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**PERFORMANCE EVALUATION OF**

**NORWEGIAN AND GLOBAL MUTUAL FUNDS**

**1999 – 2006**


**by**

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# ABSTRACT

In this study I evaluate the performance of a sample of eight Norwegian mutual funds and eight global mutual funds over the period January 1999 to June 2006. Norwegian mutual funds invest in companies, which are listed on the Oslo Stock Exchange and global mutual funds invest in companies in USA, Europe, Asia and South America. This study examines the risk-adjusted returns using Sharpe's ratio, Treynor's ratio, Jensen's measure, Appraisal Ratio and Modigliani and Modigliani measure for these Norwegian and Global mutual funds. The analysis will focus on the funds performances in the form of risk-adjusted return. In the empirical examination, I have used arithmetic risk-adjusted monthly return. The purpose is to compare the performances of global mutual funds and domestic mutual funds and seeks to test whether the mutual funds achieve a higher risk-adjusted excess return than the market and if the mutual funds have the same risk profile and investment strategy as they claim. On the basis of the results I found in the empirical analysis, I conclude that only a few funds managed to generate a risk-adjusted excess return corresponding to the fund's investment strategy and profile and few funds have the same risk profile as they claim.

The performance evaluation methods, which are used to rank the mutual funds in this thesis, have strong positive correlation. This adds robustness to my results. Different fund management companies charge different management fee from their customers. The results based on the empirical analysis indicate that the mutual funds, which have lower subscription cost and management fee, obtain higher risk adjusted returns than the mutual funds with high subscription cost and management fee.

## Foreword

This thesis, Performance evaluation of Norwegian and global mutual funds for the period 1999-2006, is written as a part of the siviløkonom-degree program at the Norwegian School of Economics and Business Administration.

First of all, I would like to thank Jan-Magnus Moberg for guiding me through the entire process. He has been a great motivator. I would like to thank Tore Tønseth at NHH, Dag Eidsæther and Gaute Kjøia at DnBNOR Kapitalforvaltning ASA, Helge B. Rutgersen at Odin Forvaltning, Ole Petter Karlsen at Pareto, Tobias Ness at Storebrand for providing the necessary data material regarding index and mutual funds. I would also like to thank Øyvind Skar at OSE information.

Finally, I would like to thank my family for great support and understanding.


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Rajwinder Kaur Daphu

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# 1   MOTIVATION / PRESENTATION OF THE SURVEY

## 1.1   Background

A large part of private savings in Norway is made through investments in shares, bonds and the capital market. A large percentage of all investments are made by professional managers, pension funds, insurance companies, mutual funds and banks. There has been an incredible growth in the number of mutual funds and the total assets under their management in the last two decades. Investment in mutual funds has become one of the popular forms of saving. Since the beginning of the mutual fund history in Norway in 1982 the number of mutual funds competing for the wealth of the investors has grown considerably.  At the same time, due to globalisation investors can choose to purchase shares in various domestic funds or further diversify their holdings by investing a portion of their portfolios in global mutual funds.
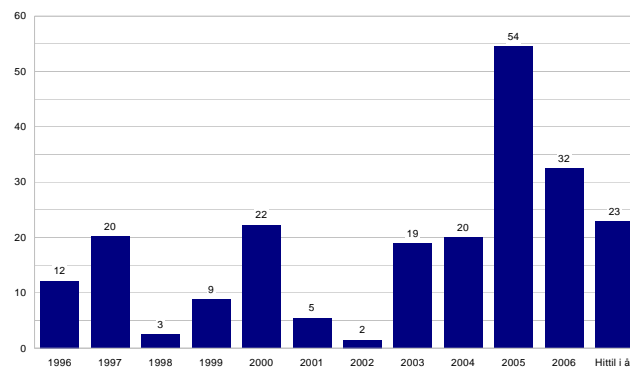


Figure 1. Net subscription in mutual funds during 1999 – 2006, in billions of NOK. (Source: Norwegian Mutual Fund Association ─ Overview on Norwegian mutual fund market)

At the end of 2005, the total subscription of mutual funds was about NOK 54 billion and the total subscription of mutual funds decreased to NOK 32 billion in 2006. One of the reasons for this could be that investments in mutual funds decrease the income tax but in 2006 a percentage of deduction from income tax has been decreased. Tax advantage is not the only reason to save in mutual funds because there is still a growing trend to subscribe mutual funds because subscription of funds is NOK 23 billion in the first quarter of 2007. In figure 1 we see that since 1996 there has been a growth in subscribing mutual funds (Norwegian Mutual Fund Association -VFF).

Figure 1 shows that the growth for subscription of mutual funds varies from year to year. During 1998-1999 and then again in 2001 subscription of mutual funds decreased to a great

extent and reasons were bursting of the dot-com bubble and terror attacks that affected stock markets all over the world. Figure 1 shows a sharp decrease in subscription of mutual funds during 2002 and the stock market crash was the reason for this sharp drop in stock prices during 2002 in stock exchanges across the United States, Canada, Asia, and Europe. However, the stock market was better in 2003 and again people wanted to invest in mutual funds. In the period of 2005 subscription of mutual funds was at the top, one of the reasons perhaps being international diversification.

As Redman, Gullet and Manakyan (2000) explain that an individual investor with limited capital, was once unable to achieve full diversification benefits. It is now possible to create mutual fund portfolios similar to portfolios of investors who purchase fixed income securities and equities directly. Due to international diversification it is possible to structure a portfolio of mutual funds that invest in a diverse array of securities traded within Norway and abroad.

One can obtain an excess return by investing into the stock market instead of saving in a bank. Figure 2 illustrates excess return, with ten years investment horizon in the period 1969 to October 2003 that a private investor obtains by investing in the stock market in comparison of investing bank deposits. During a ten years investment horizon there are only 28 of 286 periods when investment in shares have given a worse return than bank deposits (Norwegian Mutual Fund Association -VFF).
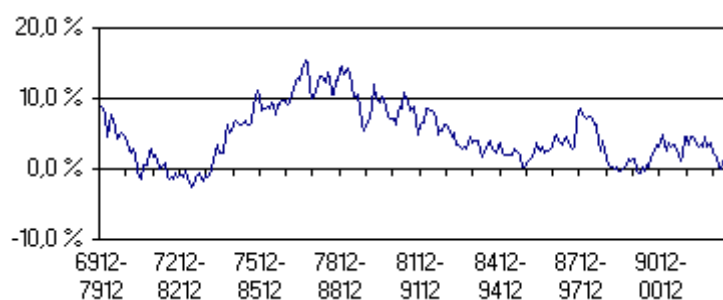


Figure 2. Excess return: saving in the stock market vs. ordinary bank deposits (source: Norwegian Mutual Fund Association —facts about mutual funds)

There are 23 companies with a license to manage mutual funds in Norway. Twenty of these are members of the Norwegian Mutual Fund Association (NMFA). At the end of 2006, NMFAs members had a total capital under management of NOK 343 billion. NOK 142 billion is attributed to the household sector. Mutual fund assets equal approx. 6 percent of total household financial assets. That's why to a large extent, revenues of fund management companies are based on managing mutual funds (Financial Supervisory Authority of Norway)

## 1.2  Purpose

In this study I wish to evaluate the performance of 8 Norwegian and 8 global mutual funds listed on the Oslo Stock Exchange over the period January1999 to December 2006. This study examines the risk- adjusted returns using Sharpe's Index, Treynor's Index Jensen's Alpha, Modigliani and Modigliani, Appraisal Ratio and Information Ratio for these mutual funds.

Further, I want to compare the performances of global mutual funds and domestic mutual funds and will find the answers of following questions:

- Do the mutual funds achieve a higher risk-adjusted excess return in comparison to market?
- Do the mutual funds have the same risk profile and the investment philosophy as they claim?

## 1.3  Structure

This study is organized in seven sections; in chapter two a general description of mutual funds and their function in the financial markets is presented. Chapter three represents the theory that I will use in the empirical examination. Chapter four describes the method on which this thesis is based and also focuses on some methodological problems with the measure. Databases and mutual funds, which I have chosen to analyse, are being presented in chapter five along with the choice of risk-free rate, market indices and return method. In chapter six I present the results I have obtained from the theory, which is used and presented in chapter three. In chapter seven I conclude. A larger overview on the different investment philosophies of different funds is given in the appendix.

## 2 MUTUAL FUND IN THE NORWEGIAN MARKET

### 2.1 General about mutual fund

Norwegian Mutual Fund Association defines a mutual fund, as a security that will invest up to 80% of funds portfolio value in shares and that will not invest in interest- bearing papers. A mutual fund is often defined as a pool of investments used to buy a large portfolio of securities. Fund management companies on the behalf of the shareholders professionally manage these securities, and each investor holds a pro rata share of the portfolio. The fund management companies must act solemnly in the interest of the investors and are strictly regulated by the Norwegian Security Exchange Commission.

Information about the mutual funds is collected from web pages of Norwegian Mutual Fund Association ― facts about funds, Oslo Stock Exchange and different fund management companies.

### 2.2 Different types of funds

In this study I will focus solely only on stock funds but there are four primary classes of mutual funds available to investors. Stock or Equity funds invest primarily in stock, although they may, at the portfolio manager's discretion, also hold fixed-income or other types of securities. Funds commonly will hold between 4% and 5% of total assets in money market securities to provide liquidity necessary to meet potential redemption of shares. The market share of equity funds in Norwegian stock market is 61%.

Hybrid funds combine stocks and bonds into one fund. The idea is to provide an investment that diversifies across different types of securities as well as across different issuers of a particular type of security. Thus, if an investor found a hybrid fund that held the percentage of stocks and bonds he wanted, he could own just one fund instead of several. Despite this apparent convenience, most investors still prefer to choose separate funds. Only about 5% of all mutual fund accounts are hybrid accounts.

Bond funds specialize in the fixed-income sector. Within that sector, however, there is considerable room for specialization. For example, various funds will concentrate on corporate bonds, Treasury bonds, mortgage-backed securities, or tax-free bonds. Bonds are not as risky

as stocks, and so it is not usually as important that investors diversify across a large number of different bonds. Additionally, it is relatively easy to buy and sell bonds through secondary market. As a result, it is not surprising that bond mutual funds hold only about a third of the assets held by stock mutual funds. Bond funds own 12% of market share.

Money market funds invest in money market securities. They usually offer check-writing features, and net value is fixed per share, so that there are no tax implications such as capital gains or losses associated with redemption of shares. Money market funds own 22% of the market share.

Stock funds are the most common fund investment for the average Norwegian investor. Within Open-end fund category, there are no limitations to buying new shares, and hence investors can buy and sell at will whereas within Closed-end fund category, investors invest an initial amount at start up of the fund. In general these funds are closed to new investors (Mishkin and Eakins, 2006)**.** Global funds are a subcategory of stock funds. A global fund invests in stocks and stock related securities all over the globe. The investment in the global stock market will not exceed 80%. Global funds are a group of funds, which have the main part of their assets invested in global stock markets including Europe, USA and Japan.

Different mutual funds groups have been established in Norway such as Norwegian funds, Swedish funds, Norwegian/international funds, Nordic funds, European funds, Asian funds, Global funds, Regional funds and Branch funds  (www.vff.no).

## *2.3   Reasons for saving in Mutual Funds*

Saving in mutual funds has a number of advantages compared with other forms of saving. Saving in funds is a very simple and inexpensive way for you to participate in the value creation-taking place worldwide. There are many reasons to choose mutual funds when you make a decision to invest your savings. Some of these include investment horizon, return, risk, tax, safety and professionalism (VFF). Following points explaining mutual funds taken from Mishkin and Eakins (2006) and web pages of different funds, which are included in the empirical analysis:

The primary advantage of funds (at least theoretically) is the professional management of your money. Investors purchase funds because they do not have the time or the expertise to manage

their own portfolios. A mutual fund is a relatively inexpensive way for a small investor to get a full-time manager to make and monitor investments.

Diversification is another reason to save in mutual funds. By owning shares in a mutual fund instead of owning individual stocks or bonds, you diversify risk. The idea behind diversification is to invest in a large number of assets so that a loss in any particular investment is minimized by gains in others. In other words, the more stocks and bonds you own, the less any one of them can hurt you. Large mutual funds typically own hundreds of different stocks in many different industries. It wouldn't be possible for an investor to build this kind of a portfolio with a small amount of money.

Because of advantage of easy liquidity, a mutual fund allows you to request that your shares be converted into cash at any time. Any bank has its own line of mutual funds, and the minimum investment is small. Most companies also have automatic purchase plans whereby as little as 600 NOK that can be invested on a monthly basis. The Internet has also allowed a vast amount of information to be made quickly, cheaply and widely available to the public. Saving in funds gives you a great degree of freedom and flexibility. You may buy and sell units whenever you want – for almost any amount you want.

Saving in funds is probably the form of saving subject to the strictest public regulation, and the one that provides the best protection for consumers. Each individual fund is evaluated, researched and ranked every day, enabling you to continually monitor the performance of your fund.

By investing in mutual funds, you get three tax benefits; tax-free returns, long run tax credit and reduced net wealth tax. Tax-free return: one part of returns on mutual funds is totally tax-free. You only pay tax on the part of returns, which exceeds the risk-free rate of interest. Long run tax credit: return exceeding risk-free rate of interest is taxable, but you should not have to pay tax before you sell your shares. So long you don't do any change in your investment the tax amount will be outstanding in the mutual fund and will give you even more return in long run. Reduced net wealth tax: shares in mutual fund and the most combination funds get 15 percent deduction in net wealth tax from and with financial year 2007 (www.Skagenfondene.no)

## 2.4  Laws and Regulations – Securities markets

Securities trading are regulated by the financial supervisory authority of Norway (Kredittilsynet). Trading in securities markets in Norway is regulated under some laws. The major law, the Act on Securities Funds (No. 52 of 12 June 1981) contains strict rules about marketing of Norwegian and foreign securities funds and approval of prospectuses of all funds by financial supervisory authority of Norway. The purpose of the Act on Securities funds is that fund investment should be a safe investment for all types of investors.

Where tax issues are concerned, the mutual funds are exempt from taxation of capital gains and are not entitled to deduct losses realized on the sale of shares. The mutual funds may be subject to taxation on dividends from foreign companies, where a tax treaty with Norway does not prevent this. Mutual funds are exempt from wealth tax. Interest income and capital gains on interest bearing securities are taxed at a rate of 28%.

Equity fund units are subject to the provisions of the Shareholder model. If a capital gain exceeds a return corresponding to cost price x risk-free rate of interest, the excess is subject to unit holder taxation at a rate of 28%. The Norwegian Ministry of Finance will determine the base rate in January of the year subsequent to the financial year. Thus, the base rate for 2006 will only be determined in January 2007. The risk-free rate of interest is set equal to the average yield on 3-month Norwegian treasury bills. Base rate deductions are only allowed until the taxable gain is equal to zero. Any loss due to the cost price being higher than the market value will be deductible from ordinary income. Losses due to the base rate deduction itself are not deductible. Any unused base rate deduction lapses on realisation of the share. Gains/losses shall be calculated according to the "first in – first out" method. 2. 85 % of the value of the units in equity funds as of 31 December is subject to wealth tax. Shares and units held by corporations are not subject to the Shareholder model. Under existing tax rules, saving in funds qualifies for tax credits on any capital gains, since the mutual fund's realized gains are not taxed until the unit holder redeems his units (www. skagenfondene.no).

# 3   THEORY

A portfolio manager's main tasks are translating predictions about fund performance into predictions of portfolio performance, and selecting from among the large number of possible portfolios those that are efficient. The fund manager's task is to provide the required predictions of fund performance (including the interrelationships among the performances of funds).

According to Gjerde and Sættem (1991), a fund manager has three major tasks to do:

- Portfolio analysis: A fund manager analyses the securities and securities markets. He makes a suitable portfolio according to the investor's risk preferences, investment horizon and tax position.
- Portfolio revision: Once a portfolio has been established, the brief analyses are not adequate to guide fund managers. Then fund manager has to revise his portfolio according to any new information. The portfolio is revised through sales and purchase of securities. A fund manger can choose between active or passive management
- Portfolio evaluation: It is the determination of how good a portfolio is. On the basis of the models of performance evaluation, different mutual funds are compared.

## 3.1   *International Investments*

Although there is a rapidly growing trend of investing internationally, one of the strongest reasons being diversification, there are some barriers to international investments. These are related to unfamiliarity or uncertainty of the foreign markets relative to home markets. Fluctuations in exchange rates and forging stock performance can cause a loss if you have invested in a foreign company. And of course there are country specific factors. These include social, political and economic events (related to political risk). Fluctuations in liquidity, asymmetric information, different legal systems, different market operations and differential taxation can cause you loss in an international investment (Choi, 1989).
All of these factors discussed above can be classified as risk or uncertainty about the international environment, relative to the domestic environment. However, in finance, the most important component of a risk factor is often not just the level, but its co-movement relative to

other risk factors.  The simplest case is the domestic case, and the framework that is often used is the Capital Asset Pricing Model.

## 3.2   The Capital Asset Pricing Model

The Capital Asset Pricing Model, CAPM, was simultaneously and independently developed by Sharpe (1964), Linter (1965) and Mossin (1966). The CAPM is built on one of the most important issues in financial theory is the relationship between the expected return and risk in equilibrium. The Capital Asset Pricing Model (CAPM) attempts to quantify the relationship between the beta of an asset and its corresponding expected return.

The CAPM model makes a number of simplifying assumptions, of which the following assumptions are most relevant about investor behaviour and the presence of a single common risk factor (Borchert, Ensz, Knijn, Pope and Smith, 2003).

- Investors behave rationally, are risk averse, and expect to be compensated for taking a higher risk through a higher average return.

- All investors have homogeneous expectations about the risk/reward tradeoffs in the market.

- Investors only choose efficient portfolios.

- All investors have the same one period horizon

- A risk-free asset exists that investors may borrow or lend without limit

- The quantities of assets are fixed. All assets are marketable and perfectly divisible.

- There are no taxes

- All information is free and available to all investors.

The CAPM is a theoretical linear equilibrium model that is expressed in the terms of expected returns and expected risk. Using expectations the CAPM is:

$$E(r_i) = (r_f) + (E(r_m) - (r_f) \beta_i \qquad (1)$$

- $E(r_i)$  is expected return on asset i.
- $r_f$  is the risk-free rate.
- $E(r_m)$ is expected return on the market portfolio.
- $\beta_i$ is the systematic risk of asset i

Essentially, the CAPM states that an asset is expected to earn the risk-free rate plus a reward for bearing risk as measured by that asset's beta. The diagram below shows this predicted relationship between beta and expected return – this line is called the Security Market Line.
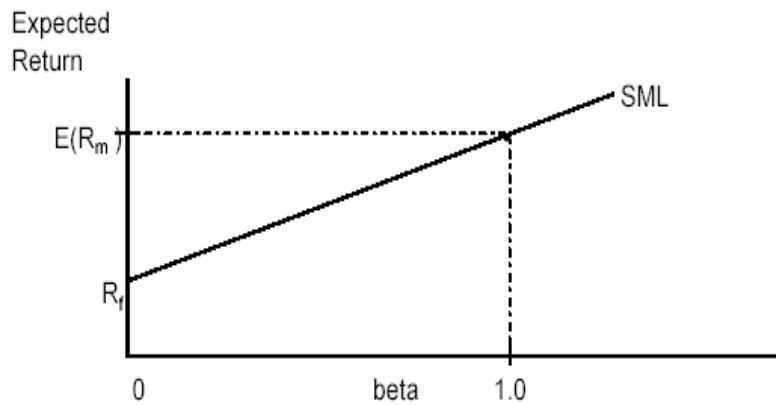


Figure: 3 The Security Market Line shows the linear relationship between expected return and systematic risk

The criterion that is widely employed for assessing portfolio performance is the "securities market line," the linear relation between mean returns on assets or portfolios and the betas of these assets calculated against a market index. The Security Market Line is even more widely accepted as a tool for assessing the ex ante or ex post qualities of securities, portfolios and investment projects (Roll, 1978).

Expected return on an asset is the sum of the risk free rate of return and the assets risk premium. The asset beta is a measure of systematic risk, which means to what extent the return on the asset covariates with the return on the market portfolio. The expression for the asset beta is:

$$\beta_i = \frac{Cov\ [r_i, r_m]}{Var\ [r_m]}$$

Where

$r_i$ is the return of the asset

$r_m$ is the return of the market

$Var\ [r_m]$ or $\sigma^2{}_m$ is the variance of the return of the market, and

$Cov[r_i, r_m]$ is covariance between the return of the market and the return of the asset (Fama and French, 2004) .

If the beta-value is higher than 1 it indicates that the asset has a higher risk than the market portfolio. A beta-value of less than 1 indicates that the asset is less risky than the market

portfolio. If the beta-value is 1, the asset and the market portfolio are equally risky.  The total risk of an asset is the sum of the systematic and non-systematic risk. The systematic or non-diversifiable risk measures the extent to which the asset covariates with market return. The non-systematic or diversifiable risk of an asset is the part of total risk that can be related to asset's covariation with the rest of the market. An investor can eliminate this non-systematic risk by diversifying his or her investments.  This can be explained by figure 4 that portfolio standard deviation ($\sigma$) falls as the number of stocks increases, but it cannot be reduced to zero.

Figure 4 shows very clearly that due to the diversification factor the non-systematic risk on the portfolio decreases as we increase the number of stocks.
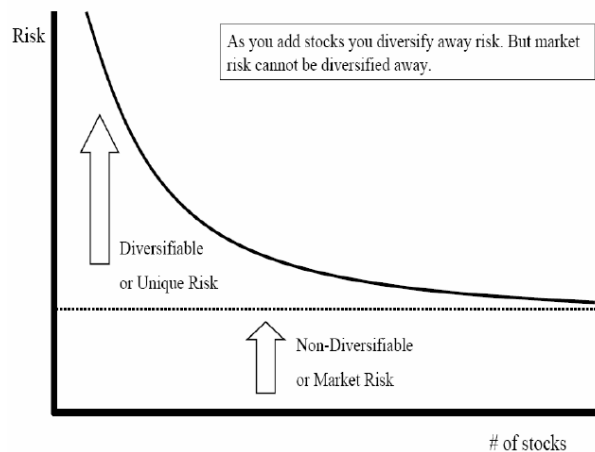


Figure 4: Portfolio risk as the function of number of stocks in the portfolio)

In practice it is impossible to measure expected return, and consequently the theoretical CAPM has to be transformed from an ex ante version to an ex post version, before the model can be tested empirically. Observed data are used to perform such tests. Since the model is tested ex post it is necessary to assume that the return on an asset is on average, equal to its expected return. Returns are normally distributed and the capital market is efficient.

## 3.3 Market model

The market model explains that an excess return of a share is the sum of many factors: share's abnormal return, beta value multiplied by market's excess return and random mutual fund return (Gjerde and Sættem, 1991). The beta can be estimated empirically from a time series of the historical returns on a given investment and the historical returns on the market portfolio. The most common way to estimate beta is a linear regression of the excess return of the given portfolio on the excess return of the market portfolio, where beta is the slope of the regression line or can be expressed by ex-post form on CAPM. In the same way, Gjerde and Sættem (1991) used the linear regression on equation (1) in their study (Gjerde and Sættem, 1991).

On ex-post form the CAPM is given by:

$$(r_{it} - r_{ft}) = \alpha_i + \beta_i (r_{mt} - r_{ft}) + \varepsilon_{it} \tag{2}$$

- $(r_{it} - r_{ft})$ is excess return on the stock, excess return on a stock is the stock's return above the risk-free rate

- $\alpha_i$ expresses the stock's expected return if the market is neutral, that is, if the market's excess return, $r_{m} - r_{f}$, is zero

- $\beta_i (r_{mt} - r_{ft})$ expresses the component of return due to movements in the overall market; $\beta_i$ is the security's responsiveness to market movements

- $\varepsilon_{it}$ is the error term. The error term can be interpreted as return beyond what is predicted by the capital market line.

Due to the impossibility to observe the true market portfolio and return, which includes all assets, a proxy for the market portfolio is usually used. This proxy for the common or systematic factor is very often some stock market index. This is the one of the strongest critiques of the CAPM as a model that it is necessary to use a proxy for the market portfolio.

In this study, all calculations are based on the CAPM. To calculate how historical return has been in relation to market index and as a simple and practical model the CAPM will be useful. This thesis is not an essay study of the CAPM, therefore it will not be explained in detail.

## 3.4  Fund Management

An investment manger can choose between active or passive management. Once a portfolio has been established, the brief analyses are not an adequate to guide investment managers. The investment manager has to revise his portfolio according to new information. The portfolio is revised through sales and purchase of securities.

Passive management is a financial strategy in which a fund manager makes as few portfolio decisions as possible, in order to minimize transaction costs, including the incidence of capital gains tax. One popular method is to mimic the performance of an externally specified index— called 'index funds'. Passive management is the most common on the equity market, where index funds track a stock market index. One of the reasons for investing in index funds is doubt about better performance of mutual fund over time. Secondly, The lack of active management gives the advantage of lower fees. However, the fees will always reduce the return to the investor relative to the index.

Active portfolio managers attempt to construct a risky portfolio that maximizes the reward-to-variability ratio. Profit seeking investment managers use active management to exploit perceived market inefficiencies. Despite the efficient market hypothesis, it is clear that markets cannot be perfectly efficient; hence there are reasons to believe that active management can have effective results. Active management may involve overwriting and underwriting securities and/or sectors of the market relative to the benchmark index, though some managers ignore indices entirely and simply try to pick the securities which they think will perform best. They may use a 'top down' approach, which tries to spot the sectors, which are likely to outperform the market as a whole, or a 'bottom up' approach, which concentrates on finding growth shares irrespective of sector (Pozen, 1999).

There are two forms of active management: market timing, which is based solely on macroeconomic factors; and security selection, which includes microeconomic forecasting. The process of selecting a portfolio can be explained in to two stages. The first stage begins with observation and experience and ends with beliefs about the future performances of available securities. The second stage starts with the relevant beliefs about future performances and ends with the choice of portfolio (Markowitz, 1952).

Selection abilities of a fund manger make him able to predict which companies and securities will be the winners in the market. Security selection is the other form of active portfolio management besides timing the overall market. As an active manager you must strike a balance between aggressive exploitation of perceived security mis-pricing and diversification motives that dictate that a few stocks should dominate the portfolio (Investments, 2005).

Market timing refers to the practice of predicting whether some broadly based index of market prices will rise or fall, and investing appropriately. Well-established among portfolio managers to be considered one of several 'styles of management' (Grant, 1978). Further Grant (1978) explains that this style is based on an unlimited number of variations: the portfolio may be invested entirely in an index portfolio when market is expected to rise, and in short-term bonds when it expected to decline. Alternatively, it can be switched between indexes of aggressive securities and defeensive securities. This viewpoint also holds that market timing, that one can enter the market on the lows and sells on the highs, does not work or does not work for small investors, so it is better to simply buy and hold.

## 3.5 Models for Performance Evaluation

Earlier studies of performance evaluation of mutual funds were just based on return, but are interested not only in funds' returns but also in risks taken to achieve those returns. There are a number of performance measures. Their common feature is that all measure funds' returns relative to risk. However, they differ in how they define and measure risk and, consequently, in how they define risk-adjusted performance. Following measures are used to evaluate the risk-adjusted performance of mutual funds in this study:

- The Sharpe ratio
- The Treynor ratio
- The Jensen's alpha
- The Appraisal Ratio
- The Modigliani$^2$ measure

Performance of mutual funds is based on more than one model but all models are important to evaluate the performance. The most famous measures used to evaluate mutual funds are Sharpe's measure, Treyner's measure, Jensen's alpha and Appraisal ratio. These measures are based on the CAPM as the asset-pricing model and these models measure the relative performance of the portfolios, so that portfolios with different risk profiles can be compared. Further I include Modigliani and Modiglianis measure ($M^2$) that is also an important measure to evaluate performance of mutual funds.

Gjerde and Sættem (1991) used only three widely used performance measures to evaluate the performance of 14 mutual funds in the period 1982-1990 but Aas and Vik (2001) also used five performance measures.

### 3.5.1 The Sharpe ratio

The Sharpe Index was introduced by Sharpe (1966) and also known as Sharpe reward to-variability ratio. This ratio uses the capital market line as a benchmark. The Sharpe ratio is calculated by first subtracting the risk free rate from the return of the portfolio, then dividing it by the standard deviation of the portfolio. It measures the reward to total volatility trade –off The higher the Sharpe ratio, the higher is the excess return from the investment. Mathematically Sharpe ratio can be written as follows:

$$S_P = \frac{r_P - r_f}{\sigma_P}$$

(3)

Where

- The Sharpe index ($S_p$)

- The return on the portfolio ($r_p$)

- The risk free rate of return ($r_f$)

- The standard deviation of the portfolio ($\sigma_p$)

Reference basis is Sharpe ratio for the market is given by:

$$S_M = \frac{r_M - r_f}{\sigma_M}$$

Where $r_m$ is return on the market portfolio and is $\sigma_m$ the standard deviation of the market portfolio. If value of $S_p$ is higher (lower) than value of the market portfolio, $S_m$, indicates that the particular mutual funds outperform (under perform) than the market. The higher the Sharpe Ratio, the more sufficient are returns for each unit of risk.

Sharpe conducted a study, as he measured the performance of 34 mutual funds in the period 1954-1963, using the Sharpe-ratio as measure of risk and Dow-Jones Index as benchmark. Most of the mutual funds have a lower reward-to-variability ratio ($S_p$= 0,633) than the Dow-Jones Index ($S_{DJ}$= 0,67). This implies that most mutual funds managers did worse in this period, than they would have done if they simply had invested in the Dow-Jones Index and obtained their preferred risk by using the risk-free rate for borrowing and lending (Sharpe, 1966).

### 3.5.2 The Treynor ratio

Treynor ratio is also known as Treynor Index or Treynor reward-to-volatility. Jacl L.Treynor introduced a performance measure based on the security market line (Treynor, 1965). Like Sharpe's ratio, Treynor's measure gives excess return per unit of risk, but it uses systematic risk instead of total risk. The Treynor performance measure is given by:

$$T_p = \frac{r_p - r_f}{\beta_p}$$

(4)

Where

- The estimate of the Treynor index ($T_p$)

- The return on the portfolio ($r_p$)

- The risk free rate of return ($r_f$)

- The estimate of portfolio p's beta ($\beta_p$)

Reference basis is Treynor ratio for the market:

$$T_M = \frac{r_M - r_f}{\beta_M} = r_M - r_f$$

If the value is higher (lower) than the value of market portfolio, it indicates that the particular fund has better (worse) than the market. Since Treynor's ratio focuses on a systematic risk, therefore this measure is suitable for a well-diversified investor. Practically Treynor's ratio is used rarely, but it is an important measure.

### 3.5.3 The Jensen's alpha

The Jensen intercept, α, is commonly known as Jensen's alpha. In 1968 Michael C. Jensen introduced the Jensen intercept, α, based on a study of 115 US equity funds in the period 1945-1964. His results are published in the article, "The Performance of Mutual Funds" in the period 1945-1964.

The Jensen's measure is the average return on the portfolio over and above that predicted by the CAPM, given the portfolio's beta and the average market return. The measure is given by:

$$J_p = \alpha_p = r_p - [r_f + (r_m - r_f) \beta_p] \tag{5}$$

Where

- The estimate of the Jenson measure ($J_p$)

- The return on the portfolio ($r_p$)

- The risk free rate of return ($r_f$)

- The return to the market portfolio ($r_M$)

- The estimate of portfolio p's beta ($\beta_p$)

- Market $\alpha_M = 0$

Mainly the Jensen' alpha focuses on the portfolio manager's ability to predict future changes in the market and hence the increased performance of the fund, and on the manager's ability to minimise the risk of the portfolio through diversification.

### 3.5.4 Appraisal Ratio

Appraisal ratio is used to measure the quality of a fund's investment picking ability. The ratio measures the abnormal return per unit of risk that in principle could be diversified away from holding a market index portfolio.

In Russell Style Classification (RSC), the appraisal ratio is calculated as follows:

$$AR_p = \frac{\alpha_p}{\sigma_{\varepsilon P}}$$

$$(6)$$

Where

Alpha = Jensen Alfa ($\alpha_p$)

Non-systematic Risk = standard error ($\sigma\ (\varepsilon_p)$)

By selecting a portfolio, a manager of an active investment fund attempts to beat the returns of a relevant benchmark or of the overall market. The appraisal ratio measures the performance of the manager by comparing the return of his stock picks to the specific risk of those selections. The higher the ratio, the better the performance of the manager in question.

### 3.5.5 Modigliani and Modiglianis measure (M²)

Leah Modigliani and his grandfather Franco Modigliani developed this performance measure. The first time it was presented was in the Journal of Portfolio Management in 1997. $M^2$ measure for portfolio evaluation shows that $M^2$ and Sharpe measures are directly related. Like the Sharpe ratio, the $M^2$ measure focuses on the total volatility as a measure of risk, but its risk-adjusted measure of performance has the easy interpretation of a differential return relative to the benchmark index. The measure is given by:

$$M^2 = r_{p*} - r_m = (S_p - S_m)\, \sigma_M \tag{7}$$

Where

The Modigliani and Modigliani measure ($M^2$)

The portfolio risk is adjusted to $\sigma_M$ ($r_{p*}$)

The return on the market portfolio ($r_m$)

The standard deviation of the market portfolio ($\sigma_M$)

The Sharpe measure ($S_p$)

The Sharpe measure for market portfolio ($S_m$)

# 4 METHODOLOGY

The method used in this study starts with Wilson's research process by 2003

| Identification of problems and opportunities |
| :---: |
| Formulations of research needs |
| Creation of research design/ choice |
| Collection of data |
| Analysis of data |
| Conclusions and recommendations |
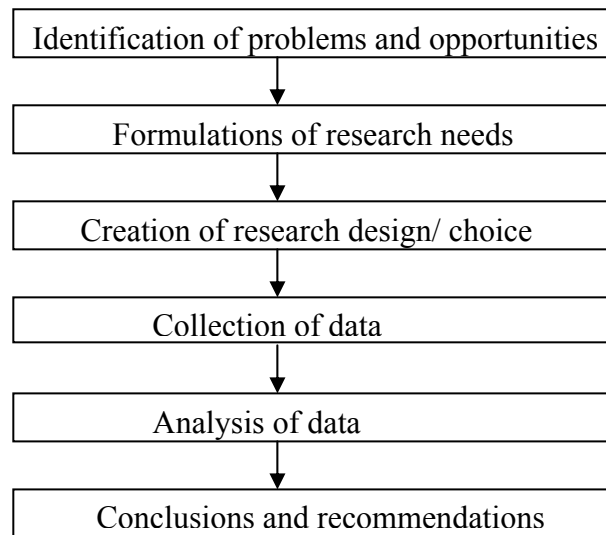
Figure 5 Steps in research process (Wilson, 2003)

Figure 5 shows the research process consists of a series of steps that guide the research project from conception through to final conclusions and recommendations.

The process starts with identification of problems and opportunities. The precise definition of the problem aids in understanding the information that will be needed and therefore helps in identifying the research objectives. The researcher's own interests, ideas and topics will be formulated in the specific research needs. On the basis of the specific research needs, design and method of data collection will be considered. At last an empirical analysis of data will be done and so conclusions and recommendations will be suggested. Due to the research questions this study does not follow the research method slavishly because it was necessary to work simultaneously with different parts of the report.

## *4.1 General Explanation of model*

The simple regression model is a model linear in its parameters, where the dependent variable (response variable) is a function of independent variables (predictor variables) plus an error term (Wooldridge, 2000). To analyse the performance of these different mutual funds, I used excess return as dependent variable, the excess return on portfolio is the portfolio's return above the risk- free rate and independent variable will be market excess return. The general linear regression model can be written as follows (Wooldridge, 2000):

$$Y = \beta_0 + \beta_1 X + \varepsilon \tag{8}$$

Where Y is the dependent variable expressed as a linear function of independent variable X plus an error variable $\varepsilon$. $\beta_0$ is the intercept, $\beta_1$ is the parameter associated with $X$. Practically the change in the dependent variable Y is simply $\beta_1$ multiplied by the change in the independent variable $X$, that means is $\beta_1$ the slope parameter in the relationship between Y and $X$ holding the other factors in $\varepsilon$ fixed. The error variable contains factors other than $X$ that effect Y (Wooldridge, 2000).

The ordinary Least Squares method is used for estimating the parameters of a simple linear regression model .The ordinary least squares estimates are obtained by minimizing the sum of the squared residuals. This is the model that gives a good explanation for the observed data. Analytically it is desired to minimize the following expression (Wooldridge, 2000):

$$\Sigma \, [ \, Y - (\beta_0 + \beta_1 X)]^2$$

To perform the regression analysis and estimating parameters, the statistical software package MINITAB, is chosen. All other calculations are done with the help of Microsoft Excel.

In addition to the empirical analysis described above, still the quantitative and qualitative information has been gathered from the fund management companies that are included in performance evaluation. The information is gathered from the web sites of these different companies on Internet and by direct contact via e-mail. The information has also been gathered from the websites of other management companies in the market. The qualitative method that is used as basis of this part of thesis is based on the method described by Wilson (2003)

**Assessment and validity of the model**

It is important for us to assess how well the linear model fits the data. Several methods are used to evaluate the regression model (Keller and Warrack, 2003).

- Co-efficient of determination ($R^2$) is the proportion of variability in a data set that is accounted for by a statistical model. $R^2$ measures the proportion of the variation in the dependent variable that is explained by the variation in the independent variable. By choosing the market model as the basis for all calculations in this study, the co-efficient of determination indicates the diversification degree of the fund:

$R^2$ = (Explained variation/Total variation) = (Systematic risk/Total risk)

A high $R^2$ indicates that the fund has low non-systematic risk (diversifiable risk), the higher the value of $R^2$, the better the diversification. The fund, which has a different investment strategy than the reference index represents, will get a low co-efficient of determination. Then deviations from the estimated regression line will be larger. In other words, the higher the value of $R^2$, the lower the deviations from the estimated regression line

- T-value is a test statistic for testing hypothesis about the estimated regression co-efficients. This test statistic can be written as follows:

T = (the estimated coefficient - presumed value of null hypothesis)/ the standard deviation of coefficient                                                        (9)

The null hypothesis ($H_0$) is that when alpha value (mean) equals zero, but alternative or research hypothesis ($H_1$) is a two-tail test and it is conducted to specify that the alpha value is not equal to the value stated in the null hypothesis. At 5% confidence level, a t-value is 1.96 and over significant, while at 1% level, t-value equal 2-576 and above.

- Standard deviation of the estimated regression co-efficients is used to measure the risk on an investment.

- The p-value of a test is the probability of observing a test statistic at least as extreme as the one computed given that the null hypothesis is true. If the p-value is less than 1% then there is overwhelming evidence to infer that the alternative hypothesis is true. If p-value lies between 1% and 5% then alternative hypothesis is true. If p-value lies between 5% and 10% then it shows weak evidence to indicate that the alternative hypothesis is true (Keller and Warrack, 2003).

## 4.2 Assumptions of the regression model

Following are the assumptions of the regression model

- Normality: The probability distribution of error variable ($\varepsilon$) is normal. By drawing the histogram of the residuals or with the Ryan-Joiner-normal distribution test, normality can be checked. Ryan-Joiner – normal distribution test can be employed in Minitab.

- Linear parameters: The dependent variable (regressand) has a linear and stable relationship between the independent variable (regressor) and the error term. When this requirement is violated, the condition is called specification fault: omitting of relevant variable or including irrelevant, wrong form of function or unstable parameter.
- The error variables are random variables with mean zero, that is, $E(\varepsilon) = 0$

- The standard deviation of error variable is $\sigma_\varepsilon$, which is a constant regardless of value of X
- Homoscedasticity: This assumption is known as constant variance. The variance of the error variable $\sigma^2_\varepsilon$, is required to be constant. When this requirement is violated, the condition is called heteroscedasticity

- Independent random variable: The random variables are not correlated (not all equal to the same constant) with one another, so that is, $E(\varepsilon_t \varepsilon_u) = 0$ for all $t \neq u$. Exception to this assumption is autocorrelation.

*Testing Heteroscedasticity*

One method of diagnosing heteroscedasticity is to plot the residuals against the predicted values of the dependent variable. Second method of testing heteroscedasticity is Spearman-Rank correlation test. If heteroscedasticity is present and a regression of spending on per capita income by state and its square is computed, the parameter estimates are still consistent but they are no longer efficient. Thus, inferences from the standard errors are likely to be misleading (Keller and Warrack, 2003).

*Autocorrelation*

If the requirement of independence of error variables is satisfied - there should be no relationship between the residuals. However, if the residuals are related, it is likely that autocorrelation exists

We can detect autocorrelation by graphing the residual against time periods or by Durbin Watson test (Keller and Warrack, 2003), which is another statistical test to determine whether there is evidence of first-order autocorrelation- a condition in which a relationship exists between consecutive residuals $e_t$ and $e_{t-1}$, where t is the time period. The Durbin-Watson statistic is defined as

$$d = \sum_{t=2}^{n}(e_t - e_{t-1})^2 / \sum_{t=1}^{n} e_t^2$$

The DW- co-efficient determines whether the null hypothesis will be accepted or rejected. The range of the values of DW-co-efficient is, $0 \leq DW \geq 4$. The value 0 indicates positive first – order autocorrelation, while value 4 indicates negative first-order autocorrelation. It depends on number of observations and significance level to test whether first-order autocorrelation exists. By using a table of critical values of DW, one can find values of $d_L$ and $d_U$. If the values of DW are lower than $d_L$, we will reject the null hypothesis in favour of the alternative hypothesis. In case the values are between $d_U$ and 2, it indicates that error variables are independent and we have no autocorrelation and we will not reject the null hypothesis.

Otherwise a very simple method is used to test whether the requirement of independence of error variables is satisfied. If a DW test statistic lies between 1.5 and 2.5, then the requirement of independence will be maintained (Kaplan and Atkinson, 1989).

# 5  DATA

## 5.1  *Database*

This study examines the performance of a sample of Norwegian and global mutual funds over the period from January 1999 to December 2006. The mutual fund database in this study consists of monthly returns on funds traded on the Norwegian market. The returns are calculated at the end of month prices. All prices are adjusted for dividends, stock splits, redemption provision etc. From my database I constructed one total sample, which consists of sixteen mutual funds. The mutual funds included in this study are selected on random basis, but it gave me a reasonably long data set. A mutual fund had to exist three years to be included in this study. Some of 16 funds are not operative during whole analysis period, and are omitted in parts of the empirical analysis. The global funds are all listed in NOK.

All information about selected funds and related fund management companies is gathered from the websites of these companies and Oslo stock exchange. All return data used in this analysis was obtained from the related companies and the database of Amadeus at the Norwegian School of Economics and Business Administration.

## 5.2  *Choice of analysis period*

By using quantitative data in the analysis, results can provide us valuable information, which can be used as the basis of comparison. Using monthly data instead of weekly or daily data in the analysis can cause less significant results. It is assumed that lacking significance will not make any difference in the analysis because analysis period is so long and has a sufficient number of observations.

To get a sufficient number of observations I chose a time period of seven years. In this respect, the chosen period is neither too long nor too short. Gjerde and Sættem (1991) chose time period from 1982-1990 for their analysis and they use a minimum three years limit in their study.

A seven-year period is long enough to get significant estimates in the regression analysis. There is no accurate answer about how long the period of analysis should be. Lehman and

Modest (Lehman and Modest, 1987) suggest that five-year samples are sufficient for our estimations. Because of limitations to the data available, I use monthly observations. Daily or weekly data is likely to be incomplete. The primary advantage with daily data would be an increase in estimate accuracy.

## 5.3   Calculation of rate of return

There are different methods to calculate the rate of return, and adjusting the return for the risk. In this method, the return data are based on end-of-period observations with the return calculated as the difference between the closing net asset value of the fund on the last trading day of the month less the closing net asset value on the last day of the previous month, measured as a percentage of the latter. All return data are adjusted for stock splits and dividends etc. This method, which is used in the analysis, is taken from Simons (1998):

$$R_t = \frac{NAV_t + DIST_t - NAV_{t-1}}{NAV_{t-1}}$$

(12)

Where

- $R_t$ :  the return in month t,
- $NAV_t$:   the closing net asset value of the fund on the last trading day of the month
- $NAV_{t-1}$:  the closing net asset value on the last day of the previous month (t-1),
- $DIST_t$: eventual capital gains distributions taken during the month.

Net Asset Value (NAV) is the value of a single mutual fund share, based on the value of the underlying assets of the fund minus its liabilities, divided by the number of shares outstanding. I have chosen to use arithmetic returns in my calculations. One of the reasons is that the use of percentage returns may have seriously violated the assumption of normally distributed residuals. Perhaps lognormal returns could have rectified this problem, but the economic contents of regression equations would have changed (Gjerde and Sættem, 1991)

## 5.4   Choice of market index

Selecting the correct portfolio benchmark is one of the most important decisions an investor makes. But this decision is significantly important for three reasons. Firstly, portfolio risk and return will be greatly influenced by the benchmark. When portfolio managers make a portfolio, they usually take the securities in the benchmark as a starting point from which to take active

positions in an effort to add value. Secondly, the investor's choice of benchmark signifies not only the kinds of securities that should be included in the portfolio, but also the types of securities that should not be in the portfolio. Finally, some benchmarks are better suited to particular investment goals than others.

There are a total of sixteen mutual funds in the empirical analysis, eight are Norwegian funds and eight are global funds. The Norwegian funds use either Oslo Stock Exchange Mutual Fund Index (OSEFX) or Oslo Stock Exchange Benchmark Index (OSEBX):

- **OSEBX**: The Oslo Stock Exchange Benchmark Index is an investable index, which comprises the most traded shares listed on the Oslo Stock Exchange. It is a semi annually revised free float adjusted index with changes implemented on 1 January and 1 July respectively. In the period between the review dates the number of shares for each security is fixed with exception of adjustments for corporate actions with priority for existing shareholders. The OSEBX index is adjusted for dividend payments OSEBX is also known as Benchmark Index Linked/TOTX or (BXLT/TOTX) (www.oslobors.no)..

- **OSEFX**: The Oslo Stock Exchange Mutual Fund Index is a capped version of OSEBX. The capping rules comply with the UCITS directives for regulating investments in mutual funds. The maximum weight of a security (issued by the same fund management company) is 10% of total market value of index and securities exceeding 5% of total market value of index combined must not exceed 40%. The OSEFX index is adjusted for dividend payments. OSEFX is also known as Mutual Fund Index Linked/TOTX or (FXLT/TOTX) (www.oslobors.no).

The eight global funds in the analysis use different types of Morgan Stanley World Index. These different indices are different representatives for the global market.

- **MSCI World Index:** Morgan Stanley Capital International's market capitalization weighted index composed of companies representative of the market structure of 22 developed market countries in North America, Europe, and the Asia/Pacific Region. The index is calculated without dividends, with net or with gross dividends reinvested, in both US dollars and local currencies.

While selecting a reference index (market index) for Norwegian funds, is very important to find a market portfolio that represents the general market growth in Norway. Market index is meant as a standard that can be used for comparison. In this analysis I wanted to choose a market index with Norwegian profile for Norwegian funds. This is why I chose the Oslo Stock Exchange Benchmark Index (OSEBX) as market index for the Norwegian funds. Skagen Vekst is one of Norwegian funds, which invest 50% in Norwegian companies, and 50% in the foreign companies.

On the other side, selecting the right benchmark can be particularly important for investors looking to invest in global funds and foreign currency exposure can affect the value and the volatility of a portfolio. This is why I wanted to choose a market index with global profile for the global funds included in this analysis and I think Morgan Stanley Capital International (MSCI) World Index is an appropriate market index for the global funds. Selecting OSEBX as market index also for global funds would be like comparing apples and oranges.

## 5.5   Choice of risk-free rate

Inter-Bank Offer Rate (NIBOR-rate) is selected as risk-free rate. NIBOR-rate is abbreviation for Norwegian Interbank Offer Rate, and the interest rate that the banks charge each other for loans. This rate is applicable to the short-term international Interbank market, and applies to very large loans borrowed from anywhere between one day to five years. This market allows banks with liquidity requirements to borrow quickly from other banks with surpluses, enabling banks to avoid holding excessively large amounts of their asset base as liquid assets.
There are 1, 3, 6, and 12-month rate for NIBOR. The 3-month NIBOR-rate is selected as the purpose of risk-free rate. NIBOR-rate should not be too long or too short because of exchange rate fluctuations.

## 5.6 Presentation of Funds

In this study I have selected to focus on 8 Norwegian funds and 8 global funds over the period from January 1999 to December 2006. Not all funds have been operative during the whole period, such that numbers of observations vary from 63 to 95. The choice of funds, which are included in this study, is based on the idea to involve the largest fund management companies in Norway.

A detailed overview of the funds is given in the table 5.1. All information about selected funds is obtained from the websites of related fund management companies and Oslo stock exchange. In addition to table 5.1 below, investment philosophy and profile of each fund is presented in the appendix 1.The table below shows, which market index is used as reference index by each, the sample period of each fund, how many numbers of observations are used in calculations, annual management fee, subscription fee, redemption fee and what is the risk profile of each fund.

Subscription fee and redemption cost varies from 0-4%, while management fee varies between 0,5-2%. These costs are different from company to company. The Skagen funds have a subscription cost of maximum 0.7 percent, depending on the amount invested, but there is no redemption cost. You pay a fixed annual management fee of one percent and a variable management fee. Nine mutual funds have the maximum management fee of 2% and only one mutual fund has the lowest management cost at 0,5%. Storebrand Verdi is the most expensive fund when it concerns about subscription fee while Skagen funds and DnB Nor Norge (III) are the cheapest funds. On the basis of redemption costs, Skagen funds are the cheapest funds while Carneige Worldwide is the most expensive fund. Often lack of active management gives the advantage of lower fees. However, the fees will always reduce the return to the investor relative to index.

Different fund management companies develop different risk scales to describe the risk carried by the fund. The most using scale is from 1 to 10, where 10 is the highest risk. I recalculated the values for the funds that use another scale. The scale can be interpreted as below (the Norwegian Fund Management Association (VFF):

- 1 to 3: low risk

- 4 to 5: middle risk

- 6 to 7:Moderate/High risk

- 8 to 10:High risk


When we look at Norwegian funds then the most funds have a high-risk profile whereas the most global funds have a moderate risk profile.


Table 5.1 below presents a detailed overview on the chosen funds.

Table 5.1: Overview of mutual funds included in the examination

| Fund name | Reference Index | Sample period | Number of Observations | Management Fee | Subscription Fee | Redemption cost | Risk Profile |
|---|---|---|---|---|---|---|---|
| *Norwegian* | | | | | | | |
| DnB Nor Norge(1) | OSEBX | 199901 - 200612 | 95 | 2,0 % | 3,0 % | 0,2% | 8 |
| DnB Nor Norge (III) | OSEBX | 199901 - 200612 | 95 | 1,0 % | 0,7% | 0,2% | 8 |
| Nordea Vekst | OSEFX | 199901 - 200612 | 95 | 2,0 % | 2,9% | 0,2% | 8 |
| Odin Norge | OSEFX | 199901 - 200612 | 95 | 2,0 % | 3,0% | 0,5% | 8 |
| Pareto Aksje Norge | OSEFX | 199901 - 200612 | 63 | 0,5 % | 1,0% | 0,2% | 6 |
| Storebrand Verdi | OSEBX | 199901 - 200612 | 95 | 2,0 % | 4,0% | 0,5% | 6 |
| SKAGEN Vekst | OSEBX | 199901 - 200612 | 94 | 1,0 % | 0,7% | 0,0% | 5 |
| Terra Norge | OSEBX | 199901 - 200612 | 95 | 2,0 % | 3,0% | 0,5% | 8 |
| *Global* | | | | | | | |
| Carneige Worldwide | MSCI World | 199901 - 200611 | 71 | 1,4 % | 3,0% | 1,0% | 5 |
| DnB Nor Global (I) | MSCI World | 199901 - 200612 | 95 | 1,8 % | 3,0 % | 0,2% | 7 |
| DnB Nor Global (II) | MSCI World | 199901 - 200612 | 95 | 1,5 % | 2,0 % | 0,3% | 7 |
| Nordea Trend | MSCI World | 199901 - 200612 | 73 | 2,0 % | 3,5% | 0,2% | 9 |
| ODIN Templeton Global | MSCI World | 199901 - 200612 | 85 | 2,0 % | 3,0% | 0,5% | 6 |
| Storebrand Global | MSCI World | 199901 - 200612 | 95 | 1,5 % | 3,0% | 0,5% | 5 |
| SKAGEN Global | MSCI World | 199901 - 200612 | 94 | 1,5 % | 0,7% | 0,0% | 5 |
| Terra Global | MSCI World | 199901 - 200612 | 90 | 1,5 % | 3,0% | 0,5% | 6 |

# 6 EMPIRICAL ANALYSIS OF MUTUAL FUNDS

In this section I will present the empirical results from the analysis. To get an overview of data material, I have chosen descriptive statistics of mutual funds to begin with.

## 6.1 Descriptive statistics of mutual funds in the period 1999-2006

Table 6.1 contains fund's number of observations, fund's excess return that is fund's average monthly return above the average risk-free rate ($\overline{r_p}$), standard deviation ($\sigma_p$), maximum- and minimum returns for the period 1999-2006. The table is also shows whether the fund is Norwegian or global.

Table 6.1: Descriptive Statistics of mutual funds during the period 1999-2006

| Fund Name | No. of observations | $\overline{r_p}$ | $\sigma_p$ | max ($r_p$) | min ($r_p$) |
|---|---|---|---|---|---|
| *Norwegian* | | | | | |
| DnB Nor Norge(1) | 95 | 0,0130 | 0,0624 | 0,1348 | -0,1645 |
| DnB Nor Norge (III) | 95 | 0,0136 | 0,0622 | 0,1373 | -0,1625 |
| Nordea Vekst | 95 | 0,0117 | 0,0637 | 0,1307 | -0,1843 |
| Odin Norge | 95 | 0,0199 | 0,0686 | 0,1682 | -0,1988 |
| Pareto Aksje Norge | 63 | 0,0258 | 0,0550 | 0,1611 | -0,1406 |
| Storebrand Verdi | 95 | 0,0165 | 0,0596 | 0,1242 | -0,1589 |
| SKAGEN Vekst | 94 | 0,0193 | 0,0573 | 0,163 | -0,1500 |
| Terra Norge | 95 | 0,0133 | 0,0663 | 0,1556 | -0,172 |
| OBEBX | 95 | 0,0140 | 0,0603 | 0,1302 | 0,1673 |
| *Global* | | | | | |
| Carneige WorldWide | 71 | 0,0019 | 0,04726 | 0,1124 | -0,1161 |
| DnB Nor Global (I) | 95 | 0,0011 | 0,04801 | 0,1471 | -0,1137 |
| DnB Nor Global (II) | 95 | 0,0021 | 0,05118 | 0,1205 | -0,1298 |
| Nordea Trend | 73 | -0,0034 | 0,05645 | 0,1425 | -0,1154 |
| ODIN Templeton Global | 85 | 0,0038 | 0,0455 | 0,0997 | -0,1400 |
| Storebrand Global | 95 | 0,0035 | 0,05653 | 0,1237 | -0,1295 |
| SKAGEN Global | 94 | 0,0184 | 0,06074 | 0,1506 | -0,1511 |
| Terra Global | 90 | 0,0002 | 0,05017 | 0,1467 | -0,1386 |
| MSCI World Index | 95 | 0,0033 | 0,03993 | 0,08639 | -0,1113 |

Numbers of observations vary from fund to fund, and maximum number of observations for a fund can be 95. There are total 7 Norwegian funds and 5 global funds, which have been operative during the whole period from January 1999 to December 2006. Although Skagen Vekst and Skagen Global have 94 observations but these funds are included.

Table 6.1 shows that from the Norwegian mutual funds, which have been operative during the whole period, Odin Norge achieves the highest monthly return (0,0199) and Nordea Vekst has return (0,0117) above the risk-free rate. Four funds (DnB Nor Norge (I), DnB Nor Norge (III), Nordea Vekst, and Terra Norge), which have been operative during the whole period, have negative excess returns. The highest standard deviation (0,0686) is for Odin Norge. Five funds (DnB Nor Norge (I), DnB Nor Norge (III), Nordea Vekst, Odin Norge and Terra Norge) have standard deviation higher than 0,06. Pareto Aksje Norge has the lowest standard deviation (0,0550) and has the highest return of all funds. The reason could be fund's investment philosophy based on stock picking. From the funds, which have been operative during whole period, Skagen Vekst has lower standard deviation (0,0573) than 0,06.

From the global funds, which have been operative during the whole period, Skagen Global has the highest monthly return (0,0184) and DnB Nor Global (I) gets the lowest return (0,0011) above the risk-free rate. Although Nordea Trend has not been operative during whole period but this fund has proven to be the worst within the global fund category because it delivered negative return (-0,0034) above the risk-free rate and very high standard deviation (0,05645). Two funds (DnB Nor Global (I), and DnB Nor Global (II)), which have been operative during whole period, have lower excess returns than market index. The highest standard deviation (0,06074) is for Skagen Global. All global funds, which have been operative during whole period, have standard deviation higher than 0,04. None of all global funds has lower standard deviation than 0,04.

From the total of 16 funds, Pareto Aksje Norge has the lowest standard deviation and has returned 2.58% vs. 1.40% for the OSEBX but if one only considers the fund's excess return that is fund's average monthly return above the average risk-free rate ($r_p$) then Odin Norge seems to be the best fund. On the other hand if we consider excess return as per unit of risk, then Skagen Vekst and Skagen Global are the best funds. Generally the Norwegian funds have higher standard deviation than the global funds. Six global funds have standard deviation that is lower than the lowest standard deviation for the Norwegian funds.

## *6.2 Market model*

Before discussing the estimated alpha- and beta values for the period 1999-2006, I want to show a tabular overview of error variable problems existing in the regression model. I will first test the first order serial correlation in residuals, secondly normality and finally heteroscedasticity.

## 6.2.1 Error variable diagnosing by the Market model

Table 6.2: Error variable diagnosing by the Market model

| Fund Name | Durbin Watson | Ryan-Joiner P-value |
|---|---|---|
| *Norwegian* | | |
| DnB Nor Norge(1) | 2,08 | 0,1000* |
| DnB Nor Norge (III) | 1,83 | 0,1000* |
| Nordea Vekst | 2,14 | 0,1000* |
| Odin Norge | 2,05 | 0,1000* |
| Pareto Aksje Norge | 1,97 | 0,0762 |
| Storebrand Verdi | 2,16 | 0,0417 |
| SKAGEN Vekst | 1,83 | 0,1000* |
| Terra Norge | 1,65 | 0,0100 |
| *Global* | | |
| Carneige WorldWide | 2,02 | 0,1000* |
| DnB Nor Global (I) | 1,57 | 0,0263 |
| DnB Nor Global (II) | 1,73 | 0,1000* |
| Nordea Trend | 1,83 | 0,0305 |
| ODIN Templeton Global | 1,91 | 0,1000* |
| Storebrand Global | 1,77 | 0,1000* |
| SKAGEN Global | 1,69 | 0,0511 |
| Terra Global | 2,05 | 0,0100 |

*normal distributed error variables

Durbin Watson tests for autocorrelation. From table 6.2, we can observe from the values of Durbin-Watson test for first order correlation that the null hypothesis is true and it shows that the errors are not correlated. All values of Durbin-Watson test- static lie between 1,55 and 2,45. I conclude that no fund has autocorrelation. From table 6.2, we can observe from the values of Durbin-Watson test for first order correlation that the null hypothesis is true and it shows that the errors are not autocorrelated. It was not tested for higher order serial correlation.

Normality has been tested with Ryan-Joiner normality test. P-values from Ryan-Joiner test show that there are only three Norwegian and four global mutual funds for which null

hypothesis can be rejected. There are nine funds, which have a correlation coefficient that is higher than the critical value (0,990)[1]. If requirement of normality is not met then it is not a serious problem. The number of observations is large enough that nonnormality does not cause any serious consequence and residual plots will show that there are a few observations that reject hypothesis about normal distribution. Gjerde and Sættem (1991) did not reject null hypothesis for few funds but Lia (1999) rejected null hypothesis for all funds. Even Aas and Vik (2001) rejected null hypothesis both for all Norwegian and global mutual funds.

By plotting the residuals against the predicted values of dependent variable I tested for heteroscedasticity and there is no sign of this. Hence the requirement of homoscedasticity is fulfilled.

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[1]critical value by Looney and Gulledge (1985)

## 6.2.2 Estimated alpha- and beta values for the period 1999-2006

In table 6.3, I have presented the results from the estimation of equation (2) that is a regression analysis based on the market model explained in the section 3.3.

Table 6.3: Estimation of regression coefficients based on the market model

| Fund Name | $\alpha_p$ | P-value | $\beta_p$ | P-value | $R^2$ |
|---|---|---|---|---|---|
| *Norwegian* | | | | | |
| DnB Nor Norge(1) | -0,0014* | 0,035 | 1,0305 | 0,000 | 0,990 |
| DnB Nor Norge (III) | -0,0008 | 0,212 | 1,0274 | 0,000 | 0,990 |
| Nordea Vekst | -0,0026 | 0,148 | 1,0195 | 0,000 | 0,930 |
| Odin Norge | 0,0054 | 0,077 | 1,0352 | 0,000 | 0,827 |
| Pareto Aksje Norge | 0,0100* | 0,002 | 0,8136 | 0,000 | 0,815 |
| Storebrand Verdi | 0,0034 | 0,104 | 0,9334 | 0,000 | 0,889 |
| SKAGEN Vekst | 0,0075* | 0,002 | 0,8734 | 0,000 | 0,845 |
| Terra Norge | -0,0012 | 0,630 | 1,031 | 0,000 | 0,879 |
| *Global* | | | | | |
| Carneige WorldWide | -0,001 | 0,794 | 0,8698 | 0,000 | 0,541 |
| DnB Nor Global (I) | -0,0018 | 0,590 | 0,8863 | 0,000 | 0,543 |
| DnB Nor Global (II) | -0,0013 | 0,701 | 1,0153 | 0,000 | 0,627 |
| Nordea Trend | -0,0073 | 0,103 | 1,0719 | 0,000 | 0,562 |
| Odin Templeton Global | 0,002 | 0,574 | 0,7767 | 0,000 | 0,484 |
| Storebrand Global | -0,0002 | 0,963 | 1,1127 | 0,000 | 0,618 |
| SKAGEN Global | 0,0146* | 0,000 | 1,2356 | 0,000 | 0,666 |
| Terra Global | -0,0024 | 0,515 | 0,9122 | 0,000 | 0,531 |

*Significant different from 0 at 1% level

In table 6.3 I included risk adjusted excess return ($\alpha_p$), systematic risk ($\beta_p$) along with Coefficient of determination ($R^{2)}$). With hypothesis testing we can investigate whether $H_0$: $\alpha_p$ is equal zero or $H_1$: $\alpha_p$ is different from zero, and $H_0$: $\beta_p$ is equal one or $H_1$: $\beta_p$ is different from one.

In table 6.3 there are four alpha values, which are significantly different from 0 at 1% level. Alpha value expresses the excess return of the mutual fund. Yterdal and Alme (2000) could show more significant results in their studies where seven mutual funds of all twenty mutual funds had significant positive excess return and two funds had significant negative excess return. It was surprising that Gjerde and Sættem (1991) could not reject the null hypothesis of a 0 abnormal return for all 14 mutual funds. There are four Norwegian and two global mutual funds, which generated positive alpha values otherwise remaining funds, have negative alpha values. Mutual funds, which did exist throughout the total period of analysis, Skagen Vekst

was the Norwegian fund that obtained highest return and Skagen Global was the only global fund that managed to outperform the market. Because both Skagen funds are actively managed, and have alpha values which are statistical significant different from zero and we can conclude that comparing with all other funds, Skagen funds realized a value creation that is accordance with the investment philosophy of these funds. It concerns also Odin Norge although this fund has not significant alpha value, but generated a positive excess return. Pareto Aksje has a high alpha value significant different from 0 at 1% level, but it is important to know that this fund did not exist during whole analysis period. DnB Nor Norge (1) is only one mutual fund, which has significant negative excess return at 1% level. Comparing alpha values from Norwegian and global mutual funds, we observe that Skagen Global obtains highest excess return and Nordea Trend has the lowest alpha value. Nordea Trend is an index independent fund.

A positive alpha value indicates that fund manger has ability to win over the market. Fjæreide (2005) found that only two of 28 funds could manage a significant positive alpha value. In case of the Norwegian mutual funds I got the same result. But the results from table 6.3 as a whole seem to be very weak. This weakens the hypothesis that the fund managers systematically manage to win over the market, and I conclude that selected mutual funds in this analysis do not seem to produce positive returns over a normal compensation for risk.

When we turn to the $\beta_p$-coefficients in table 6.3, then all 16 mutual funds have $\beta_p$ significantly different from 1. Tveito (2006) showed in his study that all funds had beta values significantly different from 1. Yterdal and Alme (2000) got the same results. There are five Norwegian funds and four global funds, which have higher $\beta_p$ than the market. Neither Gjerde and Sættem (1991) nor Lia (1999) could show funds, which have higher $\beta_p$ than the market. There are five funds, which have lower beta than the market, despite that these funds claim having higher (same) risk profile than (as) the market. To some extent, this could be explained by the fact that the funds were restricted from borrowing in the capital markets, which narrowed the fund manager's opportunity set of risky portfolios. Furthermore only a minor proportion of the funds' assets were held in fixed-income securities. There are many funds, which do not hold the risk profile as they claim. Two funds (Pareto Aksje Norge and Odin Temp. global), which have claimed high-risk profile, actually have a significant lower systematic risk than that of the funds (CA Worldwide and Skagen Vekst) with low claimed risk profile. On the other hand Storebrand Global and Skagen Global mutual funds claim a low risk profile, but calculated beta

values of both funds seem to be higher than beta values of Nordea Trend and DnB Nor Norge (I) and other funds, which have claimed a high risk profile.

It is observable that the two DnB NOR Norge funds which are funds of funds with DnB NOR Norge (IV) claim to have a high-risk profile and investment philosophy of these funds shows that these funds are index funds. This is why beta values of these funds will be equal to the beta value of market index (OSEBX) but estimated beta values of the two DnB NOR Norge funds are significant greater than 1. It has been tested that these two funds are strongly positive correlated. The coefficient of determination measures the proportion of the total risk that is market-related. In this case, we see that 99% of the two DnB NOR Norge funds' total risk is market-related and the remaining 1% is the proportion of the risk that is associated with the events specific to DnB NOR Norge funds, rather than the market. In a study conducted by Tveito (2006), Storebrand Norge and DnB NOR Norge (IV) claim to have a high-risk profile and the estimated beta values of these two funds are significant different from 1. Being the index funds, both funds have $R^2$ equal to 98%.

Table 6.3 demonstrates a striking similarity between mutual funds within the same management company. All beta estimates lay within a very narrow range. DnB Nor was a typical example. This result disagrees with the usual management claim that individual funds within the same company followed different investment policies. This shows that an investor cannot use a claimed risk profile as the criterion to choose the fund. Skagen Vekst, Carneige Worldwide and DnB Nor Global (II) are the mutual funds, which have followed their investment philosophy and risk profile as it was claimed.

The coefficient of determination, $R^2$, equals the fraction of a fund's volatility which is attributable to market movements. The coefficient can be expressed as a measurement of fund's degree of diversification. A high $R^2$ indicates that the mutual fund is well diversified and the non-systematic risk is low. On the whole the coefficient of determination is high for the funds I chose in this analysis. $R^2$ varies from 48.4% to 99% that is corresponding to the investment strategies of these different funds. We could therefore conclude that systematic risk was the dominant component of all funds. DnB Nor Norge (I) and DnB Nor Norge (III) obtained the highest (99%) value which was consistent with their pronounced goal of being an index fund. $R^2$ but Pareto Aksje Norge (81.36%) obtained the lowest $R^2$ that is consistent with the fund's pronounced investment philosophy that is stock picking that leads to incur higher non-

systematic risk than that of a diversified portfolio. The average $R^2$ for the eight Norwegian funds is 89,56% that is higher than what many other studies can show. Gjerde and Sættem (1991) found a $R^2$ at 77%, Yterdal and Alme (2000) got a value at 87,5% and Aas og Vik got 85,5% in 2001 their studies. However a study conducted by Tveito (2006) shows average $R^2$ of 94,8%. On the basis results from all these studies, one can conclude that $R^2$ is higher now than in 1992 or 2000 that makes clear the fact that fund managers have become cleverer and better to diversify their portfolios.

The regressions of the global funds have a lower explanatory power than the Norwegian funds. Aas and Vik (2001) got average $R^2$ at 27,7% for global funds that were lower than the $R^2$ got for Norwegian funds. This difference can be explained by diversification effects, including different reactions in the Norwegian economy versus the world market for simple factors for example fluctuations in oil price.

## 6.3 *Performance evaluation of funds*

In this section I will present the performance evaluation of funds on the basis of risk adjusted performance measures. I will calculate the Sharpe ratio, Jensen's measure, Treynor ratio, Modigliani[2] measure, and Appraisal ratio. I will rank all results whether a fund has been operative during the whole period or not.

## 6.3.1 Norwegian Funds

Table 6.4 contains the results of different performance measures for the Norwegian funds with OSEBX as the market index. A fund with the highest result is ranked the highest in every column of the table. Comparing many mutual funds, the one with the higher score on a performance measure has been more successful.

Table 6.4: Norwegian funds ― Ranking based on different performance measures with OSEBX as market Index

| Fund Name | Sharpe ratio | Treynor ratio | Jensen alpha | Appraisal ratio | M2 measure |
|---|---|---|---|---|---|
| DnB Nor Norge(1) | 0,2083 | 0,0126 | -0,0014 | -0,2235 | -0,0014 |
| DnB Nor Norge (III) | 0,2186 | 0,0132 | -0,0008 | -0,1252 | -0,0008 |
| Nordea Vekst | 0,1837 | 0,0115 | -0,0026 | -0,1537 | -0,0029 |
| Odin Norge | 0,2901* | 0,0192* | 0,0054 | 0,1884 | 0,0035 |
| Pareto Aksje Norge | 0,4691* | 0,0317* | 0,0100 | 0,4200 | 0,0143 |
| Storebrand Verdi | 0,2768* | 0,0177* | 0,0034 | 0,1727 | 0,0027 |
| SKAGEN Vekst | 0,3368* | 0,0221* | 0,0075 | 0,3300 | 0,0063 |
| Terra Norge | 0,2006 | 0,0129 | -0,0012 | -0,0509 | -0,0019 |
| OBEBX | 0,2322 | 0,0140 | | | |
| *RANK NO.* | | | | | |
| DnB Nor Norge(1) | 7 | 8 | 7 | 8 | 6 |
| DnB Nor Norge (III) | 6 | 6 | 5 | 6 | 5 |
| Nordea Vekst | 9 | 9 | 8 | 7 | 8 |
| Odin Norge | 3 | 3 | 3 | 3 | 3 |
| Pareto Aksje Norge | 1 | 1 | 1 | 1 | 1 |
| Storebrand Verdi | 4 | 4 | 4 | 4 | 4 |
| SKAGEN Vekst | 2 | 2 | 2 | 2 | 2 |
| Terra Norge | 8 | 7 | 6 | 5 | 7 |
| OBEBX | 5 | 5 | | | |

\* better than market index

First of all we look at Sharpe ratio. The formula used to calculate the Sharpe ratio is shown in equation (3). If a portfolio is held alone, then the investor will be concerned with the total risk, and the Sharp ratio is the proper measure because it measures the reward to total risk trade-off. It is important to observe that four funds performed better than the market. It is observable that

Pareto Aksje Norge did not exist during whole analysis period. Therefore Skagen Vekst is the best fund and Nordea Vekst is the worst mutual fund among other funds, which have been operative during whole analysis period.

In table 6.4, the Treynor's ratio is calculated according to the formula shown in equation (4). Comparing rankings based on the Sharpe ratio and Treynor ratio, we find similarities between these ratios. The reason for this is that the Treynor ratio is a risk-adjusted measure of return based on the systematic risk. It is similar to the Sharpe ratio, with the difference being that the Treynor ratio uses beta as the measurement of volatility. Being operative in the analysis period, again Skagen Vekst proves to be the best fund whereas Nordea Vekst is the worst fund. It is important to notice that four funds (SKAGEN Vekst, Odin Norge, Pareto Aksje Norge and Storebrand Verdi) are ahead of their benchmark.

Pareto Aksje Norge comes out as the best fund on the basis of ranking based on the Jensen's alpha. Among the funds, which have been operative during whole analysis period Skagen Vekst delivered the best results and Nordea vekst delivered the worst results.

Appraisal ratio is calculated as shown in equation (6). Again SKAGEN Vekst has proved to be the best fund whereas DnB Nor Norge (1) has performed the worst of all Norwegian funds. Although Pareto Aksje did not exist throughout the analysis period but it gave the best performance. The appraisal ratio is a convenient measure if this is an active portfolio, which is mixed with a passive index portfolio; the extra return compensates the voluntary non-systematic risk.

At the last table 6.4 contains the column showing performance results based on Modigliani-squared measure. We observe that Skagen Vekst consistently performed best of all funds within the category of Norwegian funds whereas Nordea Vekst has been the worst fund during whole analysis period. It is important to observe that Odin Norge fund has been the next second best fund in performance.

If we look at the rankings based on the results of all measures we find a similarity between them. On the basis of the results based on all performance measures, Pareto Aksje Norge, Skagen Vekst, Odin Norge, and Storebrand Verdi have been more successful mutual funds. All these funds follow investment philosophy based on the active management. In a study on

performance evaluation of mutual funds, conducted by Aas and Vik (2001), GAMBAK mutual fund performed the best of 9 Norwegian funds. Being a stock picker, this fund had been the best on the basis of rankings based on different performance measures (Aas and Vik, 2001).

## 6.3.2 Global Funds

Table 6.5 contains results of different performance measures for global funds with MSCI world index as the market index.

Table 6.5: Global funds — Ranking based on different performance measures with MSCI World Index as market index

| Fund Name | Sharpe ratio | Treynor ratio | Jensen alpha | Appraisal ratio | M2 measure |
|---|---|---|---|---|---|
| Carneige WorldWide | 0,0391 | 0,0021 | -0,0010 | -0,0310 | -0,0017 |
| DnB Nor Global (I) | 0,0223 | 0,0012 | -0,0018 | -0,0558 | -0,0024 |
| DnB Nor Global (II) | 0,0403 | 0,0020 | -0,0013 | -0,0398 | -0,0017 |
| Nordea Trend | -0,0601 | -0,0032 | -0,0073 | -0,1939 | -0,0057 |
| ODIN Templeton Global | 0,0826* | 0,0048* | 0,0020 | 0,0612 | 0,0000 |
| Storebrand Global | 0,0612 | 0,0031 | -0,0002 | -0,0048 | -0,0008 |
| SKAGEN Global | 0,3023* | 0,0149* | 0,0146 | 0,4136 | 0,0088 |
| Terra Global | 0,0032 | 0,0002 | -0,0024 | -0,0692 | -0,0031 |
| MSCI World Index | 0,0816 | 0,0033 | | | |
| *RANK NO.* | | | | | |
| Carneige WorldWide | 6 | 5 | 4 | 4 | 4 |
| DnB Nor Global (I) | 7 | 7 | 6 | 6 | 6 |
| DnB Nor Global (II) | 5 | 6 | 5 | 5 | 4 |
| Nordea Trend | 9 | 9 | 8 | 8 | 8 |
| ODIN Templeton Global | 2 | 2 | 2 | 2 | 2 |
| Storebrand Global | 4 | 4 | 3 | 3 | 3 |
| SKAGEN Global | 1 | 1 | 1 | 1 | 1 |
| Terra Global | 8 | 8 | 7 | 7 | 7 |
| MSCI World Index | 3 | 3 | | | |

* better than market index

Results for the Sharpe ratio show that two funds Skagen Global and ODIN Templeton Global outperform and six funds under perform the market. It is observable that ODIN Templeton Global did not exist during whole analysis period. Only one fund has negative value that is Nordea Trend which performs the worst of all global mutual funds but it is important to observe that this fund did not exist during whole analysis period otherwise it is DnB NOR global (I) which performed the worst of all global funds.

Ranking based on the Treynor ratio almost similar to Sharpe ratio except Carneige Worldwide comes on sixth place under Sharpe ratio but this gets fifth rank under the Treynor ratio.

Ranking based on Jensen's alpha shows again that Skagen global is the best fund and Nordea Trend is the worst fund. But six funds have negative values.

Rankings based on Appraisal ratio and $M^2$ measure are similar except DnB NOR Global (II) fund changes its place $5^{th}$ under Appraisal ratio to $4^{th}$ place under $M^2$ measure. But it is remarkable, in spite of being a global fund; the same six funds have negative values under both ratios. What would be the reason? Could it be due to the use of an insufficient benchmark? Dybvig and Ross explain that in the absence of any timing information on the part of the manager and with a risk less rate, when an inefficient benchmark is used, any efficient portfolio (or any portfolio efficient to the benchmark) will have a positive measure (Dybvig and Ross, 1985)

If we look at the rankings based on the results of all measures we find a similarity between them. On the basis of results based on all performance measures, Skagen Global and ODIN Templeton Global and Storebrand global have been more successful mutual funds whereas Nordea Trend, Terra Global and DnB NOR Global (I) delivered worse results. In a study on performance evaluation of mutual funds, conducted by Aas and Vik (2001), Carneige Worldwide mutual fund performed the best of 9 global funds whereas DnB Global was the worst global fund, which matches to results shown in this study (Aas and Vik, 2001).

### 6.3.3 Summary ranking based on all performance measures

Table 6.6 summaries of rankings based on all performance measures

| Fund Name | Sharpe index | Treynor index | Jensen alpha | Appraisal ratio | M2 measure |
|---|---|---|---|---|---|
| *Norwegian* | | | | | |
| DnB Nor Norge(1) | 7 | 8 | 12 | 16 | 8 |
| DnB Nor Norge (III) | 6 | 6 | 8 | 13 | 7 |
| Nordea Vekst | 9 | 9 | 15 | 14 | 12 |
| Odin Norge | 4 | 3 | 4 | 4 | 4 |
| Pareto Aksje Norge | 1 | 1 | 2 | 1 | 1 |
| Storebrand Verdi | 5 | 4 | 5 | 5 | 5 |
| SKAGEN Vekst | 2 | 2 | 3 | 3 | 3 |
| Terra Norge | 8 | 7 | 10 | 10 | 10 |
| *Global* | | | | | |
| Carneige WorldWide | 13 | 12 | 9 | 8 | 9 |
| DnB Nor Global (I) | 14 | 14 | 13 | 11 | 11 |
| DnB Nor Global (II) | 12 | 13 | 11 | 9 | 9 |
| Nordea Trend | 16 | 16 | 16 | 15 | 14 |
| ODIN Templeton Global | 10 | 10 | 6 | 6 | 6 |
| Storebrand Global | 11 | 11 | 7 | 7 | 7 |
| SKAGEN Global | 3 | 5 | 1 | 2 | 2 |
| Terra Global | 15 | 15 | 14 | 12 | 13 |

As it is made clear before that I chose to use different market indices for Norwegian funds and global funds. In table 6.6 above I didn't include market index for ranking. Comparison of the Norwegian funds with the global funds on the basis of rankings based on different performance measures produced varying results.

Pareto Aksje Norge, Skagen Vekst, Skagen Global, Odin Norge, and Storebrand Verdi have been the best of all funds but Pareto Aksje Norge did not exist during whole analysis period. One of the reasons for the best performance of these funds could be the active management. As for Skagen funds, fund manager's objective is to achieve the best possible risk adjusted return through an actively managed portfolio of Norwegian and international shares. On the other side Nordea Trend, Nordea vekst, DnB Nor Global (I) and Terra global have been the worst funds but it is observable that Nordea Trend and Terra Global did not exist during the whole analysis period. Some of the reasons behind the poor performance of global funds could be explained by different reactions in the Norwegian market vs. global market, like fluctuations in oil prices, terror attacks or any economic crises

In a study by Fjæreide (2005), Skagen Global and Skagen Vekst were the best funds and a fund with international profile was the worst fund of 28 on the basis of rankings based on different performance measures.

# 7 CONCLUSIONS

In this thesis I have examined the performance of eight Norwegian and eight global mutual funds throughout the period 1999-2006. These funds have been evaluated based on five performance measures; the Sharpe ratio, Treynor ratio, Jensen's alpha, appraisal ratio and $M^2$ measure.

Overall, few funds managed to generate risk-adjusted excess returns. If we look at the results from the market model, only Skagen Global, Skagen Vekst and Pareto Aksje Norge have significant positive alpha values. Although the other results from the market model are not significant there are some mutual funds, which distinguish themselves regarding their profiles and strategies –like Odin Norge, Storebrand Verdi and Odin Templeton Global. The results from the remaining funds contradicted with the pronounced management claim of higher risk adjusted excess returns. On the basis of scores on risk –adjusted performance measures, I conclude that only few funds managed to outperform the market.

All funds had beta values significantly different from 1.The two funds, DnB NOR Norge (I) and DnB NOR Norge (III), have a high risk profile. The results from the market model show that these two funds have beta values greater than 1 due to strong positive correlation. We got the different results from the market model. Two funds (Pareto Aksje Norge and Odin Temp. Global), which have claimed high-risk profile, actually have a significant lower systematic risk than that of the funds (CA Worldwide and Skagen Vekst) with low claimed risk profile. On the other hand Storebrand Global and Skagen Global mutual funds claim a low risk profile, but calculated beta values of both funds seem to be higher than beta values of Nordea Trend and DnB Nor Norge (I) and other funds, which have claimed a high risk profile. The risk profile between funds managed by different companies varied, while there were no significant differences between funds managed by the same company. Furthermore, I found that few mutual funds have the same risk profile as they claim.

Finally I compared all sixteen mutual funds on the basis of rankings based on all performance measures. I chose to use different market indices for Norwegian funds and global funds. Comparison of the Norwegian funds with the global funds on the basis of rankings based on different performance measures produced varying results.

Pareto Aksje Norge, Skagen Vekst, Skagen Global, Odin Norge, and Storebrand Verdi have been the best of all funds but Pareto Aksje Norge did not exist during the whole analysis period. One of the reasons for the best performance of these funds could be active management. On the other side Nordea Trend, Nordea vekst, DnB Nor Global (I) and Terra global have been the worst funds but it is observable that Nordea Trend and Terra Global did not exist during the whole analysis period. Some of the reasons behind the poor performance of global funds could be explained by different reactions in the Norwegian market vs. global market, like fluctuations in oil prices, terror attacks or any economic crises.

On the first of June, 2007 the Oslo stock exchange benchmark index made a record by reaching 500 points for the first time in the history (Dagens Næringsliv, 2nd june 2007). The good development both in Norway and globally has continued so far this year. One of the key themes at the moment is the marked increase in the mergers and acquisition activity, both of the offensive and defensive kind. Ola Honningdal Grytten, professor of economic history at NHH is one of the experts who are expecting that sooner or later this positive bubble in the stock market will burst that will be very painful for most investors. For the time being it is a golden time for both investors and the fund managers.

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- Wikipedia: en.wikipedia.org

**Lecture notes :**

- FIN 400 Finansmarkeder, Spring 2006. Professor Tore Leite
- FIN 402E Corporate Finance, Spring 2006. Professor Per Østberg

# 8 APPENDIX

*Investment philosophy and profile of different mutual funds*

**Carneige Worldwide**

Carnegie Worldwide is an international fund that invests in stock markets all over the world. The paramount requirement of company's objective is to provide their customers a longer stable income with low degree of risk. Fund manager Randel has over 20 years' investment experience at Carnegie and is the driving force behind this process. The approach is collegiate and pragmatic. Stock selection criteria are strict and target companies with high cash flow yields, which broadly fall within the team's long-term investment themes. These currently include energy, Japan and emerging markets. The portfolio is concentrated into 25-30 names and built irrespective of the benchmark. Despite maintaining a long-term horizon, Randel's long experience and market awareness allow for tactical adjustments, as recently demonstrated by the timely reduction of emerging markets. No formal risk controls are in place. However, the fund is managed in a highly risk-aware fashion and approximately half of the stocks in the portfolio tend to be invested in solid, defensive industries, such as tobacco. Performance is strong, top quartile over three and five years and top decile since launch: the result of sound theme selection, as well as successful stock picking

Benchmark: MSCI The World Index (NTR)

**DnB Nor Norge (1)**

Fund is a fund of fund with DnB NOR Norge (IV). DnB Nor Norge (I) offers a well-diversified portfolio and aims to reflect the total market. The fund invests mainly in the stocks of leading companies listed on the Oslo Stock Exchange. The portfolio has good spread between companies and the branches. Investment decisions are taken on the basis of fundamental analysis of markets, branches and companies

Benchmark:  Oslo Stock Exchange Benchmark Index

**DnB Nor Norge (lll)**

Fund is a fund of fund with DnB NOR Norge (IV). DnB Nor Norge (II1) offers a well-diversified portfolio and aims to reflect the total market. The fund invests mainly in the stocks of leading companies listed on the Oslo Stock Exchange. The portfolio has good spread between companies and the branches. Investment decisions are taken on the basis of fundamental analysis of markets, branches and companies.
Benchmark: Oslo Stock Exchange Benchmark Index


 **DnB Nor Global (1)**

The fund is a fund of fund with DnB NOR Global (V) and invests in stocks and stock related securities all over the globe. DnB NOR Global (I) invests mainly in large and solid companies, which are listed on the leading stock exchanges in USA, Europe and Asia. The fund must have good spread both geographically and by industry. The fund investments are traded in foreign currency and fluctuations in foreign currency can affect the value of the fund. Investment decisions are taken on the basis of fundamental analysis of markets, branches and companies.
Benchmark: MSCI World Index (NTR)


**DnB Nor Global (ll)**

The fund is a fund of fund with DnB NOR Global (V) and invests in stocks and stock related securities all over the globe. DnB NOR Global (I) invests mainly in large and solid companies, which are listed on the leading stock exchanges in USA, Europe and Asia. The fund must have good spread both geographically and by industry. The fund investments are traded in foreign currency and fluctuations in foreign currency can affect the value of the fund. Investment decisions are taken on the basis of fundamental analysis of markets, branches and companies.
Benchmark: MSCI World Index (NTR)


**Nordea Vekst**

The objective of the fund is expanding the Norwegian Stock market focusing on the companies where results are expected to grow faster than average on the Oslo Stock Exchange. The fund has an index-independent management style, and is expected to have a risk profile that is  bit higher than the Norwegian Stock market. International exposure will not exceed 20% and investment exposure in unlisted securities should not exceed 10%. The fund is good for long run investments in the stock market.
Benchmark: Mutual Fund Index Linked/TOTX

**Nordea Trend**

Nordea Trend is a mutual fund that invests in the most attractive trends and subjects in established and fully developed markets. The portfolio is concentrated in 25-30 stocks and purpose is to obtain high return by selecting companies, which are exposed against trends and subjects in the world economy. The fund has an active management strategy. The potential return is high for the fund, but fund's risk profile says that investment horizon should be long. The fund has high-risk profile

Benchmark: MSCI World Index (TR)

**Storebrand Verdi**

Storebrand Verdi has an objective to get possible highest return by investing in value companies on the Oslo Stock Exchange. Such companies are in shipping, offshore, finance and cyclical industry as general. Portfolio typically consists of 20-25 companies where risk for companies is relatively lower than average of companies on Oslo Stock Exchange. The fund suits best for investors who want tan active managed fund with a value-oriented style.

Benchmark: Oslo Stock Exchange Benchmark Index

**Storebrand Global**

Storebrand Global has an objective to get possible highest return by investing in the most developed stock exchanges of the world. The fund chooses the large companies with solid market position, but with a good spread both geographically and by industry. Investment in the same company will not exceed 10%.

Benchmark: MSCI World Index (NTR)

**Pareto Aksje Norge**

Pareto Aksje Norge invests in a limited number of stocks that are chosen from the 40-50 leading stocks on the OSE. The fund avoids investing in the defensive industries such as weapons, alcohol, tobacco and porno. The fund has also focus on the companies, which have good regarding corporate governance. The objective of managing the fund is to obtain the highest possible absolute return.

Benchmark:  The Oslo Børs Mutual Fund Index (OSEFX)

**Terra Norge**

The fund invests mainly in the Norwegian stock market up to 80 % and 20% of fund will be invested in international stocks. Terra Norge is a conservative fund for you who want a mutual fund that focuses on the most solid companies at OSE. 50% of the fund will be invsted in companaies listed on Oslo stock exchange.

Benchmark: Benchmark Index Linked/TOTX or (BXLT/TOTX).


**Terra Global**

Terra Global is a fund in the fund, and invests all stocks in Morgan Stanley Global Value Equity Fund. The fund invests in stocks all over the globe.

Benchmark: MSCI World Index (NTR)


**SKAGEN Global**

The fund's investment process is based on thorough research conducted by professionals with many years of experience in global fixed income and equity markets. When selecting companies, fund mangers take a bottom-up approach, finding high quality companies at a low price, which are characterised by being undervalued, under-researched and unpopular. Fund managers invest in companies whose management focuses on creating shareholder value, and who have solid business models, a sensible debt exposure. This fund has broad mandates, with the freedom to select companies from equity and fixed income markets around the world. In this way risk can be minimised by maintaining a sensible geographic and sector balance SKAGEN Global is an equity fund that invests in global except Norway equities. The fund must have a good spread both geographically and by industry, based on where the value creation is taking place. The investment focus is on individual companies that are solid, yet under priced – independent of their markets or industries.

Benchmark: MSCI World Index (NTR)

**SKAGEN Vekst**

SKAGEN Vekst is an equity fund where a minimum 50 percent of the assets must be invested in Norway, and the rest invested in the global equity market. With its global mandate, the fund may take part in value creation in companies that operate in industries that are poorly represented on the Oslo Stock Exchange, and thereby achieve a lower risk profile. The investment focus is on individual companies that are solid, yet under priced – independent of their markets or industries.

Benchmark: Benchmark Index Linked/TOTX or (BXLT/TOTX).


**ODIN Norge**

The fund is managed by Jarl Ulvin since 2000. Odin Norge invests in Norwegian stocks, and is relatively free to choose sectors and companies in their portfolio composition. The fund has objective to obtain higher return than the Norwegian stock market over time.

Benchmark:  Mutual Fund Index Linked/TOTX (FXLT/TOTX).


**ODIN Templeton Global**

ODIN Templeton Global is a fund of fund with a fund that exclusively invests in Templeton Global Fund A. ODIN Templeton Global is totally managed by Franklin Templeton. Odin forvaltning has nothing to with this fund except that the fund is exclusive from the distributive perspective. Franklin Templeton managed the fund since 1999 but recently this fund has been overtaken by Odin forvaltning with same investment philosophy. Under fund that is managed by Franklin Templeton invests in stocks all over the world. The reference index of the fund is MSCI All Country World Free Index.

Benchmark: MSCI The World Free Value NDTR_D