).

Figure 3.3



$$E(R_i) = RF + \beta_i [RP_m] \dots\dots\dots (3-4)$$

The new terms in the equation are $E(R_i)$ which is the expected return on an individual security and the β_i which is the beta coefficient for an individual security . Like the capital market equation the security market equation states that the expected return on a particular security will be the return on the risk-free asset plus a risk premium, However, in the security market equation only one part of the risk is considered and that is the nondiversifiable beta risk.

The beta coefficient in equation (3.4) can be calculate using the following equation:

$$\beta_i = \frac{\sigma_i}{\sigma_m} r_{im} \dots\dots\dots(3.5)$$

Where,

$\beta_i \Rightarrow$ volatility of the stock to the market movements.

$\sigma_i \Rightarrow$ standard deviation of an individual security

$\sigma_m \Rightarrow$ standard deviation of the market portfolio

3.2. CAPM as Performance Measures

As was stated in the begging of this chapter one of the major applications of the capital asset pricing theory is the measurement of performance in the market . Investment companies and investors are increasingly using performance measures

based on the CAPM to evaluate and compare one style of management to another .

The performance measures can be used in many ways most importantly :

- 1) To evaluate the risk-return performance of large investment firms such as mutual funds.
- 2) To evaluate individuals sell-buy actions in the market.

Although large investment firms have their own well-known performance measures, in this project we will discuss and use the three performance measures that are well discussed in the finance literature and they are (1) the Sharpe model, (2) the Treynor model, and (3) the Jensen model.

3.2.1 The Sharpe Model

The Sharpe performance index (Sharpe 1966) is an application of the capital market line. The main idea is the use of the total risk (both the diversifiable unsystematic risk and the nondiversifiable beta risk) as shown in the equation (3-6),

$$S_p = \frac{\bar{R}_p - RF}{\sigma_p} \dots\dots\dots (3.6)$$

Where,

$S_p \Rightarrow$ Sharpe performance index

$\bar{R}_p \Rightarrow$ average portfolio return.

$\overline{RF} \Rightarrow$ the average risk-free return

is eliminated and the remaining risk is the systematic beta risk. Therefore, when the two indexes generate different result that is because the portfolio is not perfectly diversified.

3.2.3 The Jensen Model

The Jensen Model (Jensen 1968) is somewhat different from the other two indexes in that it employs an absolute measures known as Jensen's alpha, unlike the relative estimates used by the Sharpe and Treynor indexes. The alpha gives an estimation of the constant periodic return earned by an investment which was different (more/less) from a buy-hold strategy of equal risk. The model is based , like the Treynor index, on the concept of the security market line and it starts from the equation of the (SML) for one period, which states that the estimated return on an investment is equal to the return on a risk-free asset plus a risk premium found by multiplying the beta of the investment (portfolio or security) by the market risk premium. This is shown in equation (3-8) which is reproduced below with some modification to be a better description of the above discussion:

$$E(R_{pt}) = RF_t + \beta_p [E(R_{mt}) - RF_t] \quad \dots\dots\dots (3.8)$$

Where,

$E(R_{pt}) \Rightarrow$ expected return on a portfolio during the period t .

$RF_t \Rightarrow$ the return on a risk-free asset during the period t.

$\beta_p \Rightarrow$ beta coefficient for the portfolio.

$E(R_{mt}) \Rightarrow$ the expected market return during the period t .

Because of the assumptions of capital asset pricing model it can be assumed that investors in the market will not be constantly involved in under-or overestimating realized returns. Therefore, this expectation model can be described by the following market model for a portfolio:

$$R_{pt} = RF_t + \beta_p [E(R_{mt}) - RF_t] + E_{pt} \dots\dots\dots(3-9)$$

There are three points to be noted in equation (3-9).

- (1) That all returns are actual returns realized during some time period.
- (2) That the beta is constant during the time period under study.
- (3) The term E_{pt} , indicates the returns on an investment that are not related to the market. The value of this term will be minimum in a well diversified portfolio.

To find the excess return, equation (3.9) is modified by subtracting the return on a risk-free asset from both sides:

$$(R_{pt} - RF_t) = \beta_p [E(R_{mt}) - RF_t] + E_{pt} \dots\dots\dots(3.10)$$

The above equation can be a good description of return on all securities only if the capital asset pricing model is true and speculators can not neither win nor lose in their efforts to find securities that are under-or overvalued. However if some speculator constantly lose and others constantly win, Jensen uses the term alpha to describe the return that a portfolio manager is able to earn above an

unmanaged portfolio of equal risk. This is shown in the equation below :

$$(R_{pt} - RF_t) = \alpha_p + \beta_p [E(R_{mt}) - RF_t] + E_{pt} \dots\dots\dots (3.11)$$

Where,

$\alpha_p \Rightarrow$ the constant periodic return above or below that of an unmanaged portfolio.

The Jensen Model is more superior than the Sharpe and Treynor models in that it uses an absolute performance that can be easily interpreted and can be statistically determined to be significant or not. We will deal with the performance measures in more depth in chapter five where the return on a number of international mutual funds are compared to the market return and try to answer the question of the ability of portfolio managers to earn returns in excess of the market returns.

Chapter Four

Literature Overview

4.1 Introduction

The problem of how to properly evaluate portfolio performance remains largely unresolved despite broad agreement on the intuitive level that an actively managed portfolio with superior performance should exhibit higher average returns than a passively managed portfolio with the same amount of risk. Unfortunately, two obstacles prevent the easy implementation of this intuitive notion of superior performance to evaluate the track record of managed funds. The first stems from disagreement on the appropriate way to quantify risk and, hence, on what constitutes normal performance. The second problem concerns errors in inference that may arise when portfolio managers can, in fact, outperform the market.

In this chapter we will try to overview the literature of three of the hottest subjects in the field of performance evaluation, which got much of the researchers attention and focus recently:

- 1 - Performance Benchmark
- 2- Timing and Selectivity
- 3- International Investment

The first two are of theoretical interest, where the last one is of a practical interest.

4.2 Performance Benchmark

In order to measure abnormal performance by mutual funds, it is necessary to have a benchmark for normal performance. Numerous investigators have employed the usual proxies for the market portfolio as Capital Asset Pricing Model benchmark to evaluate the performance of mutual funds. Roll (1978), however, has argued that the use of the CAPM as a benchmark is logically inconsistent since the model assumes that all investors have common beliefs and information and, hence that any measured abnormal performance can only occur when the market proxy is inefficient.

The apparent inefficiency of the usual market proxies, coupled with concern over the testability of the CAPM , has led researchers to explore alternative asset pricing theories. One theory that has stimulated much recent research is the Arbitrage Pricing Theory (APT) developed by Ross (1976). In his work, Ross contended that systematic risk need not be adequately represented by a single common factor such as the return on the market and instead presumed that there are K common sources of covariation (risk) affecting security returns. These K factors constitute another potential benchmark with which to measure normal performance.

Lehmann and Modest (1978) tackled the question of the sensitivity of commonly used mutual fund performance measures to the choice of benchmark; In their paper , they examined the returns of 130 mutual fund over the period January 1968 through December 1982 to find out whether inferences about their performance

are sensitive to the benchmark chosen to measure normal performance, and they concluded that:

"The investigation yielded several noteworthy conclusions. We found mutual fund rankings to be very sensitive to the asset pricing model chosen to measure normal performance. Similarly, alternative Arbitrage Pricing Theory implementations often suggested substantially different absolute and relative mutual fund rankings. All methods gave the appearance of widespread abnormal performance by mutual funds in two of the three sample periods".

4.3 Market Timing and Selectivity

The study of investment performance has long sought to draw the distinction between the ability to "time " the market and the ability to forecast the returns on individual assets. This distinction has been viewed as a useful device for attribution of a manager's performance, i.e., superior performance is due to either timing or selection ability or some combination of the two. Indeed, portfolio managers often characterize themselves as market timers or stock pickers. An ability to distinguish between these two sources of superior performance may allow more accurate measures of the value of the services provided by managers. At the same time, the distinction between these two types of performance may have intrinsic interest. The distribution of prices and observed trades may be very different depending on whether private information in the economy is predominantly about market aggregates or is predominantly firm-specific. The active nature of portfolio

management is often based on the claim of superior information. If this is so, then the main problem in performance evaluation is inferring the quality of private information possessed by a portfolio manager. Many tests do not successfully separate measures of quality from measures of aggressiveness. By trading aggressively, a manager with little information may be able to mimic certain aspects of the performance of a manager having more precise information. Since a client can always alter the aggressiveness of managed portfolio on his own account, aside from possible savings in transactions costs that may make mutual funds superior to individual investment, the value added by a portfolio manager is a function solely of the precision of his information. (Admati et al 1986) proposed two approaches that can be used to make the precise distinction between timing information and selectivity information. Lee and Rahman (1990) examined the monthly returns (87 months- January 1977 - March 1984) for a sample of 93 mutual funds in order to detect the selection ability and market-timing ability of a mutual fund manager, and found that statistically significant measured abnormal timing and selectivity performance by mutual funds, which indicate that at the individual level there is some evidence of superior forecasting ability on the part of the fund manager. This result has an important implication. Funds with no forecasting skills might consider a totally passive management strategy and just provide a diversification service to their shareholders.

4.4 International Investment

In a partially - or fully-integrated world capital market, the investor need not restrict portfolio choice to domestic securities. Previous literature, such as Grubel (1968) , and Levy and Sarnat (1970), has demonstrated the potential gains from international diversification. Most previous international diversification studies analyze hypothetical portfolios, such as ex-post optimal international portfolios representing national stock market indexes, rather than portfolios actually held by investors. Such studies concluded that it indeed pays to diversify internationally.

Despite this conclusion, investors actually may not be able to reap the benefits from international diversification for two important reasons. First, studies to date completely ignore barriers to international investment such as excessive information and transaction costs, withholding taxes on foreign investment income, and capital/exchange market regulations. Second, previous studies ignore the problem of parameter uncertainty by assuming that the true values of investment parameters, such as the mean and the covariance matrix, are known ex-ante. In reality, these parameters are estimated, and estimation errors may result in a suboptimal portfolio selection . Taking both these problems together, it is not certain if investors can still benefit from international investment.

International mutual funds, unlike hypothetical international portfolios, represent portfolios actually held by investors. Moreover, international mutual funds are constructed and managed subject to parameter uncertainty and current barriers to international investment. Consequently, an evaluation of their

performance should indicate whether this feasible method of international diversification actually provides greater benefits to investors than portfolio restricted to domestic securities.

Despite the proliferation of international mutual funds and their increasing popularity, relatively little is known about their performance. This is in sharp contrast to the number of studies that have been conducted on domestic mutual funds.(Eun et al 1991) in their article attempted to remedy this lack. They first examine the performance of nineteen U.S. - based international funds in terms of mean-variance efficiency. Benchmark portfolios include the S&P 500 index, the Morgan Stanley Capital International (MSCI) World Index, and a self-constructed index of U.S multinational firms. Second, they examined how well each international fund complements a well-diversified U.S. portfolio in enhancing mean-variance efficiency. Third, they conducted selectivity and market-timing analyses to evaluate to what degree international mutual funds provide a hedge against downside risk in the U.S. Stock market. Fourth, they determined whether investment in international funds provides a better hedge against U.S. inflation than domestic stock investment.

They concluded that the historical performance shows that their sample international mutual funds would allow U.S. investors to diversify risk internationally. Share prices of domestic multinational companies are found by contrast to behave much like those of domestic firms. According to the Sharpe performance measure, the majority of International funds outperformed the S&P 500 during the ten-years period of 1977 - 1986,however failed to outperform the MSCI

world index (Morgan Stanley Capital International). The analysis of U.S and International funds indicates that, U.S. investors could have benefited from partially or wholly investing in any of the sample international funds during the ten-years period.

Another somewhat surprising result in regard to international investment is the one arrived at by (Cheney et al 1992) in their study of comparing the performance of American multinational companies versus mutual funds of U.K origin during the period 1988 - 1989, and the result was that, U.S international investors were unable to outperform an international index by investing in international funds (reported in the study); U.K - based investors, however, had a much better chance of earning significant risk-adjusted excess returns. In other words , based on the superior performance of the U.K trust , U.S. international investors may tempted to invest in U.K trusts rather than U.S international funds!.

While the results of the above study might be somewhat surprising (at least to U.S. based investors and international fund managers), caution should be exercised in drawing general conclusions . Factors that might have had an influence and deserve additional research include :

1. the selected funds and trusts were not representative of the overall population
2. the international investment environment over 1988-89 might have been more favourable in the U.K. than the U.S. and thus provide a better opportunity for earning excess risk-adjusted returns.
3. differences in the organizational form and trading activities of U.S. based open-ended funds versus U.K. trusts may have influenced the results.

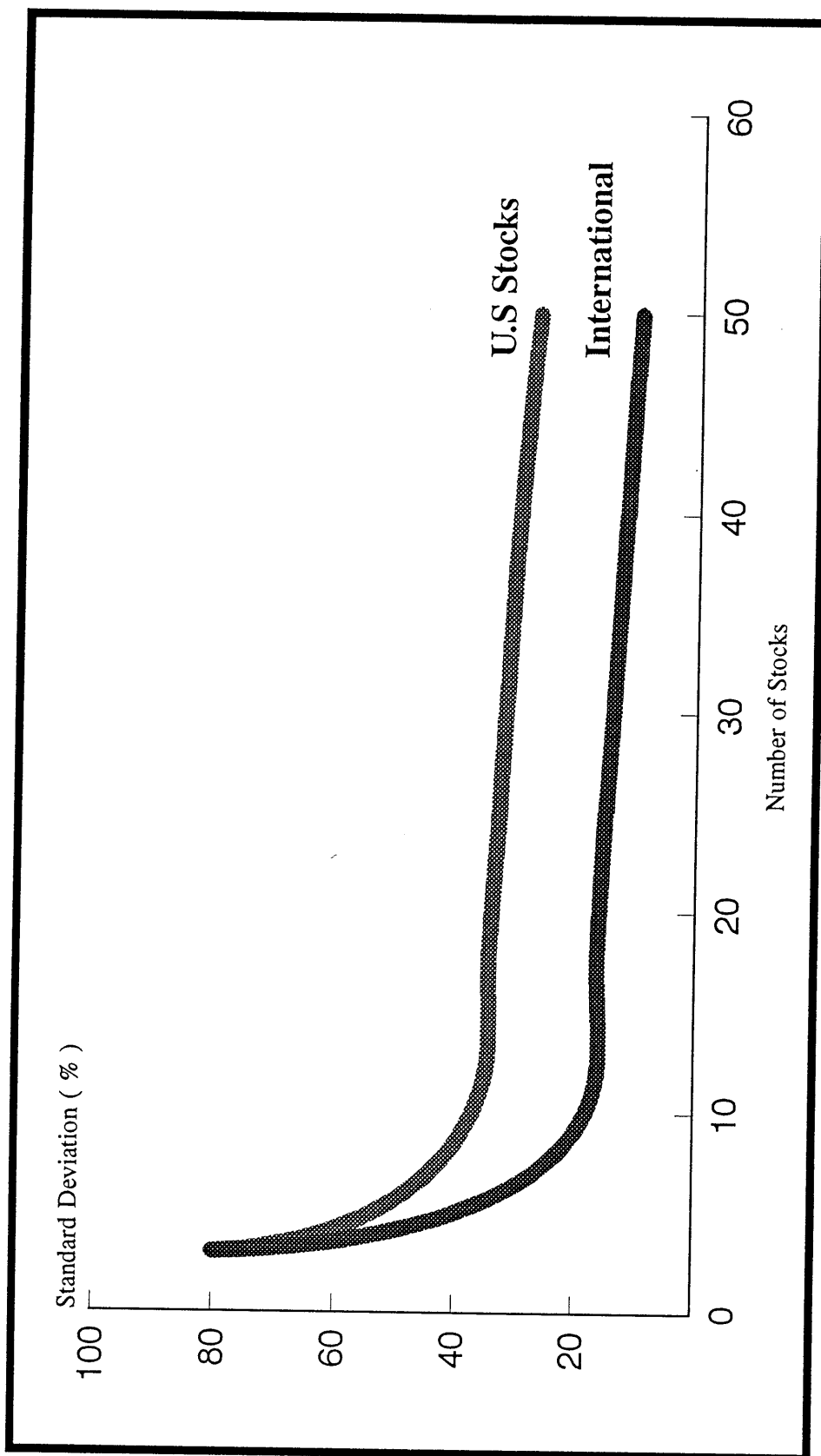
One of the classic studies examining the potential for international diversification was performed by Solnik in the mid-1970s (1974). Solnik examined the results of the naive diversification strategy that would result if a U.S. investor had randomly selected securities from two different groups. The first group consisted solely of U.S. stocks. The second group consisted of both U.S. and European stocks. Stocks returns were calculated weekly for the period 1966 - 71.

Results are shown in Figure 4-1. Which says that , naive diversification does reduce portfolio risk up to some limit which is referred to as nondiversifiable market risk. This happens whether one is dealing with returns on U.S. domestic stocks or returns on both U.S. and international securities.

The important implication of Figure 4-1 is that the nondiversifiable risk of internationally diversified portfolios was considerably lower than portfolios restricted to U.S. securities. When one buys a foreign security, two things affect its risk and expected return :

1. The risk and expected return inherent in the security itself .(Domestic risk and return).
2. The risk and return inherent in the currency of the country in which the security is traded. (Exchange Rate risk and return.)

Figure 4-1. Naive Domestic U.S Diversification Versus Naive International Diversification. (Solnik 1974)



Chapter Five

Application of Performance Measures

5.1 The Issues

Returns on the shares of a managed investment Company are calculated in the same manner as returns on any other marketable security. Share price appreciation during some time interval is added to any dividends received and this total is divided by the share price at the beginning of the period. For example suppose that during one year period a mutual fund's return was higher than the S&P composite during the same period. The question is : Did the fund outperform the market in this period. There is no doubt that the fund has a higher return than would have been provided by a passive, unmanaged position in the S&P composite. But this does not necessarily mean that the fund's management was able to outperform the market. While realized security returns are important, they are only one aspect of performance evaluation, In addition, we should consider:

- 1- *Risk*. Any performance measure must explicitly incorporate an allowance for the amount of risk incurred. Instead of thinking about return earned on an investment, we should think about return earned per unit of risk.
- 2- *Consistency*. The risk-return performance of a managed portfolio should consistently beat that of an unmanaged portfolio. During any one year, a managed account could provide a higher return per unit of risk than an

unmanaged account due to management skill or pure luck. Only by examining the consistency of a fund's performance can we decide whether skill or luck caused a given year's performance.

- 3- *Expenses.* Portfolio managers may have sufficient skill to identify mispriced securities in the market, but unless these gains are large enough to offset the expenses associated with owning investment company shares, passive management would provide larger net return.

In this chapter we will discuss the application and the use of the three measures discussed in chapter three on a real life data. The data consists of twenty three funds managed under the regulations of the United Kingdom.

5.2 Methodology

As product of much of the theoretical and empirical research on the capital asset pricing model, three models have been developed to aid in examining the historical risk-return performance of actively managed portfolios.

These were discussed at length in chapter three. The Sharpe performance index divided the average return for bearing risk by the standard deviation of historical returns. That is :

$$S_p = \frac{\overline{R_p} - \overline{RF}}{\sigma_p} \dots\dots\dots (5.1)$$

where S_p refers to the Sharpe performance index for portfolio or fund **P**, $\overline{R_p}$ is the average historical return of the portfolio or fund, $\overline{RF}$ is the average risk-free rate, σ_p is the standard deviation of the portfolio or fund. We can see from equation (5.1) that Sharpe measure includes both diversifiable and nondiversifiable risk in the denominator, which means that it should be used when an investor has his all money invested in a single fund. S_p for a given fund is related to other funds as well as to some aggregate market index in order to determine the relative performance ranking of each fund. In our case we will use the **Wilshire-5000** index as a reference.

The Treynor performance index T_p is calculated in much the same manner as Sharpe's, except that only the nondiversifiable risk of the portfolio as proxied by beta (β) is used :

$$T_p = \frac{\overline{R_p} - \overline{RF}}{\beta_p} \dots\dots\dots (5.2)$$

like the S_p measure, the Treynor performance index is a relative measure, which

must be compared with values for other fund and an aggregate market index (Wilshire-5000).

The above two indexes are relative measures and cannot answer the question of whether the fund outperform the market by chance only or because of the good management of the fund. The Jensen performance index tests for a statistically significant and positive constant rate of return. This constant, nonmarket-related return is known as alpha and is estimated by empirically testing the following regression equation:

$$\Delta R_p = \alpha_p + \beta_p \Delta R_m \dots\dots\dots (5.3)$$

Excess portfolio or fund returns (ΔR_p = the portfolio or fund return during a period t minus the risk-free rate in the same period) are related to excess market returns (ΔR_m = the market return during the period t minus the risk-free rate in the same period). The following is a step by step on how to compute Jensen index :

- 1- ΔR_p and ΔR_m are given from our data.
- 2- Use the data in (1) to get the regression equation in (5.3), thus compute α_p and β_p .
- 3- We assume that β_p is constant through the whole period under consideration ,then determine different values for α_p for each ΔR_p and ΔR_m

- 4- In order to test whether alpha is statistically different from zero, a Z-statistic is calculated as follow :

$$Z = \frac{\alpha_p}{\text{Standard deviation of } \alpha_p} \dots\dots\dots (5.4)$$

- 6- When the calculated Z is greater than 1.96, we can say with 95% confidence that the fund outperformed the market index. Conversely, when the calculated Z is less than - 1.96, we can say with 95% confidence that the fund underperformed the market index, otherwise the fund is no different to the market.

5.3 Data

Table 5-1 presents complete details of the 23 mutual funds we are going to examine, and I would like to point to the following regarding the mutual funds and other data:

- 1- The source of the fund's data is Credit Swisse Financial Products (London), which I approached them through the Arab Banking Corporation (Bahrain).
- 2- Most of the funds are composed of assets in the industrialized countries, where the rest consist of either UK equity or USA equity.
- 3- Capital growth is the main target of most of the funds.
- 4- All of the funds are under the regulation of the United Kingdom.
- 5- Table 5-2 shows the annual return of each fund for the period (1982-1992)

Table 5-1 Investment Trust / Managed Fund Description and details
(source : Credit Suisse Financial Products , London)

No.	Acronym	Name	Fund Objective	Composition of Fund	Country of Regulation
1	AAGT	Abbey American Growth Trust	Capital growth from North American equity	100% US equity Phillp Morris	United Kingdom
2	AGT	Abbey General Trust	Balance of capital growth and income UK equity	92 % UK equity 2 % US equity Glaxo, Britoil	United Kingdom
3	AIG	Aetna International Growth Trust	High income from UK equity	100% UK equity Lonhro, BP	United Kingdom
4	ADPT	Allied Dunbar Pacific Trust	Long-term Capital growth Exposure to Far East	Equity: Japan, Hong Kong, Thailand, Malaysia, Australia	United Kingdom
5	BUGFI	Barclays Unicom Gilt and Fixed Interest Income	Security of Capital from Sterling Fixed Interest	87 % UK paper 3 % US paper	United Kingdom
6	CUHYF	Commercial Union High Yield Fund	Equity and fixed interest in UK	100% UK British Ges, BP	United Kingdom
7	JCNAF	James Capel North American Fund	Blanced equity exposure to US and Canada	Royal Dutch, Detroit Edison, Philip Morris	United Kingdom
8	EFMIF	Edinburgh Fund Managers International Fund	Capital growth in equitless Worldwide exposure	45 % UK; 21 % Pacific 18 % Europe; 8 % Japan; 3 % US	United Kingdom
9	ELFET	AXA Equity and LAW Far East Trust	Maximum overall growth in oriental equity markets	54 % Japan; 16 % Hong Kong; 9 % Singapore	United Kingdom
10	FAT	Fidelity American Trust	Capital growth in North American equity	92.5 % US	United Kingdom
11	GGIG	Gartmore Global income and Growth	Balanced capital growth and income International portfolio	26.6 % Europe; 21.8 % US; 15.8 % UK; 8.9 % Japan	United Kingdom
12	HAT	Henderson Australia Trust	Capital Growth in Australasian equity markets	Commercial, Industrial and mining in Australia and New Zealand	United Kingdom
13	HSET	Hill Samuel European Trust	Capital growth in European equity Focus on peripheral markets	18 % France; 16 % Switzerland; 15 % Germany; 13 % Italy; 28 % others	United Kingdom
14	LUKSC	Lazard UK Small Companies Growth Trust	Capital Growth in Larger UK new companies	100 % UK equity	United Kingdom

Table 5-1 continued

No.	Acronym	Name	Fund Objective	Composition of Fund	Country of Regulation
15	MGGG	M and G Gold and General Fund	Commodity and energy (exploration and extraction) firms equity	44 % UK; 22 % US; 15 % South Africa; 10 % Australia; 5 % Europe; 4 % other	United Kingdom
16	MIMBA	MIM Britannia American Growth Fund	Capital Growth in leading US companies equity	100 % US equity	United Kingdom
17	MIF	Mercury International Fund	International equity exposure	26 % US; 19 % Japan; 12 % UK	United Kingdom
18	MJGF	Midland Japan Growth Fund	Capital Growth in oriental equity	80 % Japan; 20 % other	United Kingdom
19	SPFSF	Save and Prosper Financial Securities Fund	International equity exposure to financial services companies	50 % UK; 25 % US; 4 % Switzerland; 4 % Asia; 17 % other	United Kingdom
20	SPGEF	Save and Prosper Gold and Exploration fund	Commodity and energy (exploration and extraction) firms equity	32 % Canada; 24 % US; 23 % South Africa; 17 % Australia; 4 % other	United Kingdom
21	SPGFI	Save and Prosper Gilt and Fixed Income Fund	High Income with capital growth in sterling denominated securities	100 % UK equity	United Kingdom
22	TGGCG	Target Gold and General Capital Growth	Focused on capital accretion in international equities	37 % North America; 32 % Canada; 14 % Australia; 17 % other	United Kingdom
23	TIF	Target Income fund	High income from predominantly UK shareholdings	87 % UK ;13 % other	United Kingdom

Table 5-2 Investment Trust / managed fund Data (source : Credit Suisse Financial Products , London)

Period	1 . AAGT	2 . AGT	3 . AIG	4 . ADPT	5 . BUGFI	6 . CUHYF	7 . JCNAF	8 . EFMIF
1982	32.30%	30.90%	17.70%	-0.90%	36.20%	29.10%	45.60%	6.20%
1983	27.80%	20.30%	38.40%	47.00%	8.90%	20.30%	34.00%	34.30%
1984	16.50%	16.50%	26.20%	15.00%	5.10%	23.50%	13.20%	25.60%
1985	19.90%	20.10%	22.10%	-2.00%	7.00%	18.50%	0.20%	-0.20%
1986	7.60%	18.20%	36.30%	73.00%	7.80%	29.50%	23.40%	32.70%
1987	-14.30%	11.10%	19.20%	-11.10%	9.20%	18.80%	-26.60%	-17.70%
1988	18.00%	2.10%	11.00%	23.33%	4.30%	27.90%	15.60%	10.40%
1989	40.90%	27.50%	19.80%	33.30%	2.10%	21.40%	35.20%	37.40%
1990	-28.90%	-20.80%	-21.00%	-41.40%	0.20%	-25.70%	-28.30%	-27.50%
1991	30.80%	8.70%	6.90%	17.82%	7.30%	9.66%	29.29%	16.60%
1992	37.00%	16.23%	19.90%	16.39%	7.40%	21.07%	34.90%	17.90%
Period	9 . ELFET	10 . FAT	11 . GGIG	12 . HAT	13 . HSET	14 . LUKSC	15 . MGGG	16 . MIMBA
1982	11.60%	49.30%	14.70%	-25.60%	25.10%	18.30%	-6.10%	24.00%
1983	46.90%	35.30%	24.10%	39.10%	62.60%	25.70%	39.90%	27.30%
1984	10.60%	6.80%	46.30%	-18.00%	10.60%	27.60%	14.80%	14.70%
1985	3.10%	3.10%	23.10%	-6.10%	60.30%	16.00%	-18.10%	16.20%
1986	79.70%	23.70%	34.50%	44.10%	63.90%	31.20%	26.20%	11.20%
1987	1.60%	-16.80%	-19.60%	-12.70%	-31.50%	22.10%	19.00%	-26.40%
1988	22.60%	20.40%	3.90%	43.50%	19.00%	7.40%	1.90%	24.00%
1989	27.20%	44.70%	32.30%	25.40%	51.20%	7.00%	38.00%	32.80%
1990	-38.70%	-22.60%	-17.80%	-30.00%	-25.80%	-28.10%	-33.10%	-28.30%
1991	16.10%	43.00%	19.00%	21.90%	9.10%	31.40%	6.28%	20.00%
1992	10.80%	23.00%	27.25%	7.90%	11.80%	8.50%	-6.66%	36.80%
Period	17 . MIF	18 . MJGF	19 . SPFSF	20 . SPGEF	21 . SPGFI	22 . TGGCG	23 . TIF	
1982	16.90%	2.90%	8.90%	-18.50%	35.20%	121.90%	24.00%	
1983	33.50%	65.90%	38.30%	16.30%	5.40%	1.90%	39.40%	
1984	20.60%	26.00%	20.90%	-6.40%	3.70%	-11.00%	38.90%	
1985	9.90%	7.60%	25.40%	-2.50%	6.40%	-20.20%	27.20%	
1986	39.90%	74.80%	30.40%	65.10%	6.30%	40.00%	35.90%	
1987	-9.80%	-15.30%	0.30%	11.50%	11.00%	-20.10%	12.60%	
1988	16.20%	32.50%	12.40%	-34.40%	0.40%	-24.40%	6.90%	
1989	29.80%	35.90%	25.20%	27.80%	3.70%	24.70%	5.30%	
1990	-33.30%	-51.10%	-29.00%	-38.90%	1.10%	-38.70%	-16.70%	
1991	13.00%	5.95%	13.40%	8.89%	3.78%	-2.13%	9.48%	
1992	21.45%	2.33%	34.30%	3.74%	7.93%	5.76%	12.31%	

- 6- The US dollar is the accounting currency used by the funds.
- 7- Since the annual rate of returns of the funds are given with respect to the dollar, the market proxy I am going to use is the **Wilshire 5000**, for which I was able to get the annual rates for nine years only (1982 -1990), Bogle (1992). Due to this , the extra two years (1991-1992) of the annual rate of returns of the funds will be lost and will not be included in the calculations
- 8- The **Wilshire 5000** should be a better measure for the US market portfolio than the **S&P 500**. The **Wilshire 5000** covers a larger number of companies and thus has a broad representation of large companies and smaller-capitalization stocks (Robert 1987).
- 9- The US Treasury Bill rate was used as the risk-free return. (The International Financial Statistics yearbook, USA, 1992).

5.4 Presentation of the results

Tables 5-3 through 5-25 contain detailed calculations for each fund (one table per fund), which were produced using **Microsoft Excel** software. Each table is partitioned to four sections:

- 1- The first top section lists the periods, T-bill rate, return on funds, excess fund return (return on fund minus T-bill rate), return on **Wilshire 5000**, and excess return on **Wilshire 5000** (return on **Wilshire 5000** minus T-bill rate), it also shows the average and the standard deviation of all the

- 2- The second Section contains the correlation coefficient for the fund, and was calculated between the excess fund returns and the excess

Wilshire5000 returns, it also include the Beta of the fund :

$$\text{Beta of fund} = \frac{\text{Std. dev of fund excess returns}}{\text{Std. dev of wilshire 5000 excess returns}} \times \text{correlation coefficient}$$

obviously Beta for **Wilshire 5000** is 1 for all the funds.

- 3- Section three of each table contains the three indexes, in addition it contains the Sharpe and Treynor indexes of the **Wilshire 5000** just below the correspondence fund index. The Sharpe and the Treynor indexes for the Market (**Wilshire 5000**) are obviously the same for all funds and in our case equal to .6 and 7.41 respectively.
- 4- Section four is a graphical plot of the fund excess return against the **Wilshire 5000** excess return, and it is very helpful in understanding how the Jensen's alpha (the intersection of the straight line with the y-axis) is related to the distribution of the points across the graph. The graph also gives a feeling of the sensitivity of the fund's return in relation to the market (**Wilshire 5000**) return (Beta).

Finally Table 5-26 summarizes all the results in a single table for ease of reference.

5.5 Comments and conclusion on the results

- 1- Examining the Sharpe index first ,from Table 5-26, we see that only three of the funds (no. 3, 6, and 23) have a higher sharpe indexes than the **Wilshire 5000** , which is equal to .6 for all funds, and the difference is very small and can be neglected if we consider transaction cost , the rest of the funds have their sharpe indexes well below the **Wilshire 5000**. We conclude that according to Sharpe index, these funds performed very bad in relation to an unmanaged market portfolio.
- 2- Since the Sharpe index includes the diversifiable and the nondiversifiable risks in it's equation, we conclude from (1) that these funds must be held within a portfolio of other assets to diversify the risk.
- 3- The average Sharpe index for all of the funds is .27 which is well below that of the market (.6) .
- 4- Examining the Treynor index (Table 5-26), it can be seen that 10 out of the 23 funds performed better than the **Wilshire 5000**, but on average 1 of the 23 funds were not able to beat the market (the fund's average Treynor index is 7.0 , where that of the market is 7.41). The question

now is, did these 10 funds beat the market by chance only, or is it due to the good management, that can be answer when we examine the Z-statistics of Jensen's alpha next.

- 5- From Table 5-26 it is clear that the funds with positive alphas have their Z-Statistics well below 1.96 (95% confidence), which says that the 10 funds in (4) which outperform the market is due chance only, and they are not different from the market. The rest of the alphas are negative but still with Z greater than - 1.96, hence they perform equal to the market .
- 6- The single clear conclusion from the above is non of the funds were able to produce returns in excess to the market, on the contrary , we conclude that most of the funds performed poorly in relation to the Market.

Table 5-3 Performance of Fund (Abbey American Growth Trust)

Period	T-Bill Rate %	Return on Fund %	Excess Fund Return %	Return on Wilshire 5000 (%)	Excess on Wilshire 5000 Return (%)
1982	10.72	32.30	21.58	18.70	7.98
1983	8.62	27.80	19.18	23.50	14.88
1984	9.57	16.50	6.93	3.10	-6.47
1985	7.49	19.90	12.41	32.60	25.11
1986	5.97	7.60	1.63	16.10	10.13
1987	5.83	-14.30	-20.13	2.30	-3.53
1988	6.67	18.60	11.93	17.90	11.23
1989	8.11	40.90	32.79	29.20	21.09
1990	7.51	-28.90	-36.41	-6.20	-13.71
Average	7.83	13.38	5.55	15.24	7.41
Standard deviation	1.53	21.06	20.30	12.29	12.19

Correlation Between Fund and Wilshire-5000	→	0.79
Beta of Fund	→	1.32
Beta of Wilshire-5000	→	1.00

Sharpe Index for Fund	→	0.26
Sharpe Index for Wilshire-5000	→	0.60
Treynor Index for Fund	→	4.20
Treynor Index for Wilshire-5000	→	7.41
Jensen's Alpha	→	-4.25
Standard Deviation of Alpha	→	12.36
Z-statistics of Jensen's Alpha	→	-0.34

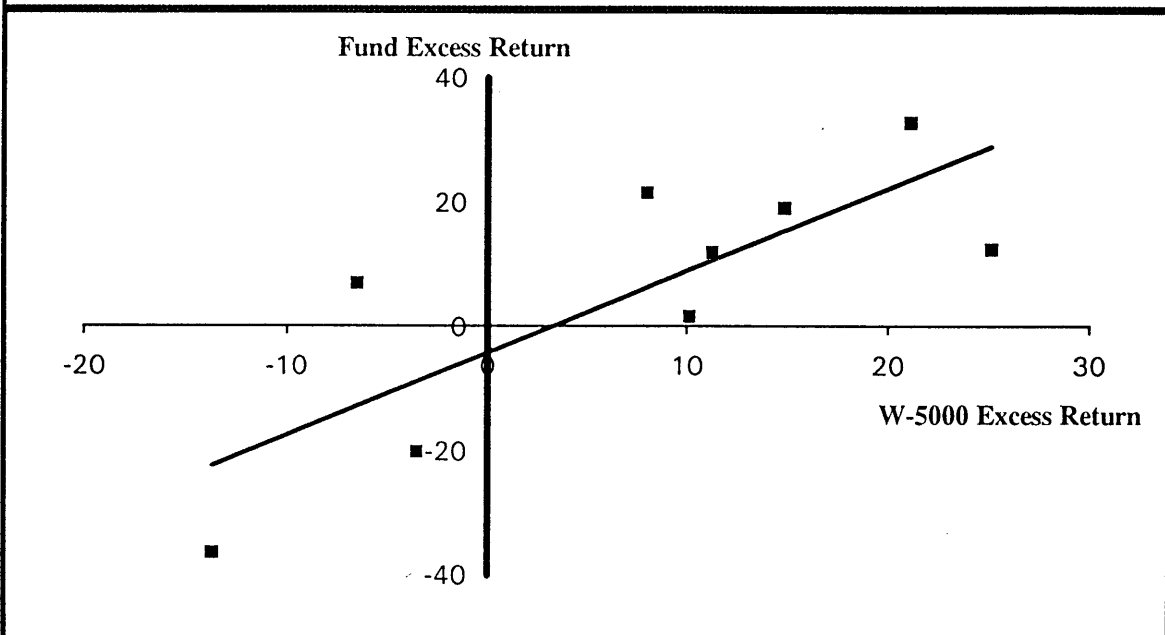


Table 5-4 Performance of Fund (Abbey General Trust)

Period	T-Bill Rate %	Return on Fund %	Excess Fund Return %	Return on Wilshire 5000 (%)	Excess on Wilshire 5000 Return (%)
1982	10.72	30.90	20.18	18.70	7.98
1983	8.62	20.30	11.68	23.50	14.88
1984	9.57	16.50	6.93	3.10	-6.47
1985	7.49	20.10	12.61	32.60	25.11
1986	5.97	18.20	12.23	16.10	10.13
1987	5.83	11.10	5.27	2.30	-3.53
1988	6.67	2.10	-4.57	17.90	11.23
1989	8.11	27.50	19.39	29.20	21.09
1990	7.51	-20.80	-28.31	-6.20	-13.71
Average	7.83	13.99	6.16	15.24	7.41
Standard deviation	1.53	14.64	14.08	12.29	12.19

Correlation Between Fund and Wilshire-5000	→ 0.68
Beta of Fund	→ 0.78
Beta of Wilshire-5000	→ 1.00

Sharpe Index for Fund	→ 0.42
Sharpe Index for Wilshire-5000	→ 0.60

Treynor Index for Fund	→ 7.86
Treynor Index for Wilshire-5000	→ 7.41

Jensen's Alpha	→ 0.35
Standard Deviation of Alpha	→ 10.36
Z-statistics of Jensen's Alpha	→ 0.03

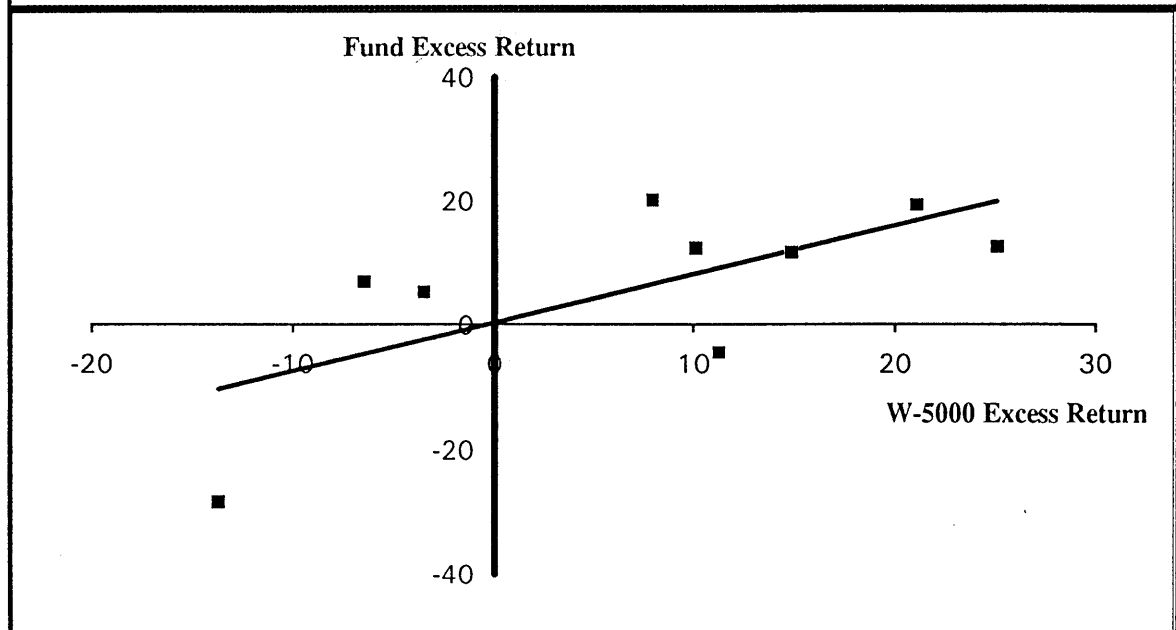


Table 5-5 Performance of Fund (Aetna International Growth Trust)

Period	T-Bill Rate %	Return on Fund %	Excess Fund Return %	Return on Wilshire 5000 (%)	Excess on Wilshire 5000 Return (%)
1982	10.72	17.70	6.98	18.70	7.98
1983	8.62	38.40	29.78	23.50	14.88
1984	9.57	26.20	16.63	3.10	-6.47
1985	7.49	22.10	14.61	32.60	25.11
1986	5.97	36.30	30.33	16.10	10.13
1987	5.83	19.20	13.37	2.30	-3.53
1988	6.67	11.00	4.33	17.90	11.23
1989	8.11	19.80	11.69	29.20	21.09
1990	7.51	-21.00	-28.51	-6.20	-13.71
Average	7.83	18.86	11.02	15.24	7.41
Standard deviation	1.53	16.34	16.33	12.29	12.19

Correlation Between Fund and Wilshire-5000	→ 0.54
Beta of Fund	→ 0.72
Beta of Wilshire-5000	→ 1.00

Sharpe Index for Fund	→ 0.67
Sharpe Index for Wilshire-5000	→ 0.60

Treynor Index for Fund	→ 15.21
Treynor Index for Wilshire-5000	→ 7.41

Jensen's Alpha	→ 5.65
Standard Deviation of Alpha	→ 13.73
Z-statistics of Jensen's Alpha	→ 0.41

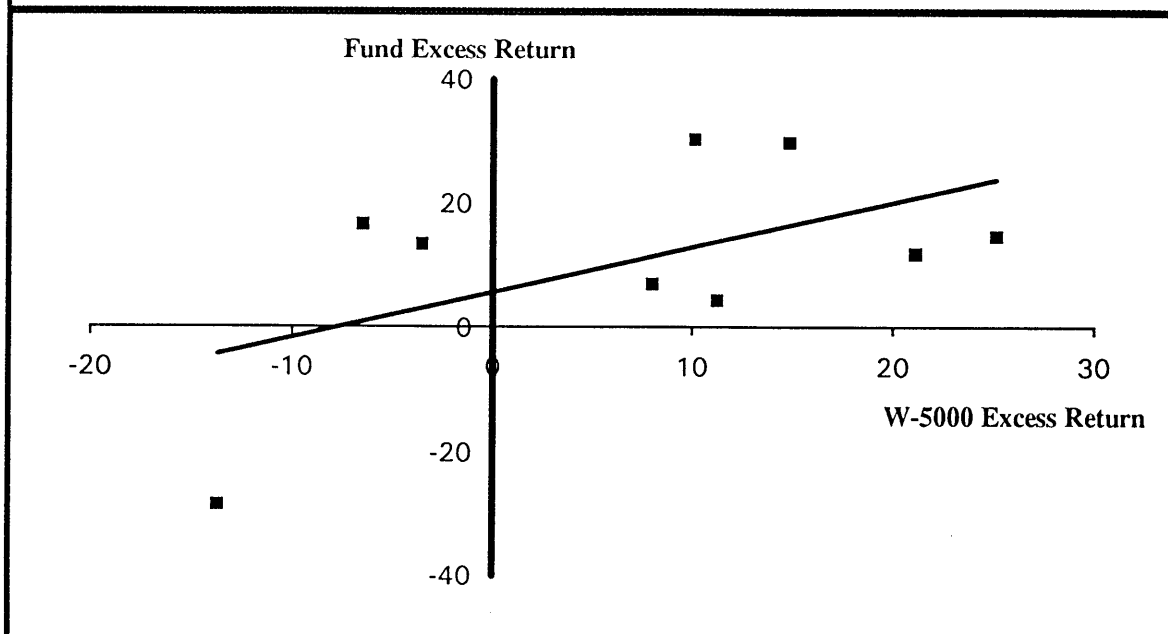


Table 5-6 Performance of Fund (Allied Dunbar Pacific Trust)

Period	T-Bill Rate %	Return on Fund %	Excess Fund Return %	Return on Wilshire 5000 (%)	Excess on Wilshire 5000 Return (%)
1982	10.72	-0.90	-11.62	18.70	7.98
1983	8.62	47.00	38.38	23.50	14.88
1984	9.57	15.60	6.03	3.10	-6.47
1985	7.49	-2.50	-9.99	32.60	25.11
1986	5.97	73.80	67.83	16.10	10.13
1987	5.83	-11.00	-16.83	2.30	-3.53
1988	6.67	23.33	16.66	17.90	11.23
1989	8.11	33.30	25.19	29.20	21.09
1990	7.51	-41.00	-48.51	-6.20	-13.71
Average	7.83	15.29	7.46	15.24	7.41
Standard deviation	1.53	32.07	32.31	12.29	12.19

Correlation Between Fund and Wilshire-5000	→ 0.51
Beta of Fund	→ 1.36
Beta of Wilshire-5000	→ 1.00

Sharpe Index for Fund	→ 0.23
Sharpe Index for Wilshire-5000	→ 0.60

Treynor Index for Fund	→ 5.48
Treynor Index for Wilshire-5000	→ 7.41

Jensen's Alpha	→ -2.63
Standard Deviation of Alpha	→ 27.71
Z-statistics of Jensen's Alpha	→ -0.10

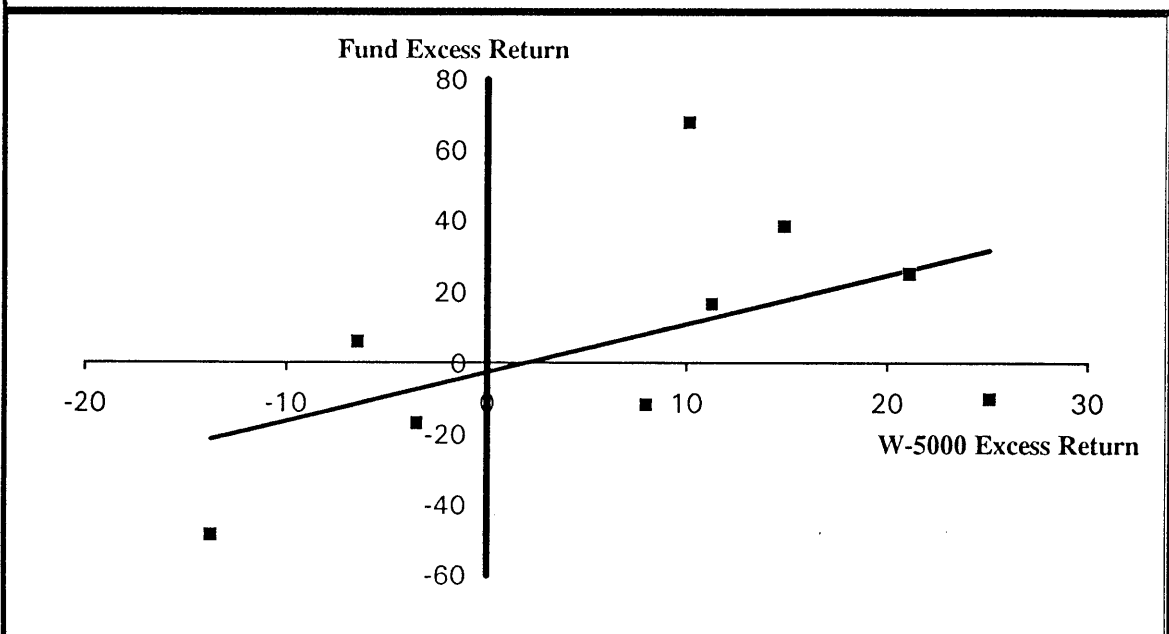


Table 5-7 Performance of Fund (Barclays Unicom Gilt Fixed Interst Income)

Period	T-Bill Rate %	Return on Fund %	Excess Fund Return %	Return on Wilshire 5000 (%)	Excess on Wilshire 5000 Return (%)
1982	10.72	36.20	25.48	18.70	7.98
1983	8.62	8.90	0.28	23.50	14.88
1984	9.57	5.10	-4.47	3.10	-6.47
1985	7.49	7.00	-0.49	32.60	25.11
1986	5.97	7.80	1.83	16.10	10.13
1987	5.83	9.20	3.37	2.30	-3.53
1988	6.67	4.30	-2.37	17.90	11.23
1989	8.11	2.10	-6.01	29.20	21.09
1990	7.51	0.20	-7.31	-6.20	-13.71
Average	7.83	8.98	1.15	15.24	7.41
Standard deviation	1.53	10.04	9.24	12.29	12.19

Correlation Between Fund and Wilshire-5000	→ 0.10
Beta of Fund	→ 0.08
Beta of Wilshire-5000	→ 1.00

Sharpe Index for Fund	→ 0.11
Sharpe Index for Wilshire-5000	→ 0.60

Treynor Index for Fund	→ 15.14
Treynor Index for Wilshire-5000	→ 7.41

Jensen's Alpha	→ 0.58
Standard Deviation of Alpha	→ 9.19
Z-statistics of Jensen's Alpha	→ 0.06

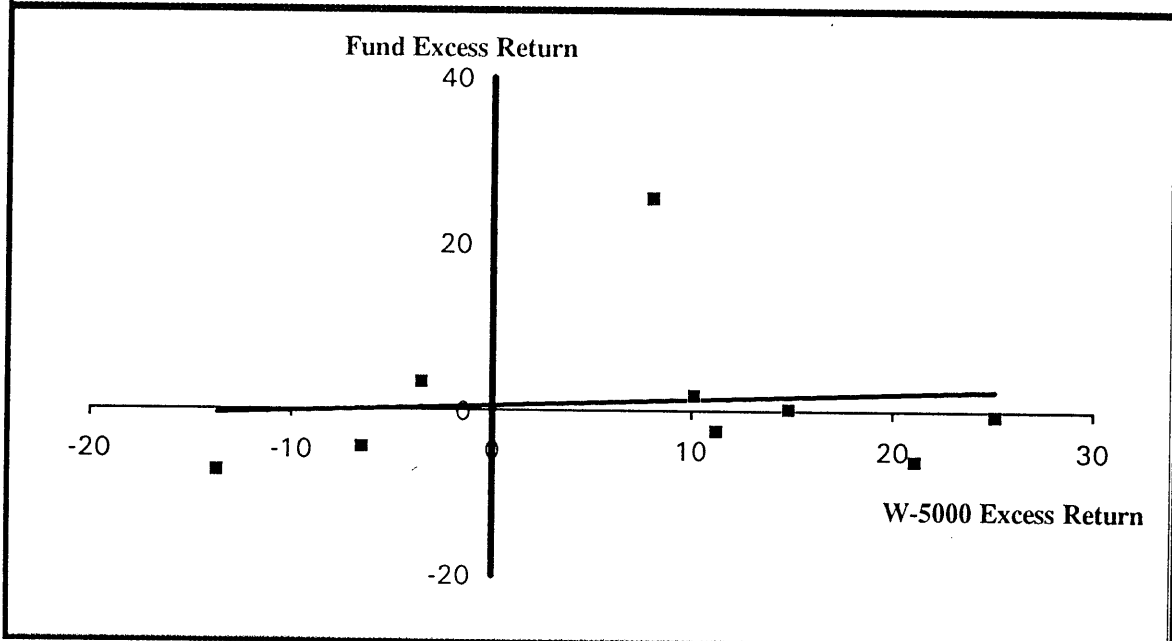


Table 5-8 Performance of Fund (Commercial Union High Yield Fund)

Period	T-Bill Rate %	Return on Fund %	Excess Fund Return %	Return on Wilshire 5000 (%)	Excess on Wilshire 5000 Return (%)
1982	10.72	29.10	18.38	18.70	7.98
1983	8.62	20.30	11.68	23.50	14.88
1984	9.57	23.50	13.93	3.10	-6.47
1985	7.49	18.50	11.01	32.60	25.11
1986	5.97	29.50	23.53	16.10	10.13
1987	5.83	18.80	12.97	2.30	-3.53
1988	6.67	27.90	21.23	17.90	11.23
1989	8.11	21.40	13.29	29.20	21.09
1990	7.51	-25.70	-33.21	-6.20	-13.71
Average	7.83	18.14	10.31	15.24	7.41
Standard deviation	1.53	16.02	15.93	12.29	12.19

Correlation Between Fund and Wilshire-5000	→ 0.56
Beta of Fund	→ 0.74
Beta of Wilshire-5000	→ 1.00

Sharpe Index for Fund	→ 0.64
Sharpe Index for Wilshire-5000	→ 0.60

Treynor Index for Fund	→ 13.99
Treynor Index for Wilshire-5000	→ 7.41

Jensen's Alpha	→ 4.85
Standard Deviation of Alpha	→ 13.16
Z-statistics of Jensen's Alpha	→ 0.37

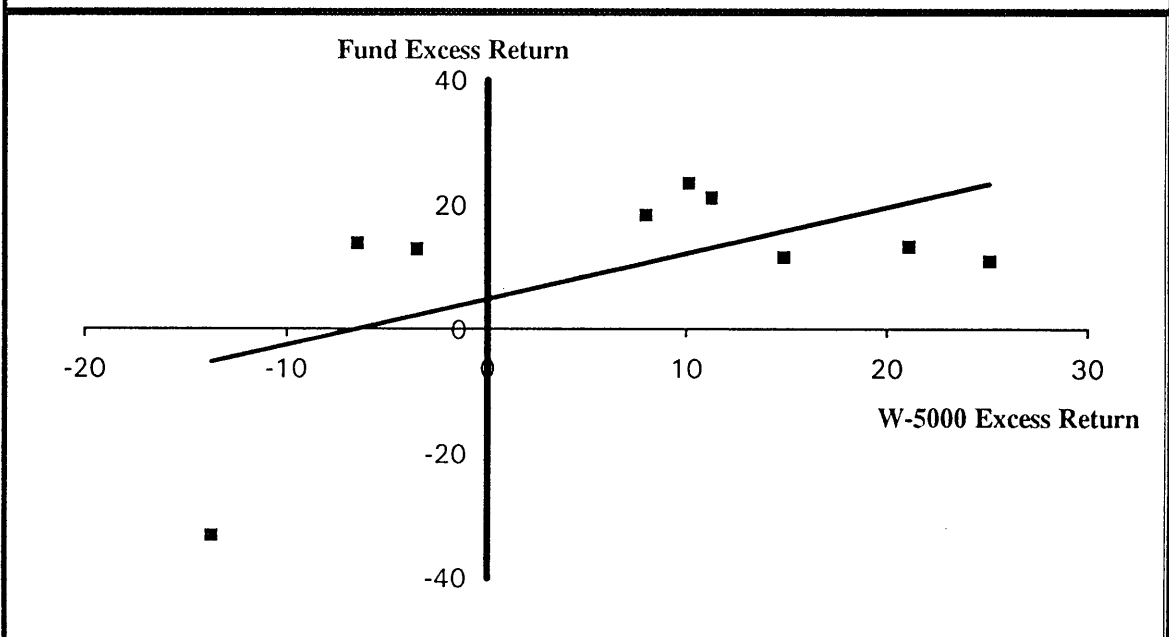


Table 5-9 Performance of Fund (James Capel North American Fund)

Period	T-Bill Rate %	Return on Fund %	Excess Fund Return %	Return on Wilshire 5000 (%)	Excess on Wilshire 5000 Return (%)
1982	10.72	45.60	34.88	18.70	7.98
1983	8.62	34.00	25.38	23.50	14.88
1984	9.57	13.20	3.63	3.10	-6.47
1985	7.49	0.20	-7.29	32.60	25.11
1986	5.97	23.40	17.43	16.10	10.13
1987	5.83	-26.60	-32.43	2.30	-3.53
1988	6.67	15.60	8.93	17.90	11.23
1989	8.11	35.20	27.09	29.20	21.09
1990	7.51	-28.30	-35.81	-6.20	-13.71
Average	7.83	12.48	4.65	15.24	7.41
Standard deviation	1.53	24.83	24.00	12.29	12.19

Correlation Between Fund and Wilshire-5000	→ 0.61
Beta of Fund	→ 1.19
Beta of Wilshire-5000	→ 1.00

Sharpe Index for Fund	→ 0.19
Sharpe Index for Wilshire-5000	→ 0.60

Treynor Index for Fund	→ 3.90
Treynor Index for Wilshire-5000	→ 7.41

Jensen's Alpha	→ -4.19
Standard Deviation of Alpha	→ 19.11
Z-statistics of Jensen's Alpha	→ -0.22

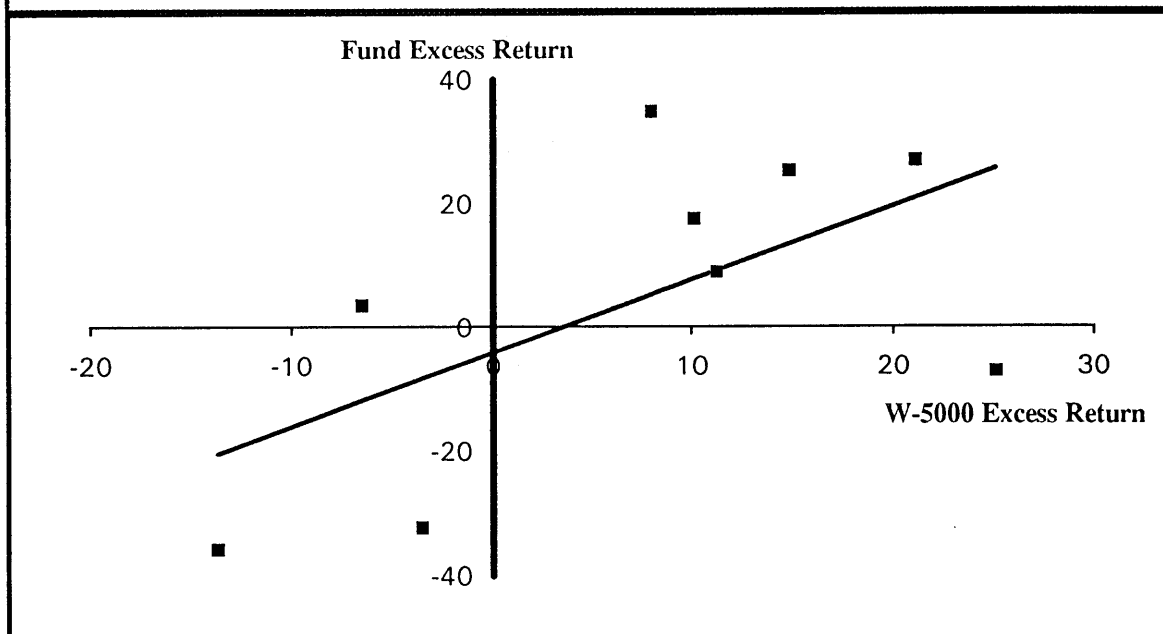


Table 5-10 Performance of Fund (Edinburgh Fund Managers International)

Period	T-Bill Rate %	Return on Fund %	Excess Fund Return %	Return on Wilshire 5000 (%)	Excess on Wilshire 5000 Return (%)
1982	10.72	6.20	-4.52	18.70	7.98
1983	8.62	34.30	25.68	23.50	14.88
1984	9.57	25.60	16.03	3.10	-6.47
1985	7.49	-2.00	-9.49	32.60	25.11
1986	5.97	32.70	26.73	16.10	10.13
1987	5.83	-17.70	-23.53	2.30	-3.53
1988	6.67	10.40	3.73	17.90	11.23
1989	8.11	37.40	29.29	29.20	21.09
1990	7.51	-27.00	-34.51	-6.20	-13.71
Average	7.83	11.10	3.27	15.24	7.41
Standard deviation	1.53	22.07	21.76	12.29	12.19

Correlation Between Fund and Wilshire-5000	→ 0.53
Beta of Fund	→ 0.95
Beta of Wilshire-5000	→ 1.00

Sharpe Index for Fund	→ 0.15
Sharpe Index for Wilshire-5000	→ 0.60

Treynor Index for Fund	→ 3.43
Treynor Index for Wilshire-5000	→ 7.41

Jensen's Alpha	→ -3.79
Standard Deviation of Alpha	→ 18.41
Z-statistics of Jensen's Alpha	→ -0.21

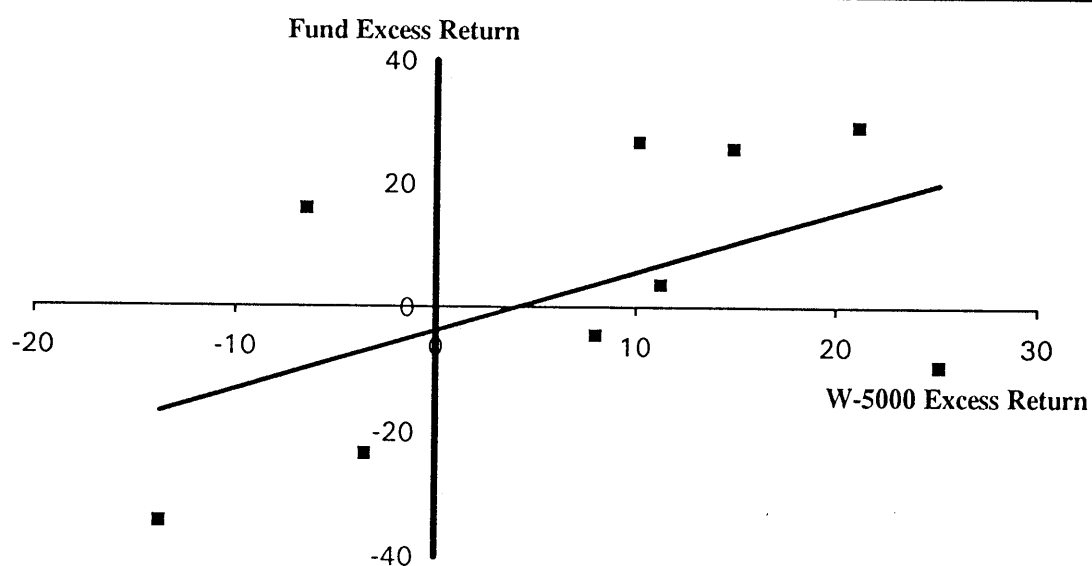


Table 5-11 Performance of Fund (AXA Equity and Law Far East Trust)

Period	T-Bill Rate %	Return on Fund %	Excess Fund Return %	Return on Wilshire 5000 (%)	Excess on Wilshire 5000 Return (%)
1982	10.72	11.60	0.88	18.70	7.98
1983	8.62	46.90	38.28	23.50	14.88
1984	9.57	10.60	1.03	3.10	-6.47
1985	7.49	3.10	-4.39	32.60	25.11
1986	5.97	79.70	73.73	16.10	10.13
1987	5.83	1.60	-4.23	2.30	-3.53
1988	6.67	22.60	15.93	17.90	11.23
1989	8.11	27.20	19.09	29.20	21.09
1990	7.51	-38.70	-46.21	-6.20	-13.71
Average	7.83	18.29	10.46	15.24	7.41
Standard deviation	1.53	30.82	31.11	12.29	12.19

Correlation Between Fund and Wilshire-5000	→ 0.51
Beta of Fund	→ 1.30
Beta of Wilshire-5000	→ 1.00

Sharpe Index for Fund	→ 0.34
Sharpe Index for Wilshire-5000	→ 0.60

Treynor Index for Fund	→ 8.04
Treynor Index for Wilshire-5000	→ 7.41

Jensen's Alpha	→ 0.82
Standard Deviation of Alpha	→ 26.77
Z-statistics of Jensen's Alpha	→ 0.03

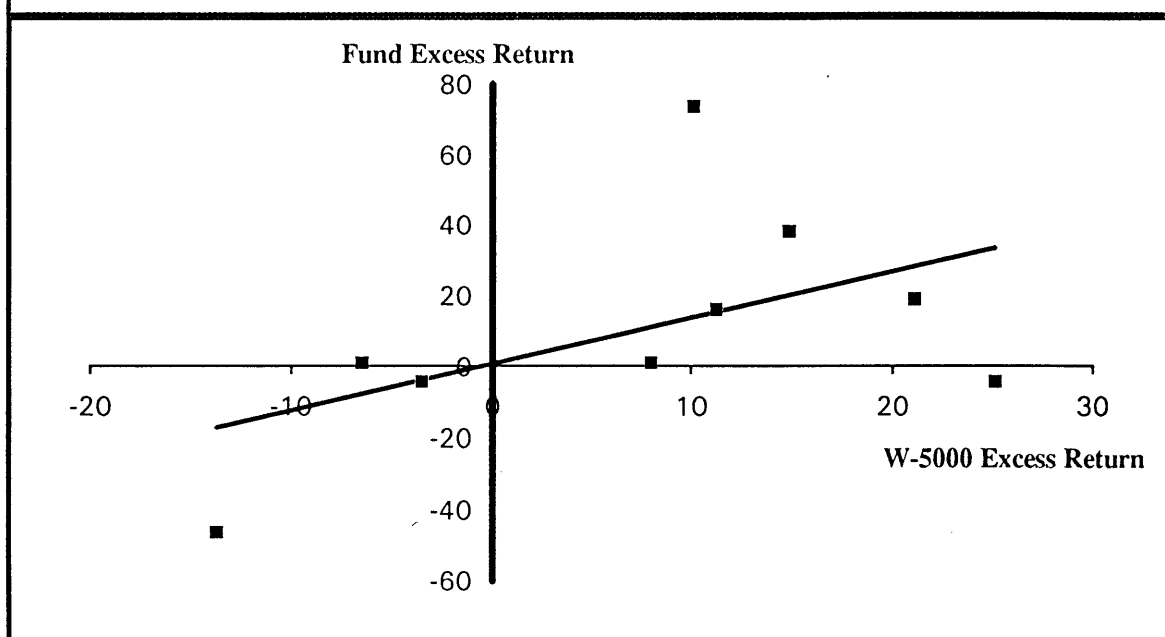


Table 5-12 Performance of Fund (Fidelity American Trust)

Period	T-Bill Rate %	Return on Fund %	Excess Fund Return %	Return on Wilshire 5000 (%)	Excess on Wilshire 5000 Return (%)
1982	10.72	49.30	38.58	18.70	7.98
1983	8.62	35.30	26.68	23.50	14.88
1984	9.57	6.80	-2.77	3.10	-6.47
1985	7.49	3.10	-4.39	32.60	25.11
1986	5.97	23.70	17.73	16.10	10.13
1987	5.83	-16.80	-22.63	2.30	-3.53
1988	6.67	20.40	13.73	17.90	11.23
1989	8.11	44.70	36.59	29.20	21.09
1990	7.51	-22.60	-30.11	-6.20	-13.71
Average	7.83	15.99	8.16	15.24	7.41
Standard deviation	1.53	24.04	23.31	12.29	12.19
Correlation Between Fund and Wilshire-5000					
				0.65	
Beta of Fund				1.25	
Beta of Wilshire-5000				1.00	
Sharpe Index for Fund					
				0.34	
Sharpe Index for Wilshire-5000				0.60	
Treyner Index for Fund					
				6.54	
Treyner Index for Wilshire-5000				7.41	
Jensen's Alpha					
				-1.08	
Standard Deviation of Alpha				17.67	
Z-statistics of Jensen's Alpha				-0.06	

Table 5-13 Performance of Fund (Gartmore Global Income and Growth)

Period	T-Bill Rate %	Return on Fund %	Excess Fund Return %	Return on Wilshire 5000 (%)	Excess on Wilshire 5000 Return (%)
1982	10.72	14.70	3.98	18.70	7.98
1983	8.62	24.10	15.48	23.50	14.88
1984	9.57	46.30	36.73	3.10	-6.47
1985	7.49	23.10	15.61	32.60	25.11
1986	5.97	34.50	28.53	16.10	10.13
1987	5.83	-19.60	-25.43	2.30	-3.53
1988	6.67	3.90	-2.77	17.90	11.23
1989	8.11	32.30	24.19	29.20	21.09
1990	7.51	-17.80	-25.31	-6.20	-13.71
Average	7.83	15.72	7.89	15.24	7.41
Standard deviation	1.53	21.60	21.03	12.29	12.19

Correlation Between Fund and Wilshire-5000	0.47
Beta of Fund	0.82
Beta of Wilshire-5000	1.00

Sharpe Index for Fund	0.37
Sharpe Index for Wilshire-5000	0.60
Treynor Index for Fund	9.63
Treynor Index for Wilshire-5000	7.41

Jensen's Alpha	1.82
Standard Deviation of Alpha	18.52
Z-statistics of Jensen's Alpha	0.10

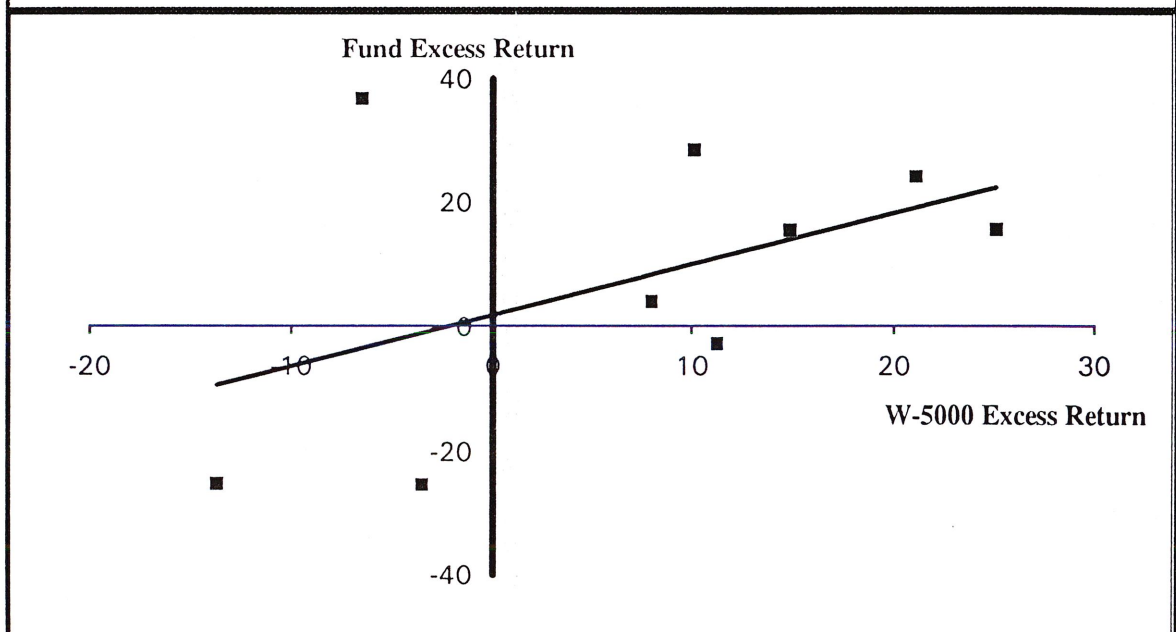


Table 5-14 Performance of Fund (Henderson Australia Trust)

Period	T-Bill Rate %	Return on Fund %	Excess Fund Return %	Return on Wilshire 5000 (%)	Excess on Wilshire 5000 Return (%)
1982	10.72	-25.60	-36.32	18.70	7.98
1983	8.62	39.10	30.48	23.50	14.88
1984	9.57	-18.00	-27.57	3.10	-6.47
1985	7.49	-6.10	-13.59	32.60	25.11
1986	5.97	44.10	38.13	16.10	10.13
1987	5.83	-12.70	-18.53	2.30	-3.53
1988	6.67	43.50	36.83	17.90	11.23
1989	8.11	25.40	17.29	29.20	21.09
1990	7.51	-30.00	-37.51	-6.20	-13.71
Average	7.83	6.63	-1.20	15.24	7.41
Standard deviation	1.53	29.24	29.89	12.29	12.19

Correlation Between Fund and Wilshire-5000	→ 0.56
Beta of Fund	→ 1.37
Beta of Wilshire-5000	→ 1.00

Sharpe Index for Fund	→ -0.04
Sharpe Index for Wilshire-5000	→ 0.60
Treynor Index for Fund	→ -0.88
Treynor Index for Wilshire-5000	→ 7.41
Jensen's Alpha	→ -11.32
Standard Deviation of Alpha	→ 24.83
Z-statistics of Jensen's Alpha	→ -0.46

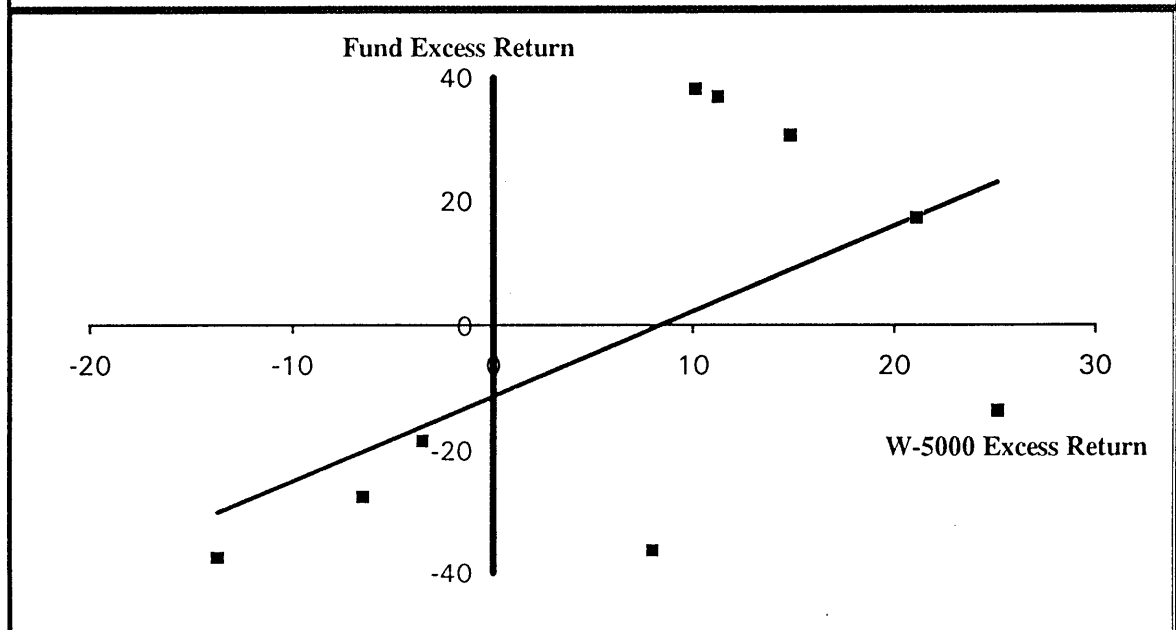


Table 5-15 Performance of Fund (Hill Samuel European Trust)

Period	T-Bill Rate %	Return on Fund %	Excess Fund Return %	Return on Wilshire 5000 (%)	Excess on Wilshire 5000 Return (%)
1982	10.72	25.10	14.38	18.70	7.98
1983	8.62	62.60	53.98	23.50	14.88
1984	9.57	10.60	1.03	3.10	-6.47
1985	7.49	60.30	52.81	32.60	25.11
1986	5.97	63.90	57.93	16.10	10.13
1987	5.83	-31.50	-37.33	2.30	-3.53
1988	6.67	19.00	12.33	17.90	11.23
1989	8.11	51.20	43.09	29.20	21.09
1990	7.51	-25.80	-33.31	-6.20	-13.71
Average	7.83	26.16	18.32	15.24	7.41
Standard deviation	1.53	34.74	34.57	12.29	12.19

Correlation Between Fund and Wilshire-5000	→ 0.85
Beta of Fund	→ 2.42
Beta of Wilshire-5000	→ 1.00

Sharpe Index for Fund	→ 0.53
Sharpe Index for Wilshire-5000	→ 0.60
Treynor Index for Fund	→ 7.57
Treynor Index for Wilshire-5000	→ 7.41
Jensen's Alpha	→ 0.37
Standard Deviation of Alpha	→ 18.00
Z-statistics of Jensen's Alpha	→ 0.02

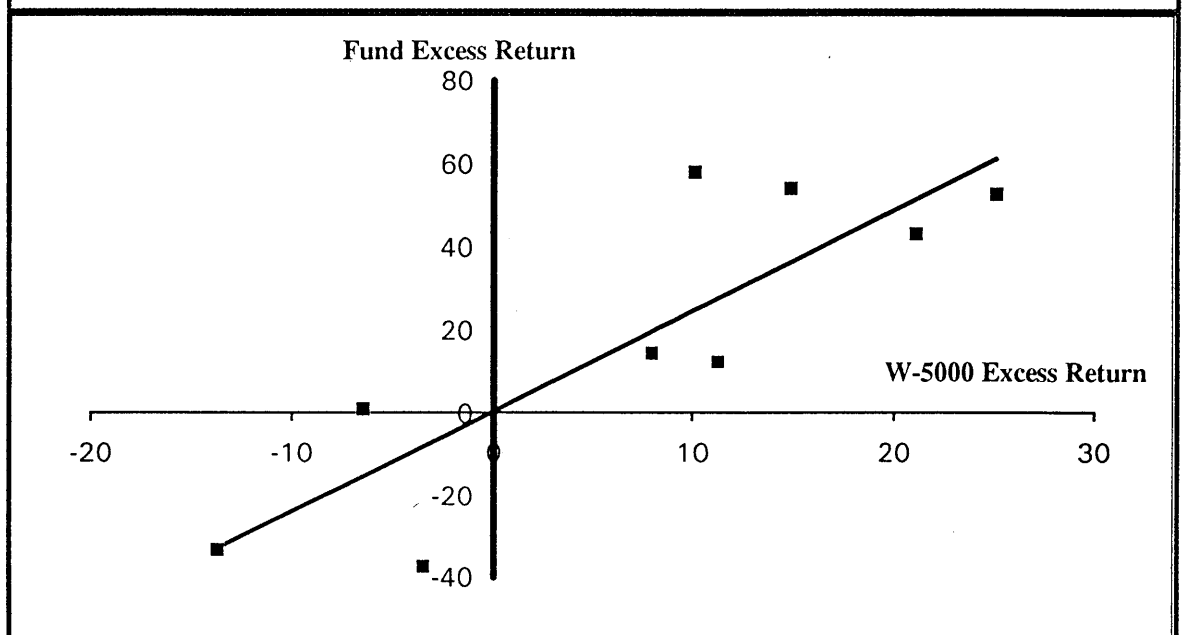


Table 5-16 Performance of Fund (Lazard UK Small Companies Growth Trust)

Period	T-Bill Rate %	Return on Fund %	Excess Fund Return %	Return on Wilshire 5000 (%)	Excess on Wilshire 5000 Return (%)
1982	10.72	18.30	7.58	18.70	7.98
1983	8.62	25.70	17.08	23.50	14.88
1984	9.57	27.60	18.03	3.10	-6.47
1985	7.49	16.00	8.51	32.60	25.11
1986	5.97	31.20	25.23	16.10	10.13
1987	5.83	22.10	16.27	2.30	-3.53
1988	6.67	7.40	0.73	17.90	11.23
1989	8.11	7.00	-1.11	29.20	21.09
1990	7.51	-28.10	-35.61	-6.20	-13.71
Average	7.83	14.13	6.30	15.24	7.41
Standard deviation	1.53	16.90	16.87	12.29	12.19

Correlation Between Fund and Wilshire-5000	→ 0.36
Beta of Fund	→ 0.50
Beta of Wilshire-5000	→ 1.00

Sharpe Index for Fund	→ 0.37
Sharpe Index for Wilshire-5000	→ 0.60
Treynor Index for Fund	→ 12.72
Treynor Index for Wilshire-5000	→ 7.41
Jensen's Alpha	→ 2.63
Standard Deviation of Alpha	→ 15.75
Z-statistics of Jensen's Alpha	→ 0.17

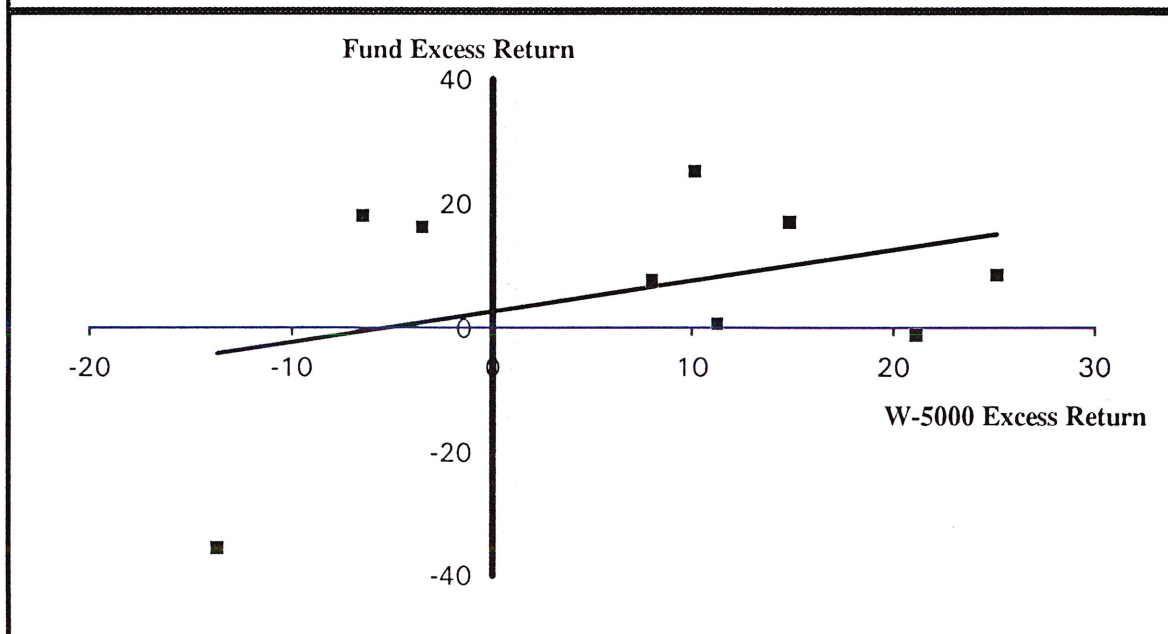


Table 5-17 Performance of Fund (M and G Gold and General Fund)

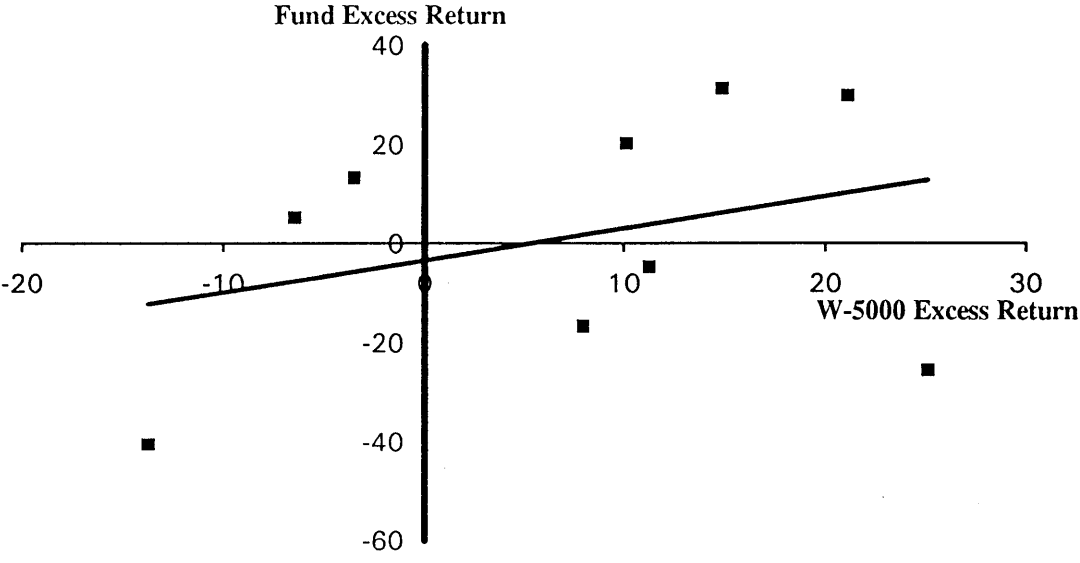
Period	T-Bill Rate %	Return on Fund %	Excess Fund Return %	Return on Wilshire 5000 (%)	Excess on Wilshire 5000 Return (%)
1982	10.72	-6.10	-16.82	18.70	7.98
1983	8.62	39.90	31.28	23.50	14.88
1984	9.57	14.80	5.23	3.10	-6.47
1985	7.49	-18.10	-25.59	32.60	25.11
1986	5.97	26.20	20.23	16.10	10.13
1987	5.83	19.00	13.17	2.30	-3.53
1988	6.67	1.90	-4.77	17.90	11.23
1989	8.11	38.00	29.89	29.20	21.09
1990	7.51	-33.10	-40.61	-6.20	-13.71
Average	7.83	9.17	1.33	15.24	7.41
Standard deviation	1.53	23.59	23.75	12.29	12.19
Correlation Between Fund and Wilshire-5000					
				0.33	
Beta of Fund				0.64	
Beta of Wilshire-5000				1.00	
Sharpe Index for Fund					
				0.06	
Sharpe Index for Wilshire-5000				0.60	
Treyner Index for Fund					
				2.08	
Treyner Index for Wilshire-5000				7.41	
Jensen's Alpha					
				-3.42	
Standard Deviation of Alpha				22.42	
Z-statistics of Jensen's Alpha				-0.15	
					

Table 5-18 Performance of Fund (MIM Britannia American Growth Fund)

Period	T-Bill Rate %	Return on Fund %	Excess Fund Return %	Return on Wilshire 5000 (%)	Excess on Wilshire 5000 Return (%)
1982	10.72	24.00	13.28	18.70	7.98
1983	8.62	27.30	18.68	23.50	14.88
1984	9.57	14.70	5.13	3.10	-6.47
1985	7.49	16.20	8.71	32.60	25.11
1986	5.97	11.20	5.23	16.10	10.13
1987	5.83	-26.40	-32.23	2.30	-3.53
1988	6.67	24.00	17.33	17.90	11.23
1989	8.11	32.80	24.69	29.20	21.09
1990	7.51	-28.30	-35.81	-6.20	-13.71
Average	7.83	10.61	2.78	15.24	7.41
Standard deviation	1.53	21.24	20.59	12.29	12.19

Correlation Between Fund and Wilshire-5000	→ 0.78
Beta of Fund	→ 1.31
Beta of Wilshire-5000	→ 1.00

Sharpe Index for Fund	→ 0.13
Sharpe Index for Wilshire-5000	→ 0.60
Treynor Index for Fund	→ 2.11
Treynor Index for Wilshire-5000	→ 7.41
Jensen's Alpha	→ -6.96
Standard Deviation of Alpha	→ 12.94
Z-statistics of Jensen's Alpha	→ -0.54

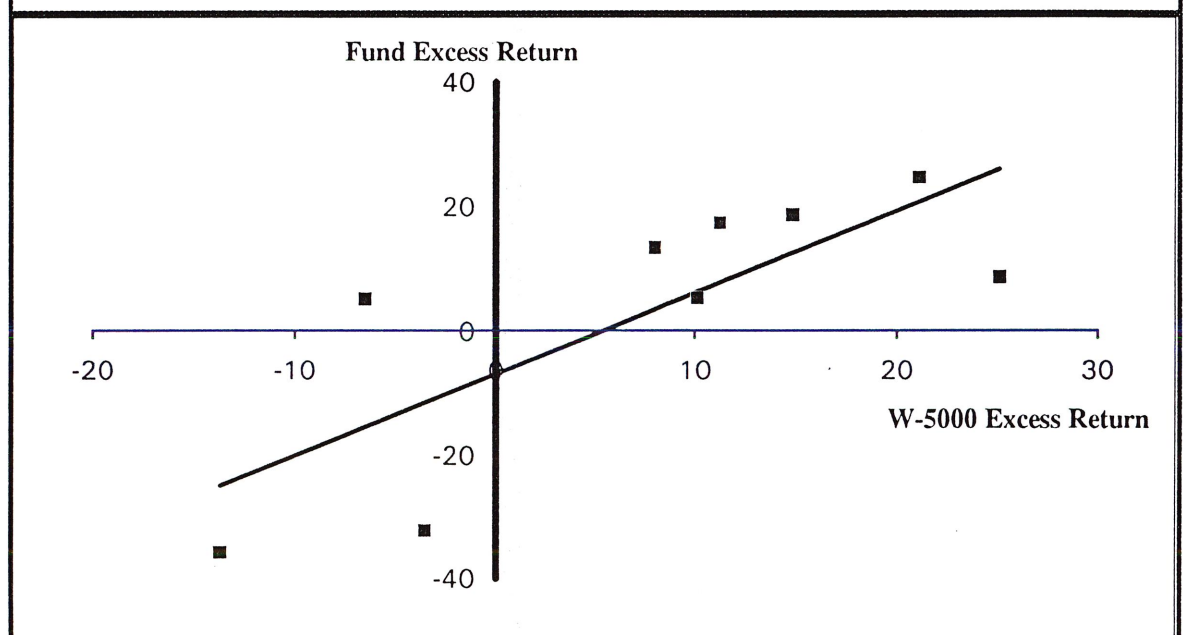


Table 5-19 Performance of Fund (Mercury International Fund)

Period	T-Bill Rate %	Return on Fund %	Excess Fund Return %	Return on Wilshire 5000 (%)	Excess on Wilshire 5000 Return (%)
1982	10.72	16.90	6.18	18.70	7.98
1983	8.62	33.50	24.88	23.50	14.88
1984	9.57	20.60	11.03	3.10	-6.47
1985	7.49	9.90	2.41	32.60	25.11
1986	5.97	39.90	33.93	16.10	10.13
1987	5.83	-9.80	-15.63	2.30	-3.53
1988	6.67	16.20	9.53	17.90	11.23
1989	8.11	29.80	21.69	29.20	21.09
1990	7.51	-33.30	-40.81	-6.20	-13.71
Average	7.83	13.74	5.91	15.24	7.41
Standard deviation	1.53	21.54	21.32	12.29	12.19

Correlation Between Fund and Wilshire-5000	→	0.66
Beta of Fund	→	1.15
Beta of Wilshire-5000	→	1.00

Sharpe Index for Fund	→	0.27
Sharpe Index for Wilshire-5000	→	0.60
Treynor Index for Fund	→	5.14
Treynor Index for Wilshire-5000	→	7.41
Jensen's Alpha	→	-2.61
Standard Deviation of Alpha	→	16.07
Z-statistics of Jensen's Alpha	→	-0.16

Fund Excess Return

W-5000 Excess Return

Table 5-20 Performance of Fund (Midland Japan Growth Fund)

Period	T-Bill Rate %	Return on Fund %	Excess Fund Return %	Return on Wilshire 5000 (%)	Excess on Wilshire 5000 Return (%)
1982	10.72	2.90	-7.82	18.70	7.98
1983	8.62	65.90	57.28	23.50	14.88
1984	9.57	26.00	16.43	3.10	-6.47
1985	7.49	7.60	0.11	32.60	25.11
1986	5.97	74.80	68.83	16.10	10.13
1987	5.83	-15.30	-21.13	2.30	-3.53
1988	6.67	32.50	25.83	17.90	11.23
1989	8.11	35.90	27.79	29.20	21.09
1990	7.51	-51.10	-58.61	-6.20	-13.71
Average	7.83	19.91	12.08	15.24	7.41
Standard deviation	1.53	36.97	37.06	12.29	12.19

Correlation Between Fund and Wilshire-5000	→ 0.57
Beta of Fund	→ 1.74
Beta of Wilshire-5000	→ 1.00

Sharpe Index for Fund	→ 0.33
Sharpe Index for Wilshire-5000	→ 0.60
Treynor Index for Fund	→ 6.92
Treynor Index for Wilshire-5000	→ 7.41

Jensen's Alpha	→ -0.85
Standard Deviation of Alpha	→ 30.35
Z-statistics of Jensen's Alpha	→ -0.03

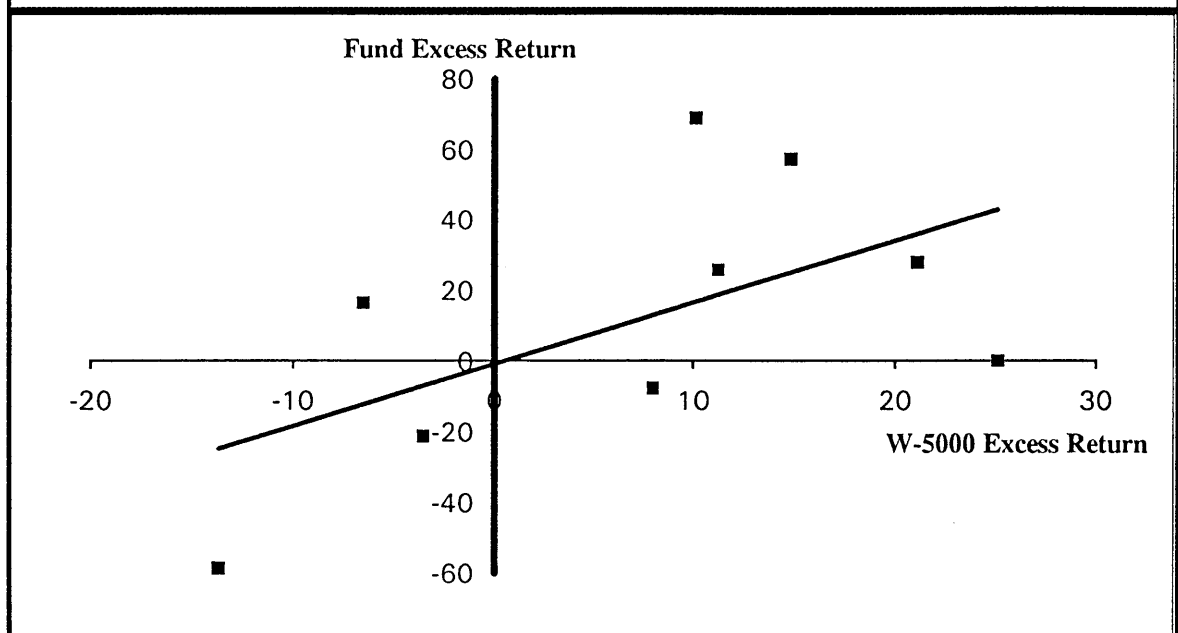


Table 5-21 Performance of Fund (Save and Prosper Financial Securities Fund)

Period	T-Bill Rate %	Return on Fund %	Excess Fund Return %	Return on Wilshire 5000 (%)	Excess on Wilshire 5000 Return (%)
1982	10.72	8.90	-1.82	18.70	7.98
1983	8.62	38.80	30.18	23.50	14.88
1984	9.57	20.90	11.33	3.10	-6.47
1985	7.49	25.40	17.91	32.60	25.11
1986	5.97	30.40	24.43	16.10	10.13
1987	5.83	0.30	-5.53	2.30	-3.53
1988	6.67	12.40	5.73	17.90	11.23
1989	8.11	25.20	17.09	29.20	21.09
1990	7.51	-29.00	-36.51	-6.20	-13.71
Average	7.83	14.81	6.98	15.24	7.41
Standard deviation	1.53	18.99	18.89	12.29	12.19

Correlation Between Fund and Wilshire-5000	→ 0.74
Beta of Fund	→ 1.15
Beta of Wilshire-5000	→ 1.00

Sharpe Index for Fund	→ 0.37
Sharpe Index for Wilshire-5000	→ 0.60

Treynor Index for Fund	→ 6.07
Treynor Index for Wilshire-5000	→ 7.41

Jensen's Alpha	→ -1.55
Standard Deviation of Alpha	→ 12.66
Z-statistics of Jensen's Alpha	→ -0.12

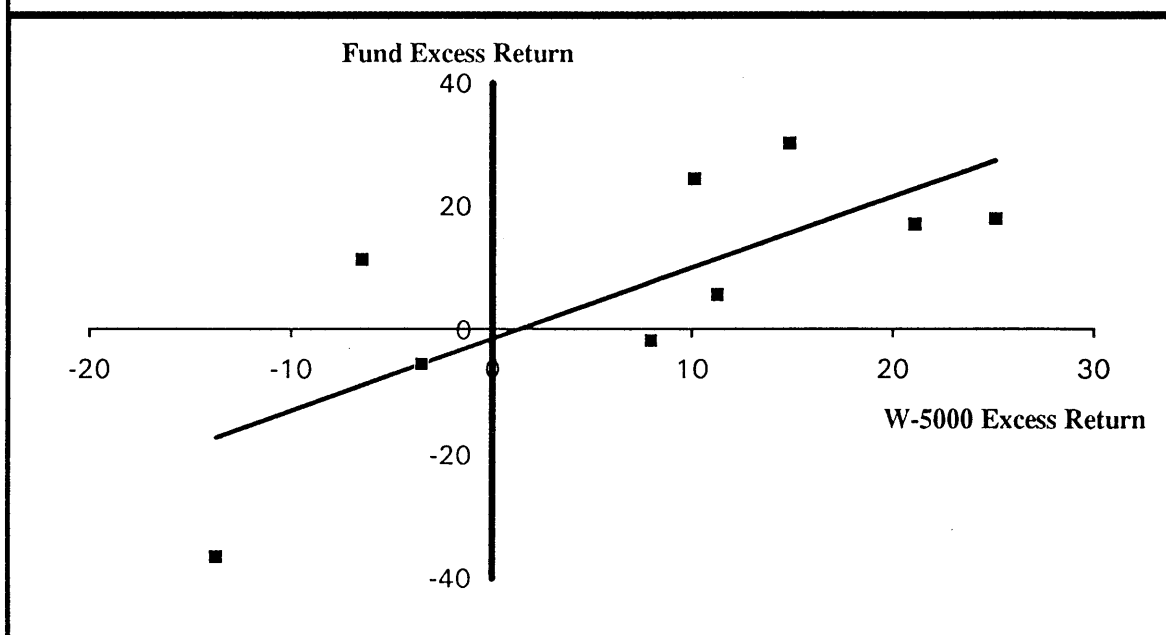


Table 5-22 Performance of Fund (Save and Prosper Gold and Exploration)

Period	T-Bill Rate %	Return on Fund %	Excess Fund Return %	Return on Wilshire 5000 (%)	Excess on Wilshire 5000 Return (%)
1982	10.72	-18.50	-29.22	18.70	7.98
1983	8.62	16.30	7.68	23.50	14.88
1984	9.57	-6.40	-15.97	3.10	-6.47
1985	7.49	-2.50	-9.99	32.60	25.11
1986	5.97	65.10	59.13	16.10	10.13
1987	5.83	11.50	5.67	2.30	-3.53
1988	6.67	-34.40	-41.07	17.90	11.23
1989	8.11	27.80	19.69	29.20	21.09
1990	7.51	-38.90	-46.41	-6.20	-13.71
Average	7.83	2.22	-5.61	15.24	7.41
Standard deviation	1.53	30.64	31.16	12.29	12.19

Correlation Between Fund and Wilshire-5000	→ 0.37
Beta of Fund	→ 0.96
Beta of Wilshire-5000	→ 1.00

Sharpe Index for Fund	→ -0.18
Sharpe Index for Wilshire-5000	→ 0.60
Treynor Index for Fund	→ -5.87
Treynor Index for Wilshire-5000	→ 7.41
Jensen's Alpha	→ -12.69
Standard Deviation of Alpha	→ 28.91
Z-statistics of Jensen's Alpha	→ -0.44

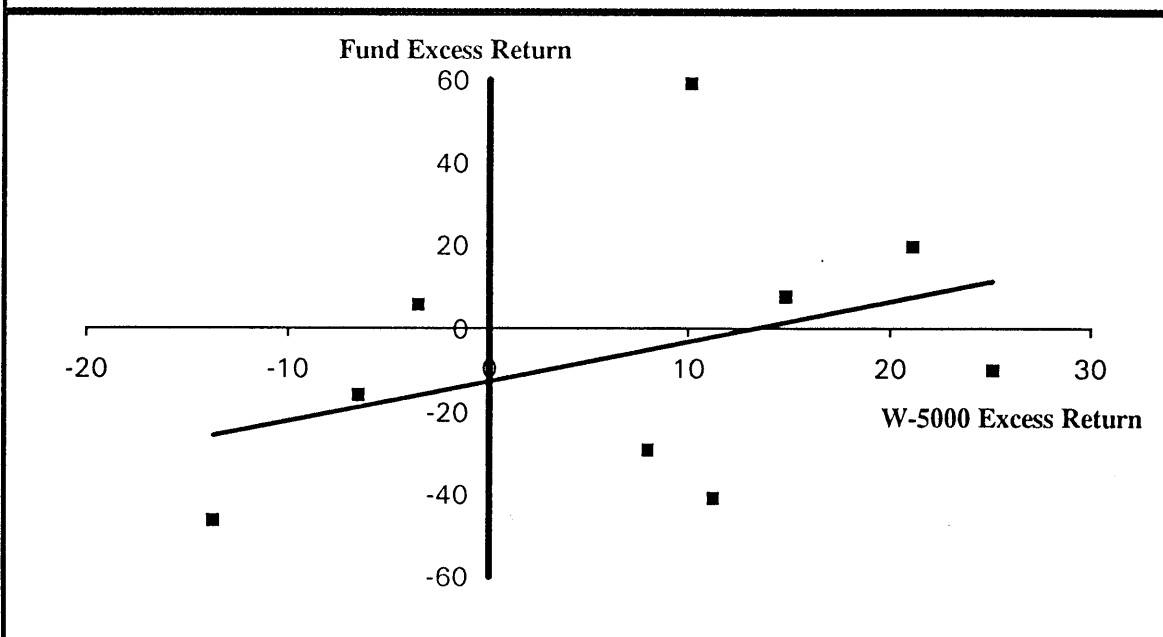


Table 5-23 Performance of Fund (Save and Prosper Fixed Income Fund)

Period	T-Bill Rate %	Return on Fund %	Excess Fund Return %	Return on Wilshire 5000 (%)	Excess on Wilshire 5000 Return (%)
1982	10.72	35.20	24.48	18.70	7.98
1983	8.62	5.40	-3.22	23.50	14.88
1984	9.57	3.70	-5.87	3.10	-6.47
1985	7.49	6.40	-1.09	32.60	25.11
1986	5.97	6.30	0.33	16.10	10.13
1987	5.83	11.00	5.17	2.30	-3.53
1988	6.67	0.40	-6.27	17.90	11.23
1989	8.11	3.70	-4.41	29.20	21.09
1990	7.51	1.10	-6.41	-6.20	-13.71
Average	7.83	8.13	0.30	15.24	7.41
Standard deviation	1.53	10.02	9.26	12.29	12.19
Correlation Between Fund and Wilshire-5000					
Beta of Fund				0.05	
Beta of Wilshire-5000				0.04	
				1.00	
Sharpe Index for Fund					
				0.03	
Sharpe Index for Wilshire-5000				0.60	
Treyner Index for Fund					
				8.47	
Treyner Index for Wilshire-5000				7.41	
Jensen's Alpha					
				0.04	
Standard Deviation of Alpha				9.25	
Z-statistics of Jensen's Alpha				0.00	
Fund Excess Return W-5000 Excess Return					

Table 5-24 Performance of Fund (Target Gold and Capital Growth)

Period	T-Bill Rate %	Return on Fund %	Excess Fund Return %	Return on Wilshire 5000 (%)	Excess on Wilshire 5000 Return (%)
1982	10.72	121.90	111.18	18.70	7.98
1983	8.62	1.90	-6.72	23.50	14.88
1984	9.57	-11.00	-20.57	3.10	-6.47
1985	7.49	-20.20	-27.69	32.60	25.11
1986	5.97	40.50	34.53	16.10	10.13
1987	5.83	-20.10	-25.93	2.30	-3.53
1988	6.67	-24.40	-31.07	17.90	11.23
1989	8.11	24.70	16.59	29.20	21.09
1990	7.51	-38.70	-46.21	-6.20	-13.71
Average	7.83	8.29	0.46	15.24	7.41
Standard deviation	1.53	46.57	45.75	12.29	12.19

Correlation Between Fund and Wilshire-5000	→ 0.25
Beta of Fund	→ 0.95
Beta of Wilshire-5000	→ 1.00

Sharpe Index for Fund	→ 0.01
Sharpe Index for Wilshire-5000	→ 0.60
Treynor Index for Fund	→ 0.48
Treynor Index for Wilshire-5000	→ 7.41

Jensen's Alpha	→ -6.59
Standard Deviation of Alpha	→ 44.26
Z-statistics of Jensen's Alpha	→ -0.15

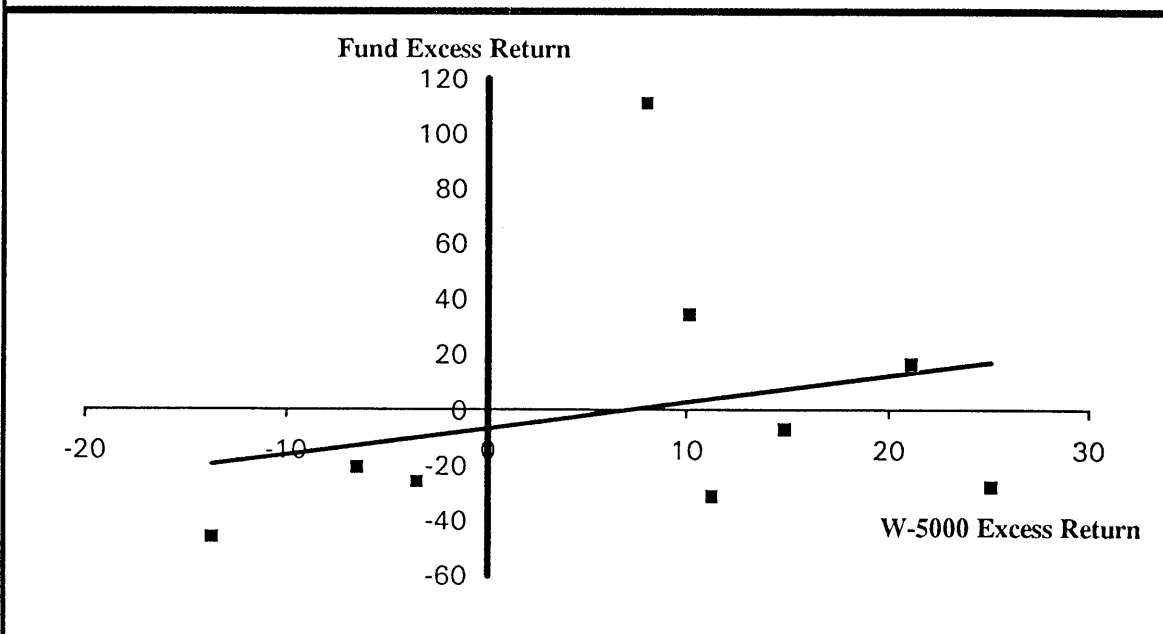


Table 5-25 Performance of Fund (Target Income Fund)

Period	T-Bill Rate %	Return on Fund %	Excess Fund Return %	Return on Wilshire 5000 (%)	Excess on Wilshire 5000 Return (%)
1982	10.72	24.00	13.28	18.70	7.98
1983	8.62	39.40	30.78	23.50	14.88
1984	9.57	38.90	29.33	3.10	-6.47
1985	7.49	27.20	19.71	32.60	25.11
1986	5.97	35.90	29.93	16.10	10.13
1987	5.83	12.60	6.77	2.30	-3.53
1988	6.67	6.90	0.23	17.90	11.23
1989	8.11	5.30	-2.81	29.20	21.09
1990	7.51	-16.70	-24.21	-6.20	-13.71
Average	7.83	19.28	11.45	15.24	7.41
Standard deviation	1.53	17.76	17.41	12.29	12.19

Correlation Between Fund and Wilshire-5000	→ 0.35
Beta of Fund	→ 0.49
Beta of Wilshire-5000	→ 1.00

Sharpe Index for Fund	→ 0.64
Sharpe Index for Wilshire-5000	→ 0.60
Treynor Index for Fund	→ 23.18
Treynor Index for Wilshire-5000	→ 7.41
Jensen's Alpha	→ 7.79
Standard Deviation of Alpha	→ 16.34
Z-statistics of Jensen's Alpha	→ 0.48

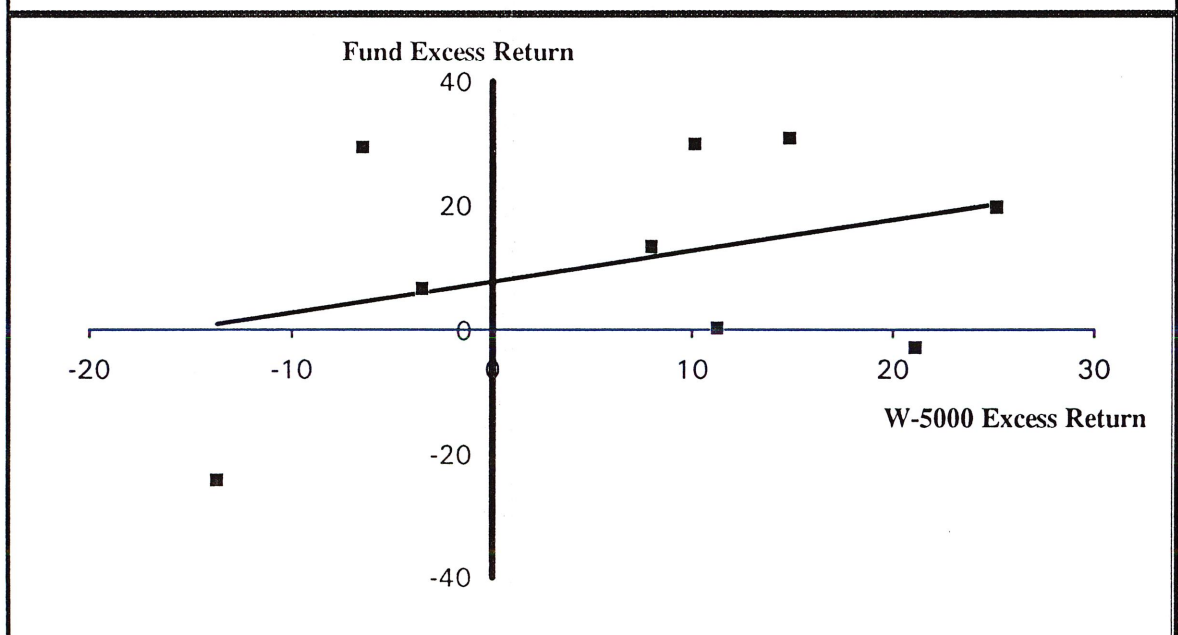


Table 5-26 Mutual Fund Performance

	Fund	Beta	Sharpe	Treynor	Jensen Alpha	Z-statistics
1	Abbey American Growth Trust	1.32	0.26	4.2	-4.25	-0.34
2	Abbey General Trust	0.78	0.42	7.86	0.35	0.03
3	Aetna International Growth Trust	0.72	0.67	15.21	5.65	0.41
4	Allied Dunbar Pacific Trust	1.36	0.23	5.48	-2.63	-0.1
5	Barclays Unicom Gilt and Fixed Interest Income	0.08	0.11	15.14	0.58	0.06
6	Commercial Union High Yield Fund	0.74	0.64	13.99	4.85	0.37
7	James Capel North American Fund	1.19	0.19	3.9	-4.19	-0.22
8	Edinburgh Fund Managers International Fund	0.95	0.15	3.43	-3.79	-0.21
9	AXA Equity and LAW Far East Trust	1.3	0.34	8.04	0.82	0.03
10	Fidelity American Trust	1.25	0.34	6.54	-1.08	-0.06
11	Gartmore Global Income and Growth Fund	0.82	0.37	9.63	1.82	0.1
12	Henderson Australia Trust	1.37	-0.04	-0.88	-11.32	-0.46
13	Hill Samuel European Trust	2.42	0.53	7.57	0.37	0.02
14	Lazard UK Small Companies Growth Trust	0.5	0.37	12.72	2.63	0.17
15	M and G Gold and General Fund	0.64	0.06	2.08	-3.42	-0.15
16	MIM Britannia American Growth Fund	1.31	0.13	2.11	-6.96	-0.54
17	Mercury International Fund	1.15	0.27	5.14	-2.61	-0.16
18	Midland Japan Growth Fund	1.74	0.33	6.92	-0.85	-0.03
19	Save and Prosper Financial Securities	1.15	0.37	6.07	-1.55	-0.12
20	Save and Prosper Gold and Exploration Fund	0.96	-0.18	-5.87	-12.69	-0.44
21	Save and Prosper Gilt and Fixed Income Fund	0.04	0.03	8.47	0.04	0
22	Target Gold and General Capital Growth	0.95	0.01	0.48	-6.59	-0.15
23	Target Income Fund	0.49	0.64	23.18	7.79	0.48
Average		1.01	0.27	7.02	-1.61	
Wilshire 5000		1	0.6	7.41		

Chapter Six

Reliability of the Measures

In this chapter we will discuss the validity of the three performance measures explained in chapter three and used to evaluate the companies in chapter five. Perhaps it is unfair to attribute the deficiencies to the measures themselves, because the real problem is with the capital asset pricing model that lays down the basis of these measures. The CAPM, like any theory is based on a set of assumptions and the problem here is that some of these assumptions are irrelevant to the situations that exist in the real world , while others are very difficult to implement . But why are they used . There can be three reasons for that (Robert 1987) :

- a) Simplicity, because of all its assumptions, the model is left with simple equations stating that the expected return is made out of two components, risk-free return plus risk premium.
- b) Implication, as stated earlier the model have many implications, the most important three are, first, analysis of security prices, second, development of an ideal investment strategy , finally the portfolio performance measures that were discussed in chapter three and implemented in chapter five.
- c) Together with the above two reasons , is the fact that there are no alternative models that explain the relationship between risk and return as

comprehensively as the capital asset pricing model. That is not to say that the capital asset pricing model is the only model in the finance literature, on the contrary many models have been developed, like the Arbitrage Pricing Model (APM), but no one model was as attractive as the CAPM.

There were a number of empirical tests made on the CAPM to see its ability to explain real life phenomenon, out of which the following conclusions were made:

- 1) While the capital asset pricing model is able to hold if tests are made on long time intervals, it is not the case on the short-term tests when the time span was four to six years.
- 2) The intercept of the capital and security market lines is not the risk free rate as was suggested by the model. The intercept term is generally higher which indicate that a revised version of the model is needed and that can be done by removing one or more of the assumptions, as done later in this chapter.
- 3) Beta is the only measure of risk , which is empirically related to average return. Whenever unsystematic risk appears to become important, it can be explained by statistical weaknesses in the data used.
- 4) The relationship between the systematic risk beta and the return is linear.

In each of the following sections we will see the effect of removing each one of the following assumptions :

- 1) Risk-free borrowing and lending.
- 2) Homogeneous expectations
- 3) Taxes equal to zero
- 4) Frictionless markets
- 5) Asset indivisibility
- 6) Single-period model.

Generally lifting any one of the above assumptions will result in a new version of the capital asset pricing model.

6.1 Risk-Free borrowing and lending

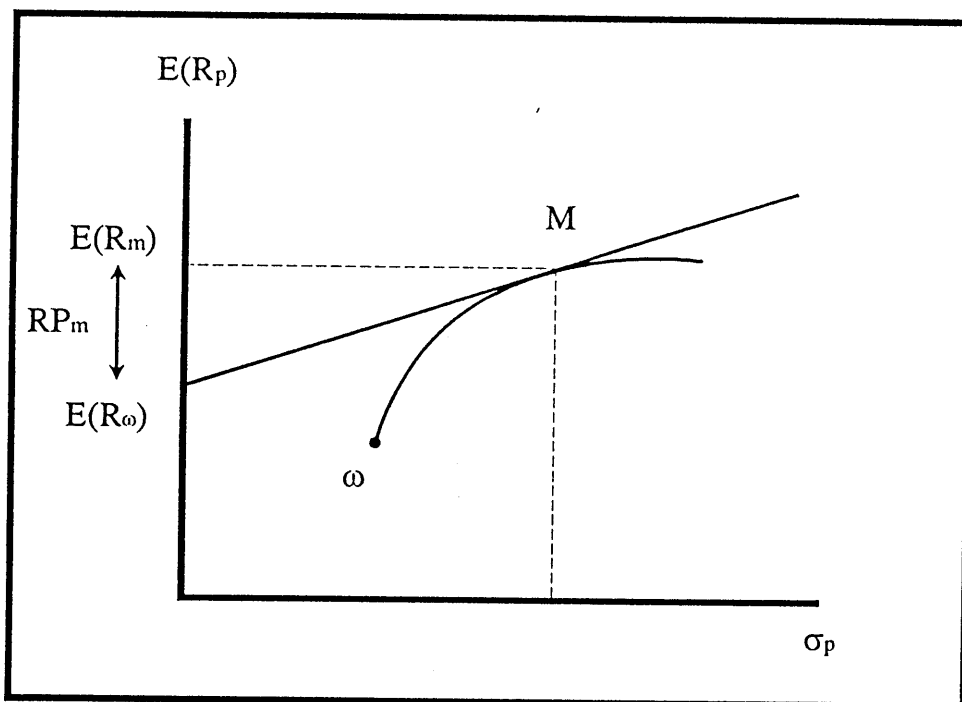
The assumption that a single risk-free asset exists is of great importance to the capital asset pricing model since by definition , the expected rate of return is the return on that asset plus some risk premium. The effect of removing this assumption will be the emergence of a new version of the CAPM. A study by Black (1972) had the following results:-

- 1) The effect on the capital market line :

Here, the idea is that with the absent of the risk-free asset , the best alternative available is to select a portfolio which is uncorrelated with the market return and has the lowest standard deviation. This step, however, will change the shape of the capital market line which is no longer linear, as shown in graph (6-1).

As shown in the graph , the capital market line is a curve extending from point W to M and it has no intercept with the vertical line like in the classical version of the capital pricing model. Taking this portfolio as a replacement of the risk-free asset the capital market line equation which is reproduced in equation (6-1) will be affected in the following manner :

Figure 6.1



$$\text{CML} \quad E(R_p) = R_F + \sigma_p \frac{[R_m - R_F]}{\sigma_m} \quad \dots\dots\dots (6-1)$$

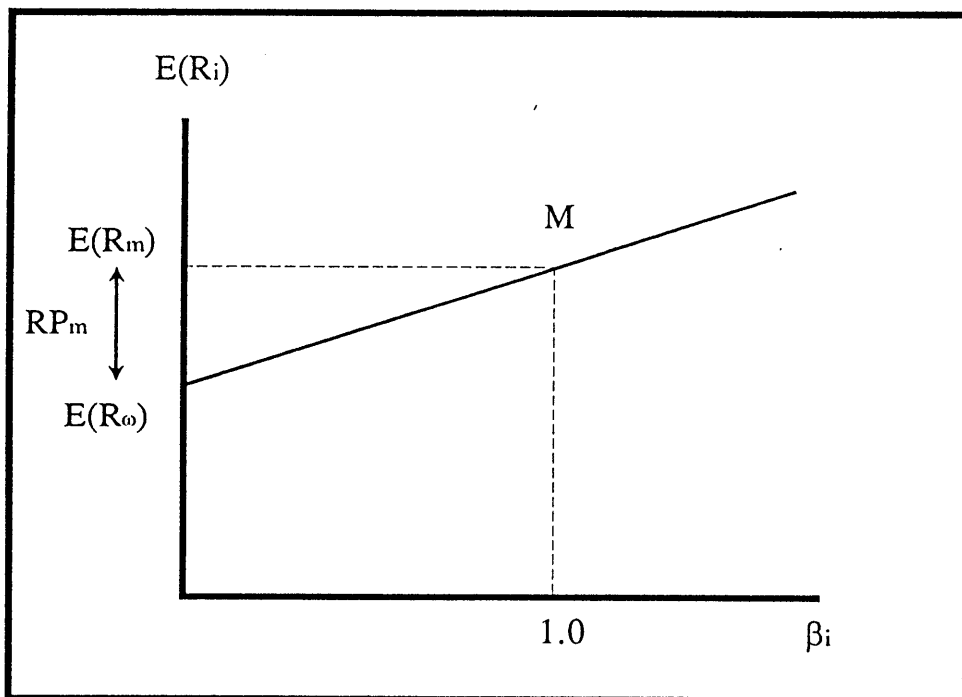
$$\text{CML} \quad E(R_p) = R_\omega + \sigma_p \frac{[R_m - R_\omega]}{\sigma_\omega} \quad \dots\dots\dots (6-2)$$

$$E(R_p) = R_\omega + \sigma_p \frac{R_{mp}}{\sigma_\omega}$$

2) The effect on the security market line:-

The same idea applies to the security market line. Which means finding an alternative security which is not related to the market return. In the SML terminology this means finding a security with zero beta. Unlike the CML the removal of the risk-less asset assumption will not affect the linearity of the security market like as shown in graph (6-2) below :

Figure 6.2



$$E(R_i) = R_F + \beta (R_m - R_F) \dots\dots\dots (6-3)$$

with no risk-free asset would be :

$$E(R_i) = E(R_\omega) + \beta [E(R_m) - E(R_\omega)]$$

$$E(R_i) = E(R_\omega) + \beta (RP_m) \dots\dots\dots (6-4)$$

In both cases the idea was to find a portfolio , or an asset that is not related to the market return . This will explain why the intercept in empirical tests does not equal to the Treasury bill estimate of the R_F .

While the zero beta model does explain the empirical results, its implementation is practically difficult . This is because to find the portfolio with the lowest standard deviation (zero beta), one will need information on all securities available , this is impossible because of two reasons, first, information on all securities are not available, second, even if they are available the process would be very costly.

6.2. Homogeneous Expectations

The second assumption in the classical capital asset pricing model, which seems rather more unrealistic is that people will have homogeneous expectations. This means that everybody in the market will have the same expectations about returns on securities and risk .

This assumption ignores the fact that there is a cost associated with accessing information, and in any market, some people will get more information than

others, and even in market where everybody will eventually get the same information, some investors will get it before others, that's why in the real world people are said to have heterogeneous expectations.

When expectations are not the same for all investors, market equilibrium will still exist and prices will be at a level where demand equals supply but there will be disagreement between investors on the following, based on information available to everyone :

- 1) The market portfolio does not play the critical role which it does with homogeneous expectations.
- 2) Each investor will still use borrowing and lending to achieve his or her desired risk-return level.
- 3) Under heterogeneous expectations assumption, it can be explained why people short sell security, when they see it is unfairly priced in the market. Under the classical capital asset pricing model everybody agrees that the returns are in a positive linear relationship with the beta risk, that's why no one will short sell any security.
- 4) Each person will have his or her own version of the capital and security market lines. Although an aggregate capital and security market lines will exist for the whole market they would no longer describe how anyone should price an asset. That is because when people hold different portfolios each will evaluate beta value for a given security differently.

In summary, a linear relation between return and risk will still exist but it will differ between people according to information available for each investor.

6.3 Zero taxes

Imposing tax will not in all cases reject results of the capital asset pricing model, because if we have one common rate of tax the SML line would be as follows :

$$E(R_i) = R_F(1-T) + b[(R_m - R_F)(1-T)] \quad \dots\dots\dots (6-5)$$

Which means that the expected return will be the same as before less the tax rate

The problem is, however, that there are more than one tax rate depending on the nature of income and different tax rate for every individual based on income level.

A study by Brennan (1971) had modified the CAPM equation to account for different tax rates that depend on the nature of income (ordinary tax rates and capital gains tax) on follows :

$$E(R_i) = R_F + \beta_i[R_m - R_{rf}] - T(D_m - R_F) + T(D_i - R_F) \quad \dots\dots\dots (6-6)$$

where,

$T \Rightarrow$ a positive coefficient which accounts for the impact of ordinary and capital gain tax rates.

$D_m \Rightarrow$ the dividend yield on the market portfolio.

$D_i \Rightarrow$ the dividend yield on stock i

The implication of the above equation is that investors with lower tax rate should hold more securities with high dividend yield , because the pre and post tax return will be more (pension funds follow this strategy because they pay no tax). On the other hand people with high tax rates should hold low dividend yield securities to increase their return by being taxed on capital gain rather than the ordinary larger tax rate.

The other complication of the taxes, is even if there was only one kind of tax, say ordinary tax, people will still differ on the amount of tax they pay depending on the level of income. The result is that people may have the same expectation of the pre tax return but they differ in the expectation of the more important post tax return . Therefore, investors with different tax rates will have different security market lines and will perceive security risk differently which will lead to hold different portfolios of risky assets.

6.4 Frictionless markets

This section is strongly related to the previous ones about taxes and homogeneous expectations , because to have a market that there is nothing to constraint the investor from selecting any portfolio desired we should have :

- 1) No taxes that will affect the decision of the investor to select his desired portfolio or include a particular security in the portfolio.
- 2) Every investor should have a costless access to all kind of information about all securities in the market.

Taking out those two conditions will have the same effect as taking out the assumption of homogeneous expectation or the assumption of zero taxes because in either case the result will be a world of different expectations between investors.

6.5 Asset indivisibility:

The asset divisibility assumption will not cause a problem if we thought of a share as an instrument that reflect the value of the asset of a company (hence, a value that can be divided). The problem can only arise when we are faced with an asset that can not be divided , which is the human capital.

In the capital asset pricing model there is no recognition of the individual own ability and how it can affect optimal security holding. The addition of the human capital as an asset will add more sense to the model but it will render the market model's beta useless.

In his study Mayers(1973) examined the equilibrium of security pricing when human capital is included . He came out with an equation that looks like that of the capital asset pricing model and will be the same if the human capital involvement was zero:

$$E(R_i) = R_F + B_i [E(RP_m)] \dots\dots\dots (6-7)$$

where ,

$$B_i = \frac{\text{Cov}(R_i, R_m) + \frac{V_H}{V_m} \text{Cov}(R_i, R_H)}{\sigma_m^2 + \frac{V_H}{V_m} \text{Cov}(R_m, R_H)} \dots\dots\dots (6-8)$$

We can clearly see that if V_H , which refers to the total value of the human capital in a society , is equal to zero the term B_i will exactly be equal to that in the classical version of the CAPM.

The other three new terms in the equation are

$V_m \Rightarrow$ the value of the market portfolio which includes all securities and real tangible assets.

$\text{Cov}(R_i, R_H) \Rightarrow$ the covariance between the returns on security i and the returns on human capital

$\text{Cov}(R_m, R_H) \Rightarrow$ the covariance between the returns on the market and the returns on human capital

The major drawback of this model is the fact that human value in the society can not be measured in a way that can be included in an equation and yield a figure, that can be used mathematically. Nobody can imagine that creativity can be measured by a number to be used in calculating the above equation.

6.6: Single-period Model

The most difficult assumption to deal with is that decisions are made in one period, because there is no clear understanding of the effect of multi-period on the capital asset pricing model. In order to reach such understanding about the applicability of a single-period model in a multi-period world, Fama (1970) has developed the required conditions.

- 1) Consumption preference is not affected by future events, for example, people's preference for sea food will not be affected by the pollution in sea water.
- 2) People act as if future consumption opportunities are independent of future events.
- 3) People act as if the distribution of assets returns are determinable at the stand of the year, and one independent of future event.

6.7 Summary

In summary, should we say that the standard CAPM is supported by historical evidence and is robust enough that its major conclusions remain even when various assumptions are removed? A strong case can be made for responding on to the question. Empirical tests found returns on portfolios with zero systematic risk to be much larger than the risk-free rate approximation. And the empirical observation that average historical portfolio returns are linearly related to Beta values and unrelated to other potential measures of risk has been shown by Roll (1978) to be due (most likely) to the luck of the researchers in choosing an ex post efficient

portfolio as their index. In fact, Roll has argued that since tests of the CAPM are no more than tests of the mean-variance efficiency of an unobservable market portfolio, the model is untestable.

In Addition, when constraints are lifted, severs damage is done to the simplicity, implications , and pragmatic value of CAPM theory. But is the theory so wrong that it should be discarded, its implications forgotten, and investment tests shortened? The answer to the first two questions, at least, is no. The CAPM presents many insights which don't totally disappear when various assumptions are removed. People should diversify broadly even if this doesn't result in owning the market portfolio. Expected returns will be related to a beta that is unique to each person's portfolio but that is reasonably similar between people if they diversify broadly. The risk of the portfolio is adjusted by combining a person's optimal risky asset portfolio with borrowing and lending . In sum, most of the model's investment implications remain. Maybe the CAPM is not the perfect reflection of reality, but it is the best place to start.

Chapter Seven

Conclusion

In this project we applied three performance measures (Sharpe, Treynor, and Jensen) on a 9 years returns of 23 mutual funds under the regulation of the United Kingdom to answer the question : were these funds able to outperform the market. To answer this question, we assumed the following:-

- 1- Since the origin of the measures is the CAPM theory , we assumed that the theory works.
- 2- Since the annual returns are based on the dollar currency, we assumed that the Wilshire 5000 is the market portfolio.
- 3- US T-bills represents the risk-free rate.
- 4- Betas of the funds are constant for the period under consideration.

Applying these measures, we were able to conclude that, on average, the funds were not able to beat the market during the period under consideration, also a closer examination of the mutual fund diversification suggests that there is room for further diversification of the composition of the funds. Our results is in conformity with most of the pervious empirical research.

Normally, research in the area of performance measures will go deeper in the problem using the power of the theory of statistics to answer and test the following hypotheses:-

- 1- The investment performance of the sample of funds was superior to a buy-the-market-and-hold strategy.
- 2- The funds exhibited consistent superior investment performance from one period to the next period or periods.
- 3- The systematic risk estimates of the funds were stationary over the period.
- 4- The stated investment objectives of the funds were significantly related to their systematic risk and total variability.
- 5- There was a significant relationship between fund risk and investment performance.

To date it seems that there is an agreement between researchers on the answers to the above questions, which are summarized in Table 7-1 on the next page, taken from a paper by Robson (1986), (the results of the same paper was added) :

Table 7-1 Five conclusions from empirical research on funds in three countries

Conclusion	USA Research	UK Research	Australian Research
1. Funds on average earn a return commensurate with their risk.	Sharpe (1966) Jensen (1968,1969) Friend, Blume and Crockett (1974) McDonald (1974) Joy and Porter (1974) Kim (1978) Mains (1977)	Ward and Saunders (1976) Firth (1978) Guy (1978)	Robson (1974) Leslie (1976) Praetz (1976) Bird, Chin and McCrae (1983) Robson (1986)
2. Funds do not exhibit run on superior performance	Jensen (1969) Carlson (1970) Friend, Blume and Crockett (1970) Voorheis (1976)	Guy (1978) Firth (1978) Moles and Taylor (1977) Gurny (1976)	As above
3. The investment objective of a fund is significantly related to risk.	Jensen (1969) Friend , Blume and Crockett (1970) McDonald (1974)	Ward and Saunders (1976) Moles and Taylor (1977) Firth (1978)	Robson (1974, 1986)
4. The systematic risk levels (beta), on average, are less than one.	All of the above	All of the above	Robson (1974) Leslie (1976) Praetz (1976) Robson (1984)
5. Fund betas are approximately stationary over time.	Jensen (1969) Mains (1977)	Ward and saunders (1976) Moles and Taylor (1977) Firth (1978)	Robson (1986)

The empirical performance studies have come under sharp attack from professional portfolio managers. While much of the criticism has come from people unfamiliar with capital market theory, some important questions have been raised by knowledgeable practitioners and academicians. Basically, the problems are:-

- 1- Is portfolio variance a reasonable total proxy? Research has shown, for example, that if investors also consider skewness of returns to be important, then investment companies have fared better than suggested by studies relying solely upon variance of returns.
- 2- Are the historical betas that are used to evaluate performance properly calculated? Conceptually, beta should be calculated using returns on an aggregate wealth portfolio of all risky assets. Such portfolio would include common stocks as well as bonds, real estate, precious metals, nonmarketable human resources, etc. The S&P or Wilshire indexes are (at best) convenient, but perhaps inadequate, proxies for the market portfolio.

- 3- Is the single-period CAPM and appropriate model on which to evaluate performance? Recent research suggests that, when the traditional CAPM is expanded, a single market-related beta is insufficient to explain excess returns. Instead, various forms of multifactor models might be necessary.

There are problems associated with the Sharpe, Treynor, and Jensen measures. However, no rigorous study has yet shown consistent abnormal performance by mutual fund.

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