Performance evaluation of Norwegian mutual funds

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Abstract

This study analyses the performance of different Norwegian mutual funds that have invested the majority of their equity in the Norwegian stock market during the period of January 2007 to January 2018. The purpose of this thesis is to investigate whether the fund managers possess stock picking- and market timing ability and how the funds performed during the different market events, both for the whole period and the sub-periods. The market events included in the data are; *The Financial Crisis, The EU Debt Crisis, The US Credit-Rating Downgrade and The Oil Crisis*. Moreover, this study investigates whether the best performing fund in one period is consistent with the best performing fund in the next period. The whole period is divided into shorter periods, which allows further evaluation of mutual funds during bull- and bear markets.

The quantitative fund performance evaluation is conducted by using different performance measurements and regression analyses. The regression analyses reflect whether the fund managers possess significant stock picking- and market timing ability. A total of 10 Norwegian mutual funds are compared and ranked, all with Oslo Stock Exchange Mutual Fund Index (OSEFX) as their benchmark.

For the whole period, Fondsfinans Norge was concluded to be the overall best performing fund and the only fund with both significant stock picking- and market timing ability. However, there were other funds that obtained significant stock picking ability, but none of these funds had significant market timing ability. Among the bottom-performing funds, Holberg Norge and Eika Norge are the only funds to obtain significant and negative alpha´s in period 2, suggesting significant underperformance relative to the benchmark. The fact that the top- and bottom-performing funds in the sub-periods were different in each period leads to the conclusion that the winner in one period is not consistent with the winner in the next period. Considering the different market events, all of the funds decreased in their performance, especially during The Financial Crisis.

Acknowledgements

This thesis completes our Master´s Degree in Business- and Administration with specialization in Applied Finance at the University of Stavanger Business School. The main objective for this thesis was to conduct a performance evaluation of a group of Norwegian mutual funds, with an emphasis on the stock picking- and market timing abilities of the fund managers.

We would like to thank the authors behind the Norwegian Volatility Index (NOVIX) who gave us excess to necessary data. Moreover, we would like to thank Henning Varner and Knut Gezelius from SKAGEN, who provided insight into the mutual fund market. In addition, we would particularly like to show our gratitude towards our supervisor, Tao Lin, for his availability, guidance and advices during the process of writing this thesis. Lastly, we would like to thank our families and friends for their support an encouragement during this process.

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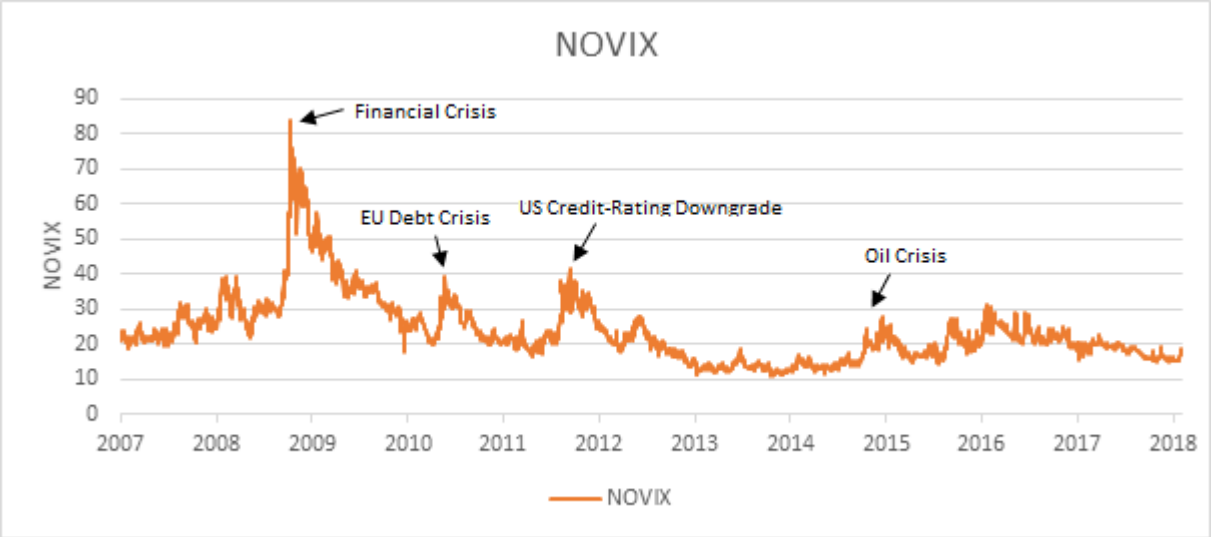
1 Introduction

1.1 Background

The history of mutual funds in Norway is not very long. In the early 1980s, only a few mutual funds were represented on the Oslo Stock Exchange (OSE). In the past decades, the number of funds and the value of funds in Norway have increased astronomically. There have been several different events that had impacts on the global financial market, including the Norwegian market. Therefore, to understand how the Norwegian funds performed during those periods becomes an interesting topic not only for the investors, but also the academics.

Figure 1: Daily data for The Norwegian Volatility Index (NOVIX)



Source: Data retrieved from NOVIX (2018)

Figure 1 shows the volatility development in the Norwegian market from January 2007 to January 2018. NOVIX is an implied volatility index for the Norwegian equity index OBX, and is based on the CBOE Volatility Index, also known as the VIX (Bugge, Guttormsen, Ringdal, & Molnár, 2016). From figure 1, one can observe that there have been several different events in the market, which led to unusual changes of the market volatility. The sharpest increase in volatility was in the end of 2008, caused by The Financial Crisis. As the figure illustrates, there have been several other spikes, indicating other events in the Norwegian market, such as; The EU Debt Crisis, the US Credit-Rating Downgrade and The Oil Crisis.

Looking at the volatility development in figure 1, an interesting question to ask is how the Norwegian fund market have performed in this period and whether actively managed funds are able to outperform their benchmark. This curiosity prompted the research questions to be further explored in this thesis.

1.2 Purpose

This thesis investigates the performance of the funds and whether the fund managers possess stock picking- and market timing ability by using different performance measurements and regression analyses. A data set consisting of actively managed funds with the majority of their equity invested in the Norwegian market is analysed. As mentioned above, there have been several market events that affected the Norwegian economy. This triggered our interest for our thesis, as we were curious on how the funds performed during the different market events.

Although fund performance has been examined in a vast number of studies, there are not many studies focusing on funds' performance related to the different events and the Norwegian market. This study covers an eleven-year period from January 2007 to January 2018 and investigates the overall performance of the funds throughout the period. In addition, the data is divided into three sub-periods that allow us to further investigate the performance of the funds during the different market events. Malkiel (2003) found that there is a small correlation between winners in one period and the winners in the next period. Therefore, it is interesting to see if the best performing funds in one period differs from the best performing funds in the next period.

To summarize, our thesis seeks to answer the following research questions:

- Do the fund managers possess stock picking- and market timing ability and how did the funds perform during the different market events?
- Is the best performing fund in one period consistent with the best performing fund in the next period?

1.3 Delimitations

This study looks into 10 actively managed Norwegian mutual funds that invest the majority of their capital in the Norwegian market, thus, it cannot be concluded that this represents the Norwegian fund market. It is important to note that this thesis is not looking into the effects of

the different events, but how the funds performed during the different market events. It is also important to mention that this thesis is not meant as a guide for investing or to be used by individual investors to pick the right mutual fund.

Several of the models used in this thesis are derived from the CAPM and are therefore based on the same assumptions and has the same weaknesses. The Fama-French-Carhart-model could have been used as an alternative to the CAPM. Since we did not have any risk premiums for the different risk factors *(HML, SMB & MOM)*, we used the factors to get a better estimate for the alpha´s and the beta´s in the regression analyses.

In fund performance, the returns can be separated into two different types of returns; gross returns and net returns. Gross returns are returns before any fees are subtracted, while net returns are returns after subtracting fees. The net returns are usually the returns that matter to the investors because this is what they are left with after subtracting management fees. However, this study only looks into monthly net returns for both the funds and the benchmark.

2 Types of funds and Regulations

This chapter defines mutual funds and the differences between passively - and actively managed funds. In addition, a brief overview of the Norwegian mutual fund market and their regulations are presented.

2.1 Mutual funds

"Mutual funds are investment pools organized as corporations or trusts under state law. To raise capital the fund issues shares to the investing public, with the proceeds placed in a more or less diversified portfolio of risky securities (primarily corporate stocks and bonds, government debt, etc.) and cash to which shareholders have a pro rata claim. A unique feature of mutual funds is that they stand ready to issue and redeem shares at the daily net asset value of the fund next computed based on the reported prices of the underlying portfolio securities" (Boatright, 2010).

There are several types of mutual funds that are available to investors, divided into different categories and investment strategies. Financial services companies manage several mutual

funds with different risk profiles. A mutual fund provides investors with the opportunity of easy access to well diversified portfolios. For a private investor it would be harder to make a well-diversified portfolio since it would have high transaction costs.

There are two types of management styles; passive- and active management. Actively managed funds use a financial strategy where the fund managers analyse companies and actively pick stocks aiming to outperform their benchmark. The fund managers rely on their own experiences, judgment and analytical research. The concept of active managing is to look for inefficiencies in the market by stock picking or market timing. However, it is an art by picking the right stocks and make decisions at the right time, so most will consider fund managers ability to time the market as luck, rather than skill (Gezelius, 2018). Passive management, also known as "indexing", is when fund managers mitigate the market index without attempting to actively pick stocks such as actively managers do. Fund managers in these types of funds try, without putting too much effort in stock picking and timing, to perform similar to a specific predetermined index. Passively managed funds are cheaper in terms of less time-consuming for the fund managers to pick stocks, thus lesser costs related to manage these types of funds (Sørensen, Miller, & Samak, 1998).

According to Bodie, Kane & Marcus (2014a), mutual funds can be divided into two different types of funds; Open-end and closed-end funds. Open-end funds are exchange-traded funds and have unlimited number of shares and are the most common of these two types of funds. Closed-end funds on the other hand are not as common as the open-end funds. Here, the investor buys a piece of the fund and one has to buy existing shares since there is a limited number of shares. There are many funds with an international focus. Global funds invest primarily in securities worldwide, which also includes the United States. International funds on the other hand, invest in securities of firms located outside the United States. Regional funds concentrate on some particular parts of the world, while emerging market funds invest in companies of developing nations (Bodie, Kane, & Marcus, 2014a).

Funds can be divided into four categories; equity funds, hybrid funds, fixed-income funds and money market funds. Each category has a different investment focus with different risk and characteristics. With different types of funds, it is easier for the investor to choose the category that is the most suitable for their risk profile. However, this thesis only focuses on open-end equity funds.

2.1.1 Types of funds

According to Bodie, Kane & Marcus (2014b), equity funds are actively- or passively managed mutual funds that invest the majority of their equity in stocks. Equity funds usually hold a small percentage of total assets in money market securities to provide the liquidity that is necessary to meet potential redemption of shares. Some equity funds are called sector funds because they concentrate on a particular industry.

A hybrid fund consists of both stocks and bonds where the distribution between stocks and bonds and the risk varies between different funds. Fixed-Income fund is also known as bond fund and as the name suggest, these funds specialize in the fixed-income sector. Moreover, these funds invest primarily in bonds and other debt instruments. Bond funds typically pay higher dividends to investors compared to other funds. A money market fund is a type of fixed income mutual fund that invest in money market securities, such as short-debt securities, certificates of deposits, commercial papers or repurchase agreements. Typically, the money market is regarded as quite safe for short-term investments, linking to bank deposits but with higher returns. The average period for an investment in money-market fund is relatively short, maturing all from 1-month to a year (Bodie, Kane, & Marcus, 2014b).

2.2 Norwegian mutual funds

The history of mutual funds in Norway is not very long. In the early 1980s, only a few mutual funds were represented on the Oslo Stock Exchange (OSE) and the market value was about 290 million NOK (Gjerde & Sættem, 1991). In the past decades, the number of funds and the value of funds in Norway have increased astronomically. Notably, the market value of the mutual funds in Norway has increased to over 1000 billion NOK as of 2017 (Statistisk sentralbyrå, 2017). An explanation for this increase can be the combination of an increased level of prosperity in Norway and an ageing population that focus more on saving than younger people through different saving schemes (Falnes-Dalheim & Slaastad, 2007).

Another aspect on the Norwegians saving behaviour can be the authorities making it easier for individuals to invest. An example of this is the increased advantages of savings in the so-called share savings account *(aksjesparekonto)*, where individuals can make different transactions without taxing for it. Another example is the tax-shield/deduction *(skjermingsfradrag)*, which applies to individuals who saves in funds. The purpose for such

subsidies is to compensate the individuals for saving their money in funds. This will, when making a redemption, lower the taxable income, which in turn will give a lower tax on capital gains.

Among Norwegian mutual funds, the equity funds are the biggest group and represent more than half of the total market value (Statistisk sentralbyrå, 2017). The share invested in equity mutual funds with a Norwegian mandate have decreased from 90 % in 1994, to less than 20 % in 2008. The decreased investments in the Norwegian market is mainly due to increased investments in equity mutual funds with an international mandate, but the investments in the equity mutual funds with the Norwegian mandate is still substantial (Sørensen L. Q., 2009).

2.3 Regulations

Like most funds in the rest of Europe, Norwegian funds are also subjected to the European Securities and Market Authority´s "Undertaking for Collective Investment in Transferable Securities Derivatives, or (UCITS)". The directive`s main purpose is to create a harmonized investing regime throughout Europe for fund transactions, creating competition and provide protection for all the investors. The directive also works as an insurance to reduce risk and increase transparency in the mutual funds that are offered to the clients. Any fund that does not follow the directive will not be able to do marketing in Europe. Norway has, in addition to UCITS, their own legislation called, *Verdipapirfondsloven* that complements UCITS in many ways (Varner, 2018).

The UCITS regulates both the weight of investment classes and what kind of eligible assets a fund may invest in, such as;

- Money-market instruments
- Bonds
- Shares
- Transferable securities and other liquid financial assets
- Financial derivative instruments
- Closed- and open-ended UCIs

One of the most important characteristics of UCITS is liquidity. The term liquidity relates to the ease of buying or selling a fund's shares or units. This means that the investors can by

anytime buy or redeem their holdings without a delay. The other important characteristic in UCITS is diversification. With this, one can reduce the overall risk by investing in various securities to spread the risk. Since UCITS funds are designed to be suitable for retail investors, their rules build in certain levels of diversification with the aim to reduce their vulnerability to the performance of a small number of assets (ALFI, 2012).

In addition, there are some tax benefits for individuals saving in funds in Norway as they can be shielded for some of the tax if they keep their holdings in funds throughout the year. The shielding rate is usually the same as the rate one gets in the bank the same year. It is also important to mention that any capital gain in equity funds are subjected to a taxation rate of 30,59 % as of 2018. Losses are deducted by the same rate of tax (Regjeringen, 2018).

3 Literature review and Theory

In this chapter, the research related to market efficiency, mutual fund performance and other relevant theories are presented.

3.1 Framework

The majority of existing literature regarding mutual funds is mainly focused on the performance, however this thesis focuses on the funds' performance during the different market events. A fund manager's ability to generate risk-adjusted excess returns relative to the benchmark can be tested in order to see whether the fund manager possess statistically significant stock picking ability. In addition, it can be tested whether the fund managers possess timing ability, which is done to see if the fund manager has abilities to go in and out of the market at the right time.

Ever since the mutual fund industry started gaining popularity, research on this area also increased. Kendall (1953) was one of the first to examine the stock market prices and found that there was no predictable pattern in stock prices. Further research conducted by other economists showed that the randomness indicated a well-functioning or an efficient market and not an irrational one. Markowitz (1952) was the pioneer behind the Modern Portfolio Theory (MPT) and established the foundation behind the Capital Asset Pricing Model (CAPM). CAPM was developed by Sharpe (1964), Mossin (1966) and Lintner (1965), who argued that investors should be compensated for systematic risk. Fama and French (2004)

criticized CAPM for being a simplification of reality since it only provides compensation for systematic risk. Fama and French (1993) developed the Three-factor model, which includes two additional sources of risk factors, and has been proved to be a better model to calculate expected returns. As an addition to the Fama-French Three-Factor Model, Carhart (1997) added a Momentum (MOM) factor into his so-called Four-factor model.

Most of the performance measurements are based on the CAPM and are therefore based on the same assumptions and have the same weaknesses. Treynor (1965), Jensen (1968) and Sharpe (1966) developed their own models to measure a fund's performance and Jensen´s Alpha is the most known and relevant measurement in use today. The aim is to compare actual portfolio returns with returns predicted by CAPM. Sortino Ratio (2008), Modigliani's Risk-adjusted Ratio (1997), and Information Ratio (1973) are other relevant measures used to evaluate a fund's performance. There is criticism aimed toward the Jensen`s alpha, especially from Roll (1977), where he argues that Jensen's alpha has the same weaknesses as CAPM. Further Roll argues that the alpha is very sensitive to the choice of benchmark. This criticism has later been backed up by Grinblatt and Titman (1989) and Elton, Gruber, Das, & Hlvaka (1993). Furthermore, Fama (1972) criticized Jensen`s Alpha for only measuring the managers stock picking ability and not the market timing ability.

A common question related to fund performance is whether or not actively managed funds outperforms passive index funds. The Efficient Market Hypothesis is a theory developed by Fama (1969), where he argued that stock prices move randomly and that it is impossible to beat the market. This theory has received criticism from academics and professional portfolio managers and the theory has never been widely accepted at Wall Street. Warren Buffett (1984) argued against EMH, claiming that markets are not always efficient. Malkiel (2003) on the other hand, supported the EMH proving that the majority of portfolio managers have been outperformed by the index and that there is a small correlation between winners in one year and the winners in the next year. The Financial Crisis led to further criticism of the EMH. Grantham (2009) claimed that the EMH was partly responsible for the crisis and that the EMH led to financial leaders underestimating the dangers of potential crisis. Brown (2011) also argued against the EMH, claiming that the hypothesis fails to detect when a bubble is forming and when it might burst.

Market timing was first presented by Treynor and Mazuy (1966), where they estimated a linear index model to see whether a fund manager is able to time the market. However, Treynor and Mazuy were not able to find any statistical evidence of timing ability in their study. Henriksson (1984) found little evidence of market timing ability when analysing 116 mutual funds. Bollen and Busse (2001) on the other hand, found evidence of market timing ability in their study by using daily data instead of monthly data.

3.2 Theory

3.2.1 The Efficient Market Hypothesis

Since the early 1950s, economists have tried to examine the stock market. Maurice Kendall was one of the first to examine the stock market prices back in 1953. Kendall found that there was no predictable pattern in stock prices and that the prices were just as likely to go up, as they were to go down on any particular day. The data gave no evidence that it was possible to predict price movements. Further research done by other economists showed that the randomness indicated a well-functioning or efficient market and not an irrational one (Bodie, Kane, & Marcus, 2014c).

The Efficient Market Hypothesis (EMH) is one of the most important theories in the social science sector. The theory states that it is impossible to beat the market and that share prices always reflects all relevant information, making it impossible to outperform the market. According to the EMH, the only way an investor can get higher returns is by having a riskier portfolio. The EMH was developed by Fama (1969), where he presented evidence that the stock prices move randomly and that the so-called random walk hypothesis holds. This hypothesis contributes to the argument that any time an investor buys or sells a stock; they are taking part in a game of chance and not skill (Mantegna & Stanley, 1999).

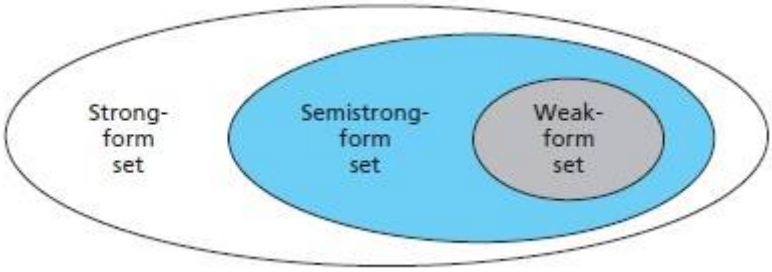
This leads us to the much-discussed question; does investors get what they pay for, when choosing actively managed funds over passive funds? EMH contributes to the argument that actively managed funds do not attribute to anything other than higher costs.

For the Efficient Market Hypothesis to hold, some necessary conditions must be satisfied (Shleifer, 2000);

- Many rational profit maximizing investors in the market that are active and updated participants.
- Irrational investors are cancelled out by other irrational investors.
- Information is free and available to all market participants. Investors react immediately on new information, leading to stock price adjustments.

One can distinguish between three versions of the Efficient Market Hypothesis; The weak, the semi-strong and the strong form as shown in figure 2.

Figure 2: Forms of Efficient Market Hypothesis



Source: Bodie, Kane & Marcus (2014d)

The weak form implies that the stock prices reflect all historical prices, returns and volume. Historical information is publicly available and costless, and there are no possibilities for an investor to profit from publicly available information, since by the time the information is available, there will be an immediate change in the price of the stock. The semi-strong form states the stock prices reflect all public information as well as quality of management, balance sheets, patents held, earning forecasts and accounting practices. The strong form states that stock prices reflect all information, both public and private (Bodie, Kane, & Marcus, 2014e).

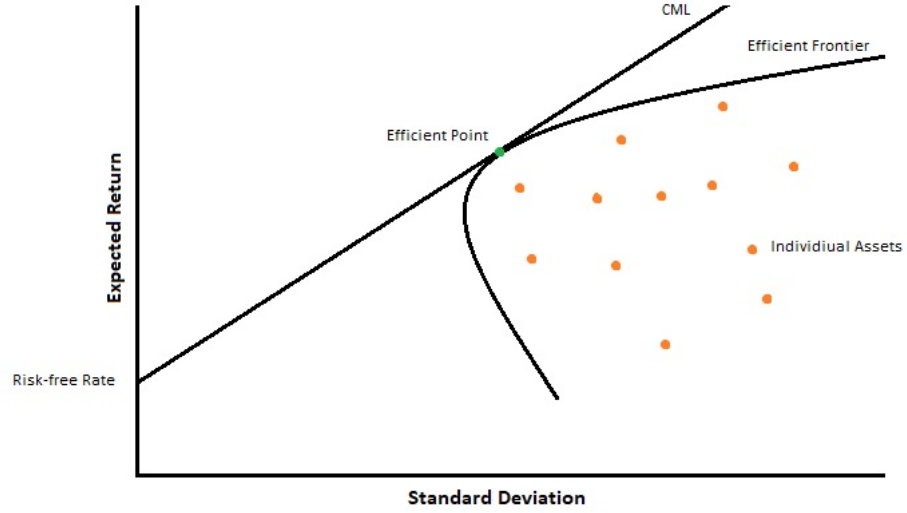
The EMH theory has received criticism, from both academics and professional portfolio managers and the theory has never been widely accepted at Wall Street. Warren Buffett (1984) argued against EMH, claiming that markets are not always efficient. Buffet has outperformed the market over long periods, which is impossible according to the EMH. With

the EMH, one can conclude that investors would be better off with a low-cost passive portfolio.

3.2.2 Modern Portfolio Theory

Modern Portfolio Theory (MPT) was pioneered by Harry Markowitz in 1952 and is a theory on how a risk-averse investor can obtain maximum expected return given a level of risk. One of the most essential parts of the MPT is the Efficient Frontier, which is a theory that claims it is possible to construct an "Efficient Frontier" of optimal portfolios, where one can get maximum expected return while obtaining a given level of risk (Francis & Dongcheol, 2013).

Figure 3: Efficient Frontier



The tangency point between the Capital Market Line (CML) and the efficient frontier in figure 3 is the "efficient point", where the investor can achieve the highest possible return at the minimum level of risk. The investors risk profile will influence the position the investor takes in the efficient set.

3.2.3 The Capital Asset Pricing Model

The foundation of the Capital Asset Pricing Model, also known as CAPM, was set by Harry Markowitz, in the work he did on Modern Portfolio Theory. Capital Asset Pricing Model was published around a decade after Modern Portfolio Theory, in articles by Sharpe (1964), Mossin (1966) and Lintner (1965). This model provides a rate of return that is adjusted for risks related to the market portfolio and says that an investor should be compensated for systematic risk. They argued that there has to be some kind of compensation for investors that

are willing to increase the risk-level of their portfolio. CAPM can be used to price both single assets and portfolios containing multiple assets. Further, the model suggests that an optimal portfolio contains a combination of a risk-free asset and the market portfolio (Bodie, Kane, & Marcus, 2014f).

The Capital Asset Pricing Model is built on the same assumptions as the Modern Portfolio Theory, where some of the most important assumptions are that investors are diversified, homogeneous and risk-averse, there is full information available in the market, all assets are equal and that transaction costs do not exist (Damodaran, 2002). There is some criticism aimed to this model, as it is a simplification of reality. The CAPM only provides compensation for systematic risk. In other words, the model assumes that portfolios are sufficiently diversified. This assumption is one of the reasons that there has been criticism aimed towards CAPM. In reality, most of the portfolios are not sufficiently diversified as CAPM assumes (Fama & French, 2004). That being said, the Capital Asset Pricing Model is one of the most recognized models when it comes to calculations relative to the rate of return.

CAPM can be defined as:

$$E(r_i) = r_f + \beta_i[E(r_m) - r_f]$$

Where;

- $E(r_i)$ = The expected return on the capital asset
- r_f = The risk-free interest rate
- β_i = The asset beta
- $E(r_m)$ = The expected return of the market
- $[E(r_m) - r_f]$ = The market risk premium

The risk-free rate of return expresses the return an investor can expect without a risk exposure. In finance, one measures the risk of an investment by looking at the variance of returns in relation to the expected return. For an investment to be risk-free, the return has to be equal to the expected return (Damodaran, 2002).

Beta measures how sensitive the return on an asset is, relative to the market. Beta can be defined as:

$$\beta_p = \frac{Cov(r_p, r_m)}{Var(r_m)}$$

Where;

- $Cov(r_p, r_m)$ = Covariance between the portfolio return and the market return
- $Var(r_m)$ = The variance of the market

The beta captures the movements in the portfolio relative to the market. When the beta value is 1, the portfolio and the market move in the same direction and has the same sensitivity. Below it is shown when the portfolio is more and less volatile than the market.

- If beta = 1 → portfolio moves with market.
- If beta < 1 → portfolio less volatile than the market.
- If beta > 1 → portfolio more volatile than the market

The market risk premium$[E(r_m) - r_f]$, is the difference between the expected market return and the risk-free rate. In other words, the investor is compensated for taking risk.

3.2.4 The Fama-French Three-Factor Model

The Capital Asset Pricing Model has been, as mentioned earlier, a subject of criticism since it only includes one source of risk. Fama and French (1993) developed a model that included more than one risk factor and has been proved to be a better model to calculate expected returns. Their model included, in addition to CAPM, the factors HML and SMB, which stands for high minus low and small minus big. These additional factors take size and book-to-market into consideration, meaning that value stocks and small stocks are riskier than growth stocks and large stocks (Bodie, Kane, & Marcus, 2014g). As an addition to the Fama-French Three-Factor Model, Mark Carhart added a Momentum (MOM) factor into his so-called Four-factor model. This factor considers trend, where downward trending stocks are riskier than upward trending stocks. The MOM factor is also known as the WML, which stands for winners minus losers. The factor looks at the top 30 percentile and the bottom 30 percentile of the dataset (Carhart, 1997).

The Four-factor model can be shown as;

$$r_i - r_f = \alpha + \beta_i(r_m - r_f) + \beta_S[SMB] + \beta_H[HML] + \beta_M[MOM] + \varepsilon_i$$

Where;

- r_i = The return on asset i
- r_f = The risk-free rate
- α = Regression alpha
- r_m = Return of the market portfolio
- $[SMB]$ = The size factor
- $[HML]$ = The growth/value factor
- $[MOM]$ = The momentum factor
- ε_i = Residuals of the regression model
- The β`s = The beta values of the different factors

3.3 Performance Measures

There are many different performance measurements that can be used when comparing different funds. In this section, the different measurements are presented where most of the measurements are based on the Capital Asset Pricing Model, thus, based on the same assumptions and have the same weaknesses.

3.3.1 The Jensen`s Alpha

The Jensen`s measure or so-called Jensen`s alpha is a measurement of risk-adjusted performance that represents the average return on a portfolio above or below the return predicted by the CAPM. In other words, one can claim that this measurement tests the fund managers´ ability to achieve higher returns than expected by CAPM, making it one of the most well-known and used performance measurement tools. Jensen´s alpha was developed by Jensen (1968), when he in an article wanted to investigate if there was a possibility that some fund managers were able to beat the market over a longer period. Jensen calculated returns of 115 different mutual funds against their expected returns using CAPM to see whether funds´ returns deviated from the CAPM or not. Jensen's alpha is defined as:

$$\alpha_p = r_p - [r_f + \beta_p(r_m - r_f)]$$

Where;

- α_p = The portfolios (p) alpha
- r_p = The portfolios (p) return
- r_f = The risk-free interest rate
- β_p = The beta of the portfolio (p)
- r_m = The expected return on market

In an efficient market, one expects α to be equal to zero and any deviation from zero can be interpreted as over- or underperforming compared to the market (Bodie, Kane, & Marcus, 2014j).

- $\alpha > 0$ = The portfolio has outperformed the market on a risk-adjusted basis.
- $\alpha < 0$ = The portfolio has underperformed the market on a risk-adjusted basis.

3.3.2 The Sharpe`s Ratio

This ratio was introduced by William Sharpe in 1966 and is a measure of performance for mutual funds. The Sharpe`s Ratio is also known as reward-to-variability ratio and is among the most common risk-adjusted performance measurement tools. This ratio gives an indication of how high the returns are compared to the riskiness of the portfolio. Sharpe`s Ratio is calculated by dividing the portfolio excess return by the standard deviation of returns (Bodie, Kane, & Marcus, 2014j).

$$S_p = \frac{(r_p - r_f)}{\sigma_p}$$

Where;

- S_p = The portfolios Sharpe`s Ratio
- r_p = Portfolio return
- r_f = Risk-free rate
- σ_p = The portfolio standard deviation

The Sharpe`s Ratio is often plotted against the Capital Market Line (CML), this way one can measure whether the fund performed better or worse compared to the market. If the funds Sharpe`s Ratio is above (below) the CML, it performed better (worse) than the market. A positive Sharpe`s Ratio indicates that the fund has a positive return, while a negative Sharpe`s Ratio on the other hand indicates negative return compared to the index.

3.3.3 The Sortino`s Ratio

This ratio was developed by Frank Sortino and is derived from the Sharpe`s Ratio but focuses on the standard deviation of negative asset returns instead of positive asset returns. This is called downside deviation and it is a useful way to evaluate the return on an investment for a given level of "bad" risk. A large Sortino`s Ratio indicates that the fund is performing well and is not facing large losses (Sortino & Stephen, 2008).

$$SO_p = \frac{(r_p - r_f)}{\sigma_p}$$

Where;

- SO_p = The portfolio Sortino`s ratio
- r_p = Portfolio return
- r_f = Risk-free rate
- σ_p = Standard deviation of negative portfolio returns

3.3.4 The Treynor's Ratio

The Treynor's Ratio is also known as the reward-to-volatility ratio and was developed by Treynor (1965). The calculation is done by dividing the portfolio excess return by the portfolio beta. The purpose of this ratio is to measure the excess return per unit of systematic risk (beta). The Treynor's Ratio only uses systematic risk, while Sharpe ratio considers total risk (Bodie, Kane, & Marcus, 2014j).

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

Where;

- T_p = The portfolio Treynor`s Ratio
- r_p = Portfolio return
- r_f = Risk-free rate
- β_p = Portfolio beta

A high Treynor`s Ratio indicates that the fund has a higher systematic risk-adjusted return compared to a fund with a lower Treynor's Ratio. In other words, the higher the ratio is, the better the portfolio has performed.

3.3.5 The Information Ratio

Information Ratio is a metric similar to all the other ratios telling us how good the fund is performing compared to the market. It measures the fund manager's ability to generate excess returns relative to the benchmark. To calculate the Information Ratio, one must divide the excess return with the Tracking Error. A positive Information Ratio indicates that the fund manager is able to outperform the benchmark. (Schneider, 2009).

$$IR_p = \frac{(r_p - r_m)}{TE}$$

Where;

- IR_p = Portfolio Information Ratio
- r_p = Portfolio return
- r_m = Market return
- TE = Tracking error

Tracking Error is a measure of the divergence between the portfolio and the benchmark. More precisely, it is the price behaviour between a portfolio and benchmark. A positive Tracking Error tells an investor that the investments are doing better than the market, while a negative Tracking Error does the opposite. To obtain this measure, one has to take the standard deviation of the divergence between the portfolio return and the index return.

3.3.6 Modigliani Risk-Adjusted Performance Ratio (M^2)

This ratio is derived from the Sharpe`s Ratio and focuses on total volatility as a measure of risk. Unlike the Sharpe`s Ratio, this measure is in percentage, which makes it easier to interpret. To compute M^2 one has to find an optimal portfolio, which means a portfolio with a combination of equity investments and risk-free investments (T-bills, bonds etc.) with the same risk as the index (Modigilani & Modigilani, 1997). After obtaining the weights and returns, one can find the return on the adjusted portfolio by using this formula:

$$R_p * = [(W_{Equity} * r_p) + (W_{r_f} * r_{r_f})]$$

Where;

- $R_p *$ = Optimal portfolio return
- W_{Equity} = Weight invested in equity
- r_p = Return portfolio
- W_{r_f} = Weight risk-free assets
- r_{r_f} = Return risk-free assets

This calculation gives the return of the optimal portfolio. Further, M^2 can be calculated by using this formula;

$$M^2 = R_p * - r_m$$

Where;

- M^2 = Modigliani Risk-Adjusted Performance Ratio
- $R_p *$ = Optimal portfolio return
- r_m = Market return

3.4 Market Timing

Market timing is an investments strategy of making buy or sell decisions of financial assets by attempting to predict future market price movements. This involves shifting between market-index portfolio and a safe asset, depending on whether the market index is expected to outperform the safe asset. This leads to a higher beta in good times and a lower beta in bad times. Market timing was first presented by Treynor and Mazuy (1966), where they estimated a linear index model, as shown below, to see whether a fund manager is able to time the market (Bodie, Kane, & Marcus, 2014L).

$$r_p - r_f = \alpha + \beta_p[E(r_m) - r_f] + \gamma[E(r_m) - r_f]^2 + \varepsilon_p$$

Later, Henriksson and Merton (1981) developed a model very similar to the model developed by Treynor and Mazuy, but instead of the squared term, Henriksson and Merton used a dummy variable *D*, which is equal to 1 if $r_m > r_f$, and zero otherwise.

$$r_p - r_f = \alpha + \beta_p[E(r_m) - r_f] + \gamma[E(r_m) - r_f]D + \varepsilon_p$$

Where;

- $r_p - r_f$ = Portfolio excess return
- $[E(r_m) - r_f]$ = Market excess return
- α, β & γ = Regression outputs
- D = Dummy variable
- ε_p = Residual value

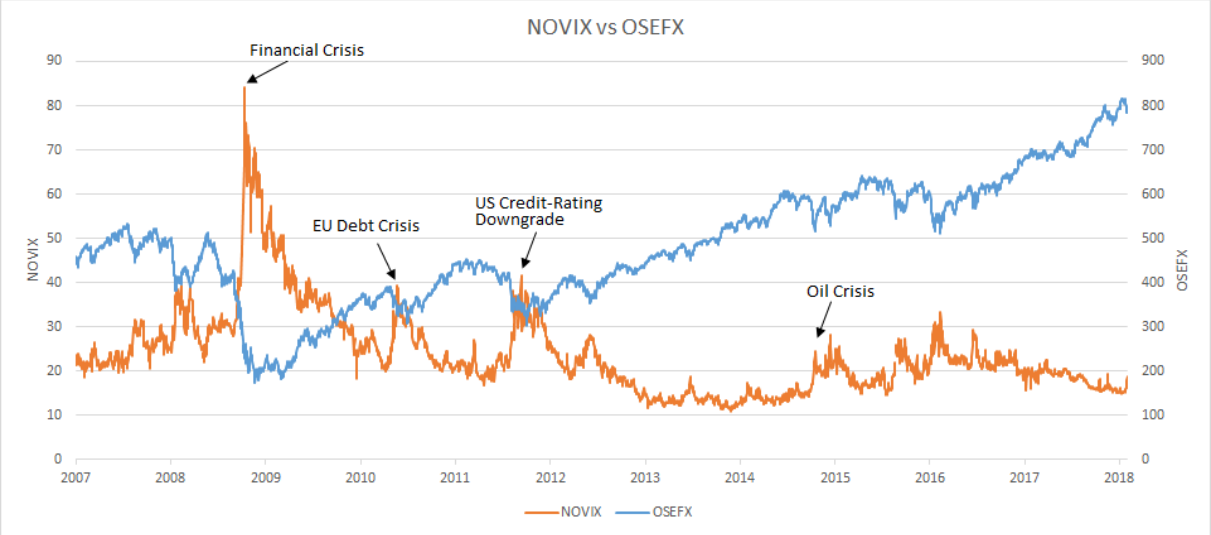
The beta of the portfolio is β in bear markets and $\beta + \gamma$ in bull markets, where a positive and statistically significant γ implies market timing ability (Bodie, Kane, & Marcus, 2014L). The Henriksson and Merton model is used in this thesis to evaluate the market timing ability for the different funds.

3.5 Market Events

Financial markets are crucial for a well-functioning economy, allocating resources to its most productive use and providing insurance against idiosyncratic shocks. From a time to another, one will see corrections in the market and these corrections can sometimes be extreme. Figure 4 includes the development of both NOVIX and OSEFX. As the graph illustrates, there have been several different global market events that also had an impact on the Norwegian market during the period covered by this thesis. It also shows that NOVIX and OSEFX tend to move in opposite direction.

NOVIX is an implied volatility index for the Norwegian equity index OBX and is based on the CBOE Volatility Index known as the VIX. Bugge, Guttormsen, Ringdal & Molnár (2016), are the authors behind the NOVIX and believe that it can be used as a reference for both practitioners and academic studies about volatility in the Norwegian market. The Oslo Stock Exchange Mutual Fund Index (OSEFX) is a weight- and dividend adjusted version of OSEBX and is used as a benchmark in this thesis. OSEFX is therefore a natural choice as a comparable to the NOVIX in the figure below.

Figure 4: NOVIX vs OSEFX from January 2007 to January 2018



Source: Data retrieved from NOVIX (2018) *& Oslo Børs* (2018)

3.5.1 Financial Crisis 2007-2008

The Financial Crisis took place in the period between 2007 and 2008. As figure 4 illustrates, there was as a sharp increase in NOVIX and a sharp decline in the OSEFX index at the end of

2008. The Financial Crisis may have been the worst crisis since the great depression back in the 1930s. Several financial institutions including big banks had to be bailed out to prevent a possible collapse of the world's financial system. The impact was so rapid that, even with the government bailout schemes, several major banks and financial institutions such as The Lehman Brothers went bankrupt, signalling a global economic downturn (Shambaugh, 2012).

3.5.2 Debt Crises

There were other two events in the period between 2010 and 2011 as we can recognize from figure 4. The first event is known as The EU Debt Crisis and the second event is known as the US Credit-Rating Downgrade.

In May 2010, the first event occurred which had a direct link to The Financial Crisis a couple of years back. This crisis is also known as the European Debt Crisis and occurred mainly due to the absence of a common European policy framework for handling the banking crisis. The European governments had to rescue troubled banks in their countries during The Financial Crisis, which further led to an increased national debt (Bruyckere, Gerhardt, Schepens, & Vennet, 2013). In August 2011, the second event occurred when Standard & Poor`s downgraded the United States of America`s long-term credit-rating for the first time in the history from AAA to AA+ due to political risks and rising national debt (Standard&Poor`s, 2011).

Both of these financial events led to a short-term fall in the Norwegian market, illustrated in figure 4 as an increase in the NOVIX and a decline in the OSEFX index.

3.5.3 Oil Crisis

Looking at figure 4, one can observe that OSEFX went from having a stable growth after The Financial- and Debt Crises, to an unstable period in mid-2014 to mid-2016, which reflects The Oil Crisis.

The Oil Crisis occurred mainly due to the North American countries becoming more self-sufficient and the OPEC countries maintaining their production levels. Moreover, economies such as China, Russia and India decreased their demand for oil, playing a major role in the decline of the oil prices in 2014 (DePersio, 2018).

In the period before The Oil Crisis, the NOVIX was in a relatively quiet period, while the OSEFX had a stable growth. We expected that The Oil Crisis would lead to a sharp fall for the OSEFX since the energy sector is a major component of the index. However, the graph tells a different story: The Oil Crisis did not lead to a sharp fall for the OSEFX, instead the index went from having a stable to an unstable growth in the period between mid-2014 to mid-2016. In the second half of June 2014, the energy sector amounted for almost 50 % of the total market value of the Oslo Stock Exchange. However, this percentage decreased to around 30 % in October 2015, meaning that the Oslo Stock Exchange became less exposed to fluctuations in the oil prices (Olsen & Velgaard, 2015).

4 Methodology and Data

The fund data used in this thesis are gathered from Thomson Reuters Eikon (Datastream) while the benchmark data is collected from Oslo Stock Exchange`s homepage. The monthly fund data is used to calculate the geometric returns which are further used to calculate the cumulative returns for the different funds, including the benchmark. The cumulative returns are used as a tool to graph the different funds' performance against the benchmark and are calculated for both the whole period and the sub-periods. The cumulative returns measure the rolling aggregated return of the geometric returns.
Geometric return can be calculated using the following formula;

$$Geometric\ Return = \ ln\left[\frac{NAV_t}{NAV_{t-1}}\right]$$

Where;

- ln = The natural logarithm
- NAV_t = The net asset value at t = 0
- NAV_{t-1} = The net asset value at t = -1

The authors behind NOVIX analysed a period between January 2006 to February 2015 and the updated data is provided continuously every 5-minutes, available at their own homepage (NOVIX, 2018). To fit our dataset, the updated daily NOVIX data was calculated by taking the daily average of the continuously updated 5-minute data from January 2007 to January 2018.

The monthly risk-free rate and the Fama-French factors are collected from BI Norwegian Business School`s homepage, where Professor Bernt Arne Ødegaard has calculated monthly risk-free rate and the Fama-French factors; SMB, HML and MOM adjusted for the Norwegian market. The monthly risk-free rates are forward looking risk-free rates estimated from government securities and NIBOR (Ødegaard, 2018). The alpha´s and the beta´s are extracted from the regression analyses, where all the Fama-French-Carhart factors are included to give a better estimate.

4.1 The Chosen Funds

According to Cesari and Panetta (2002), one must choose funds that can be classified into homogeneous categories in order to get meaningful results. The Norwegian equity funds used in this thesis have the same benchmark and similar investment strategies. All of the chosen funds follow the UCITS regulations as set by the EU-directive and have all been in the market for the whole period this study is based on.

The description of the funds is shown in Appendix A and the following funds were selected for this thesis;

- *Alfred Berg Gambak*
- *Danske Invest Norske Aksjer Institusjon II*
- *Delphi Norge*
- *Eika Norge*
- *Fondsfinans Norge*
- *Holberg Norge*
- *KLP AksjeNorge*
- *Nordea Norge Verdi*
- *Pareto Aksje Norge A*
- *Pareto Investment Fund A*

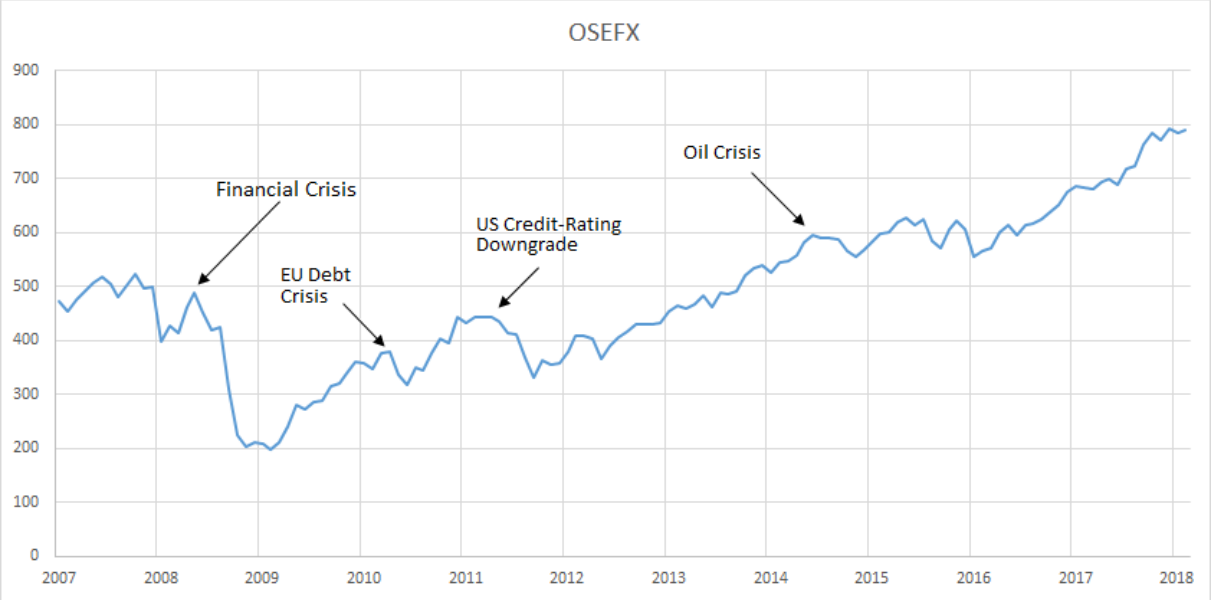
4.2 Benchmark

According to Grinblatt & Titman (1994), the choice of benchmark is likely to influence the funds' performance results. This is why it is crucial to choose a benchmark that resembles the environment around the funds one is looking into.

This thesis analyses Norwegian equity funds that invests the majority of their equity in the Norwegian market. All of the chosen funds have the Oslo Stock Exchange Mutual Fund Index (OSEFX) as their benchmark. Both the funds and the benchmark have to meet the requirements of the UCITS-regulation.

Figure 5 shows how the benchmark has developed over the chosen time-frame. As the figure illustrates, there have been several different events in the market during the chosen time period.

Figure 5: OSEFX Performance from January 2007 to January 2018



Source: Data retrieved from Oslo Børs (2018)

4.3 Statistics

In this section, the statistical part of the thesis is covered, starting with a short introduction of survivorship bias and robustness. Furthermore, statistical variables such as Skewness and Kurtosis are included to provide a description of the data used in the results.

4.3.1 Survivorship Bias

Survivorship bias occurs when unsuccessful funds stops reporting returns, leaving behind only successful funds. Funds that take higher risk and fail, will lose popularity as compared to funds that survives and outperform the market. This will eventually lead to the worst performing funds disappearing from the market, creating an environment with only the highest performing funds left (Bodie, Kane, & Marcus, 2014i).

According to Carhart, Carpenter, Lynch, & Musto (2002), the most common reason for discontinuation of a fund is poor multiyear performance and that survivorship bias increase significantly with the sample length. However, this thesis looks into single funds that have existed for at least the chosen time frame, therefore the survivorship bias in this study has a marginal effect.

4.3.2 Robustness

In this thesis, Ordinary Least Squares (OLS) is used as a method to estimate the unknown parameters in a linear regression model. The OLS model minimizes the sum of squared distances between the observed returns and the returns predicted by the regression line. For the OLS model to be consistent, there are several assumptions that need to hold (Gujarati, 2004).

Robustness in statistics refers to the strength of the statistical models. To see whether a statistical model is robust, one can look at the variable R-squared, which is a measure that shows the percentage of the variable variation which is explained by the model. In this study, adjusted R-squared is used, as it gives a better estimate by adjusting for the number of terms included in the model.

4.3.3 Probability Value

Probability value, better known as p-value, is used in this thesis to see whether the regression results are statistically significant. The test results are significant when the p-value is below or equal to the given significance level. The most common significance levels are 10 %, 5 % and 1 %, and in this thesis the 5 % significance level is used.

4.3.4 Standard Deviation

Standard deviation is a useful statistical measurement that is used to measure dispersion of a dataset from its mean. In finance, standard deviation is used as a measurement for volatility. A security with a large standard deviation indicates a high volatility in the prices. According to a survey conducted by Fidelity Investments, index funds can lose more in a bear market than an actively managed fund. This might be explained by the fact that actively managed funds can absorb the shocks better as they can take actions to reduce the losses during downturns (Fidelity Investments, 2017).
Standard deviation can be calculated using the following formula;

$$\sigma = \sqrt{\frac{\sum(Ri - \bar{R})^2}{n-1}}$$

Where;

- σ = Standard deviation
- n = Total observations
- Ri = Return asset
- $\bar{R}$ = Average return of assets

In this study, sample standard deviation of the returns is calculated for each fund, including the benchmark.

4.3.5 Skewness

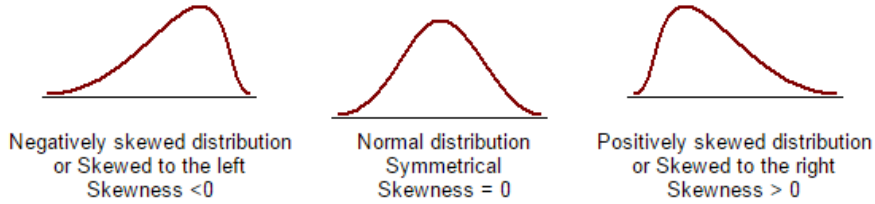
Skewness describes any potential asymmetry in the distribution of the portfolios. The distribution is skewed if the observations around the estimated mean are not symmetrically distributed. The distribution can be skewed positively or negatively. This means that the tails of the portfolios distribution can be on either the left- or right direction. A normal distribution has zero skewness (Bodie, Kane, & Marcus, 2014j).
Skewness can be calculated by using the following formula:

$$Skewness = Average\left[\frac{(R - \bar{R})^3}{\hat{\sigma}^3}\right]$$

Where;

- R = Return asset
- $\bar{R}$ = Average return of assets
- $\hat{\sigma}$ = Standard Deviation

Figure 6: Skewness Distribution



Source: (Tekmarathon, 2015)

4.3.6 Kurtosis

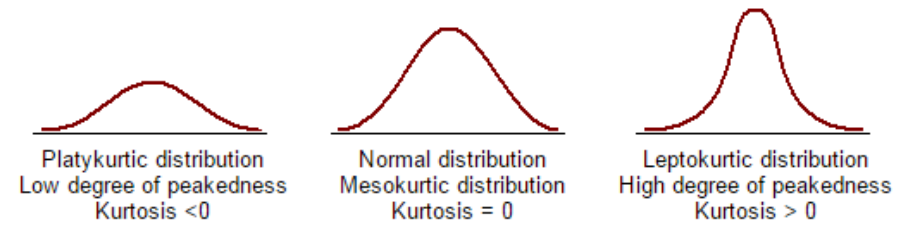
Kurtosis describes the weight in the tails and is a measure of the peak of a distribution showing how high the distribution is around the mean. A high kurtosis indicates that the variables can gain extreme outcomes (Bodie, Kane, & Marcus, 2014k).
Kurtosis can be calculated by using the following formula:

$$Kurtosis = Average\left[\frac{(R - \bar{R})^4}{\hat{\sigma}^4}\right] - 3$$

Where;

- R = Return asset
- $\bar{R}$ = Average return of assets
- $\hat{\sigma}$ = Standard Deviation

Figure 7: Kurtosis Distribution



Source: (Tekmarathon, 2015)

5 Results and Findings

This chapter analyses and presents the results obtained from the different quantitative methods used to evaluate the different funds' performance and whether the fund managers possess the ability of stock picking and market timing.

The chapter is divided into the following sections:

- 5.1 Presents the returns for the whole period and the sub-periods
- 5.2 Presents the results from the descriptive statistics
- 5.3 Presents the results from the different performance measurements
- 5.4 Presents the overall ranking of the funds
- 5.5 Presents the regression alpha´s
- 5.6 Presents the fund managers ability to time the market

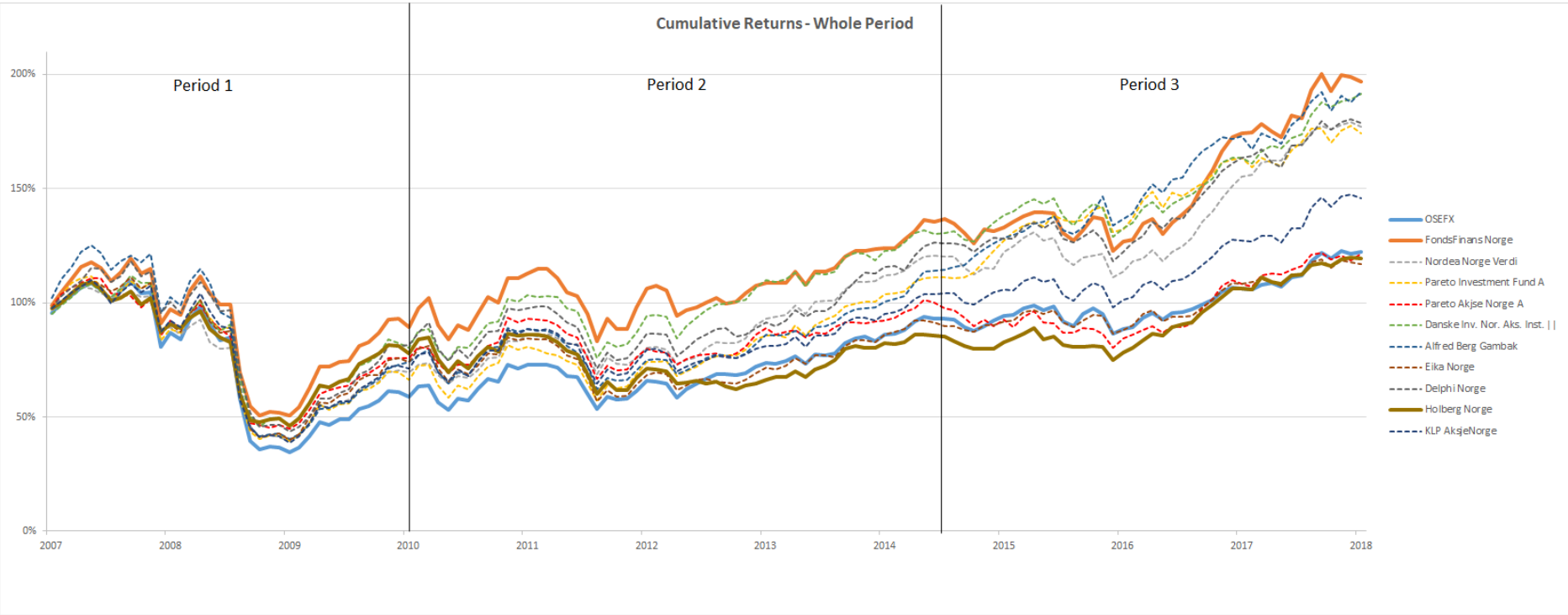
5.1 Returns in the different periods

The data is divided into three sub-periods, giving an illustration on how the funds performed compared to their benchmark during the different periods. The cumulative returns are used as a tool to graph the different funds' performance against the benchmark and were calculated both for the whole period and for the sub-periods.

The graphs include both solid lines and dotted lines. The solid lines represent the funds that have been discussed in the thesis, such as the top- and bottom-performing funds and the benchmark. The dotted lines show the funds that are not relevant for the interpretation of the returns.

5.1.1 Whole Period

Figure 8: Cumulative Returns – Whole Period



Source: Fund data was retrieved using Datastream (2018) *& Oslo Børs* (2018)

Figure 8 shows the cumulative returns for the whole period. The visual image illustrate that Fondsfinans Norge is the top-performing fund, while Holberg Norge is at the bottom. This might not be the case for the sub-periods. Since the sub-periods do not mix previous periods into the cumulative returns calculation as the whole period does, they provide a better view on how the funds performed in each period.

5.1.2 Sub-periods

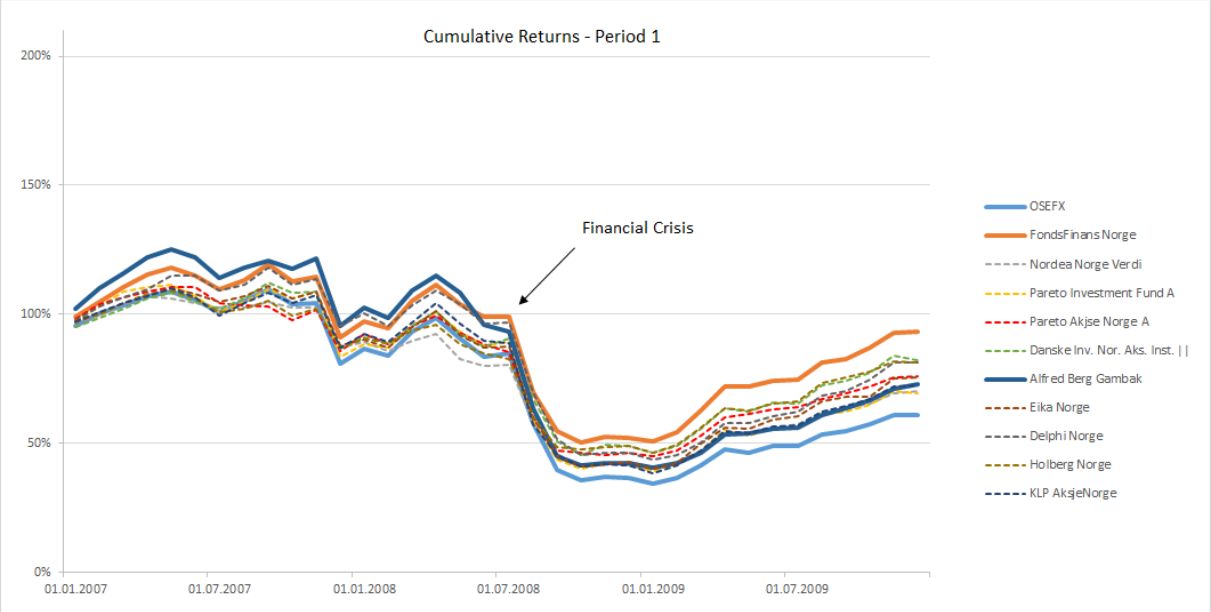
The data is divided into three sub-periods, based on the different market events discussed in Chapter 3.

Table 1: Definition of the sub-periods

Sub-Periods	Time	Market Events
1	01.01.2007 – 31.12.2009	The Financial Crisis
2	01.01.2010 – 30.06.2014	EU Debt Crisis and US Credit-Rating Downgrade
3	01.07.2014 – 31.01.2018	The Oil Crisis

5.1.2.1 Period 1: The Financial Crisis

Figure 9: Cumulative Returns - Period 1



Source: Fund data was retrieved using Datastream (2018) *& Oslo Børs* (2018)

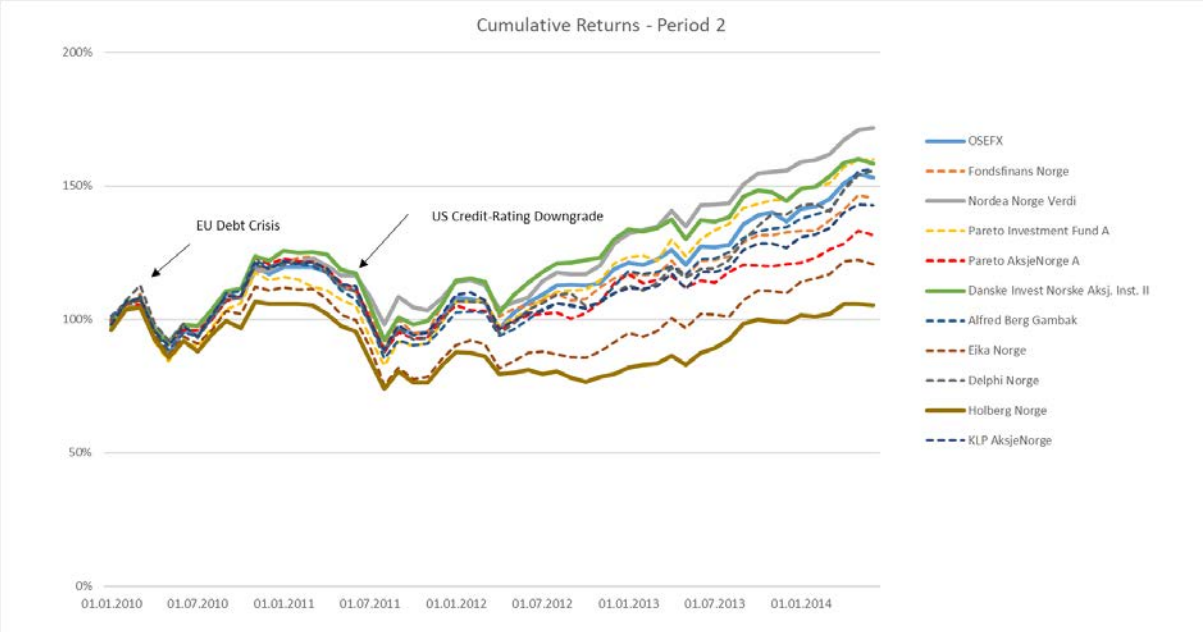
Figure 9 illustrates the cumulative returns for the different funds in period 1. Prior to The Financial Crisis, Alfred Berg Gambak seems to have performed better than all the other funds. The Financial Crisis led to a sharp fall in the performance of all the funds including the benchmark. The benchmark had among the sharpest fall during the crisis and obtained the

lowest performance compared to all the other funds during the rest of the first period. The monthly returns of all the funds, including the benchmark, had decreased by a range of 26-36 %.

In the years after The Financial Crisis, all the funds obtained high returns and Fondsfinans Norge seem to be the top-performing fund. Fondsfinans Norge were able to perform best in both bear- and bull markets, indicating that the fund managers might have been able to time the market compared to the other fund managers.

5.1.2.2 Period 2: The EU Debt Crisis & The US Credit-Rating Downgrade

Figure 10: Cumulative Returns- Period 2

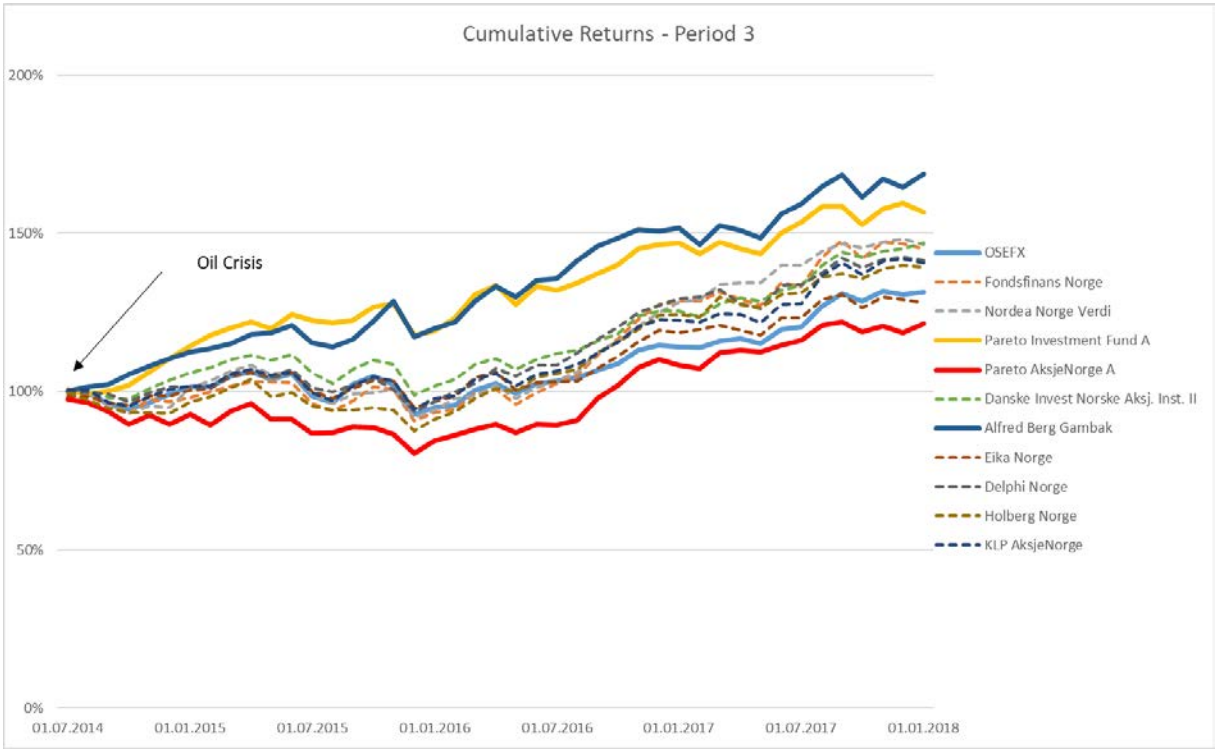


Source: Fund data was retrieved using Datastream (2018) *& Oslo Børs* (2018)

The figure above shows the cumulative returns for the different funds in period 2. There were two notable market events that occurred in this period; The EU Debt Crisis and The US Credit-Rating Downgrade. Both of the events led to a decline in the individual funds' performance and the market as a whole, but only for a short span of time. It seems like Nordea Norge Verdi and Danske Invest Norske Aksjer Institusjon II are the top-performing funds throughout this period. In contrary to the top-performing funds, Holberg Norge seem to be the bottom-performing fund, while the benchmark seems to perform above the average.

5.1.2.3 Period 3: The Oil Crisis

Figure 11: Cumulative Returns - Period 3



Source: Fund data was retrieved using Datastream (2018) *& Oslo Børs* (2018)

Figure 11 illustrates the cumulative returns for the different funds in period 3. The Oil Crisis in mid-2014 to mid-2016 led to an unstable period with relative flat growth rates. As figure 11 shows, Pareto Investment Fund A and Alfred Berg Gambak seem to be the two top-performing funds in this period. Contrarily, it seems that the benchmark performs below the average, while Pareto Aksje Norge A is the bottom-performing fund throughout this period.

5.1.3 Summary of the returns

To summarize, it is not easy to tell which fund is the top-performing by just looking at the different cumulative return figures. Fondsfinans Norge seemed to be the top-performing fund throughout the whole period in figure 8, which is not the case when looking into the sub-periods. As mentioned earlier, the sub-periods provide a better view of the funds' performance in the different periods, as it does not take previous periods into consideration the way the cumulative returns for the whole period does. According to the results, the winners in one period are not necessarily the winners in the next period. This is consistent with the theory of Malkiel (2003), who argued that there is a small correlation between winners in one period and the winners in the next period.

5.2 Descriptive Statistics

The descriptive statistics in table 2 is conducted for the whole period. Not surprisingly, the ranking of the mean shows the same results as the conclusion in the previous section.

Table 2: Descriptive Statistics - Whole Period

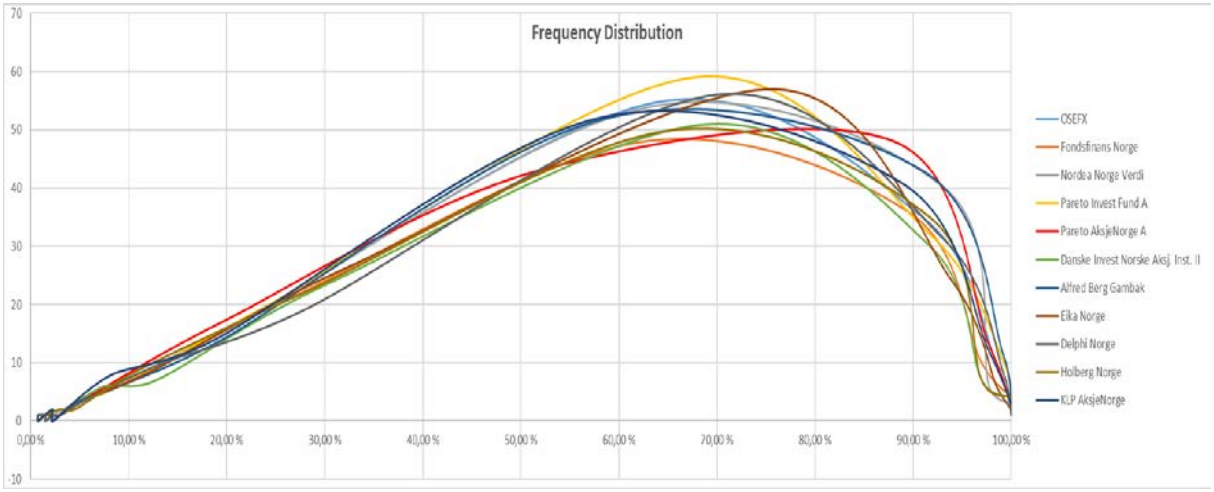
Variables	Mean	Standard Deviation	Kurtosis	Skewness	Lowest monthly return	Highest monthly return
OSEFX	0,188 %	6,53 %	8,93	-2,13	-32,27 %	15,08 %
Alfred Berg Gambak	0,514 %	6,31 %	9,48	-2,35	-32,50 %	14,98 %
Danske Inv. Nor. Aks. Inst. II	0,479 %	5,95 %	5,79	-1,64	-26,30 %	13,78 %
Delphi Norge	0,430 %	5,99 %	6,43	-1,77	-28,29 %	14,97 %
Eika Norge	0,128 %	6,24 %	7,24	-1,80	-31,48 %	16,65 %
Fondsfinans Norge	0,515 %	6,19 %	5,78	-1,50	-30,27 %	14,88 %
Holberg Norge	0,090 %	5,46 %	5,97	-1,45	-27,82 %	13,55 %
KLP AksjeNorge	0,300 %	6,27 %	8,93	-1,91	-35,85 %	15,99 %
Nordea Norge Verdi	0,384 %	5,36 %	7,98	-1,86	-28,56 %	13,92 %
Pareto Aksje Norge A	0,109 %	5,50 %	8,58	-1,84	-30,72 %	12,91 %
Pareto Investment Fund A	0,448 %	6,46 %	8,94	-2,07	-34,55 %	16,97 %

Source: Data was retrieved using Datastream (2018) *& Oslo Børs* (2018)

Fondsfinans Norge and Alfred Berg Gambak have the highest mean return over the whole period, while Holberg Norge and Pareto Aksje Norge A have the lowest mean return. Looking at the standard deviation, OSEFX has the highest standard deviation throughout the whole period. As mentioned in chapter 4, index funds can be more volatile during bear markets than actively managed funds, which is observable in figure 8 where OSEFX had among the sharpest falls during the different market events. This is also consistent with Appendix B, where the benchmark had one of the highest standard deviations and Nordea Norge Verdi the lowest throughout the whole period. However, the differences among the numbers are relatively small.

The fund with the highest monthly fall in returns during The Financial Crisis was KLP AksjeNorge, with a fall of 35,85%, while Danske Invest Norske Aksjer Institusjon II had the lowest monthly fall in returns of 26,30 %. The fund with the highest increase in monthly return after The Financial Crisis was Pareto Investment Fund A, with a return of 16,97 %, while the fund with the lowest increase in monthly return was Pareto Aksje Norge of 12,91 %.

Figure 12: Frequency Distribution – Whole Period



Source: Data was retrieved using Datastream (2018) *& Oslo Børs* (2018)

Figure 12 illustrates the frequency distribution for the different funds, including the benchmark. The distribution is unevenly distributed towards the right side, indicating negative skewness, meaning that the funds and the benchmark are more likely to obtain positive returns than negative returns. This is consistent with the descriptive statistics in table 2 showing that all the funds, including the benchmark are negatively skewed. Moreover, one can observe from the descriptive statistics that Alfred Berg Gambak has the highest negative skewness of 2,35 compared to Holberg Norge, which has the lowest negative skewness of 1,45. This indicates that Alfred Berg Gambak is the fund that is most likely to obtain positive returns, while Holberg Norge is the fund that is least likely to obtain positive returns throughout the whole period.

The fund with the highest kurtosis is Alfred Berg Gambak with a kurtosis of positive 9,48, while Fondsfinans Norge has the lowest kurtosis of positive 5,78. A high kurtosis indicates that a fund can gain extreme outcomes. However, all of the funds, including the benchmark have a positive kurtosis.

To summarize, the funds with highest mean returns are Fondsfinans Norge and Alfred Berg Gambak, while the funds with the lowest mean returns are Holberg Norge and Pareto Aksje

Norge A. These results are in line with the findings from the whole period figure in sub-section 5.1.1, where Fondsfinans Norge was the top-performing fund, while Holberg Norge was the bottom-performing fund. The standard deviation for all of the funds are relatively similar, where the OSEFX has the highest standard deviation while Nordea Norge Verdi is the fund with the lowest standard deviation as shown in table 2. Alfred Berg Gambak, which has the highest kurtosis, is consistent with the whole period figure in sub-section 5.1.1. The figure illustrates that Alfred Berg Gambak was among the top-performing funds both in the beginning and at the end of the period. This indicates that the fund obtained extreme outcomes throughout the whole period.

5.3 Performance Measurements and Ranking

In this section, the findings based on the performance measurements and a table of funds ranking in the different periods are presented. In addition, a table of the overall ranking is provided at the end of this section. The benchmark is only included in some of the measurements and is therefore not included in the ranking. It is important to notice that the performance is divided into three categories; best performing funds, worst performing funds and the funds in a neutral position. The funds that are ranked between the numbers 1-3 are defined as the best performing funds, while the funds ranked between the numbers 8-10 are defined as the worst performing funds. Funds in neutral position are numbered 4-7. Notably, the top-performing fund in each period is highlighted in green while the bottom-performing fund is highlighted in red.

5.3.1 The Jensen's Alpha

Below, Jensen`s Alpha for each fund is presented in table 3, showing both results and the ranking for each fund in the different periods. As mentioned in sub-section 3.3.1, Jensen's Alpha is a measure used to test whether the fund managers possess stock picking abilities by generating risk-adjusted excess returns relative to the benchmark. Since this measurement does not take statistical significance into consideration, the regression alpha analyses are used as a supplement to see whether the alpha´s are positive and statistically significant.

Table 3: Jensen´s Alpha

Funds	Whole period		Period 1		Period 2		Period 3	
	α	Rank	α	Rank	α	Rank	α	Rank
Alfred Berg Gambak	0,3247 %	2	0,3852 %	4	0,0856 %	3	**0,7307 %**	**1**
Danske Invest Norske Aksj. Inst. II	0,2897 %	3	0,4878 %	2	0,0816 %	4	0,3134 %	4
Delphi Norge	0,2404 %	5	0,4086 %	3	0,0587 %	5	0,2779 %	5
Eika Norge	-0,0607 %	8	0,3384 %	5	-0,4319 %	9	0,0004 %	9
Fondsfinans Norge	**0,3257 %**	**1**	**0,8484 %**	**1**	-0,0795 %	6	0,2284 %	7
Holberg Norge	**-0,0996 %**	**10**	0,1443 %	8	**-0,6648 %**	**10**	0,2684 %	6
KLP AksjeNorge	0,1111 %	7	0,2931 %	7	-0,1223 %	7	0,1568 %	8
Nordea Norge Verdi	0,1940 %	6	**-0,2053 %**	**10**	**0,3073 %**	**1**	0,3410 %	3
Pareto Aksje Norge A	-0,0815 %	9	0,0100 %	9	-0,1948 %	8	**-0,1012 %**	**10**
Pereto Investment Fund A	0,2600 %	4	0,3066 %	6	0,0932 %	2	0,5621 %	2

Source: Data was retrieved using Datastream (2018)

The alpha`s for the whole period indicates that Fondsfinans Norge is the top-performing fund with the highest alpha of 0,3257 %, while Alfred Berg Gambak is trailing just below Fondsfinans Norge with an alpha of 0,3247 %. In contrary to the top-performing funds, Holberg Norge, Pareto Aksje Norge A and Eika Norge all underperformed relative to the benchmark with negative alphas, with Holberg Norge having the lowest alpha.

In the first period, we can see that Fondsfinans Norge is the top-performing fund with a good margin, obtaining an alpha of 0,8484 %. Danske Invest Norske Aksjer Institusjon II is the fund with the second highest alpha of 0,4878 %., while Nordea Norge Verdi is the bottom-performing fund with an alpha of negative 0,2053 %, meaning that it underperformed relative to the benchmark. It is interesting to see how well Fondsfinans Norge performed, even though there was a financial crisis in this period that led to a fall in performance for all the funds.

In the second period, we can observe in table 3 that Fondsfinans Norge went from being the top-performing fund to a neutral position with an alpha of negative 0,0795 %. Nordea Norge Verdi was the bottom-performing fund in the previous period and is now the top-performing fund in this period with an alpha of 0,3073 %. Pareto Investment Fund A went from being in a neutral position to one of the best performing funds in period 2 with an alpha of 0,0932 %. The bottom-performing fund in this period is Holberg Norge with an alpha of negative 0,6648 %.

In the last period, Alfred Berg Gambak is the top-performing fund with an alpha of 0,7307 %, while Pareto Investment Fund A and Nordea Norge Verdi are among the best performing funds. Pareto Aksje Norge A performed the lowest of all the funds with an alpha of negative 0,1012 %, being the only fund with a negative alpha in this period.

To summarize, we expected all of the funds to outperform the benchmark in period 1 as the benchmark had among the sharpest fall in returns as shown in figure 9. The results from Jensen´s Alpha turned out to be different where Nordea Norge Verdi underperformed relative to the benchmark. In period 2 and 3, Nordea Norge Verdi and Alfred Berg Gambak were the top-performing funds, while Holberg Norge and Pareto Aksje Norge A were the bottom-performing funds. These findings are consistent with the cumulative return graphs in figure 9, 10 and 11 in the sub-section 5.1.2.

5.3.2 The Sharpe`s Ratio

Sharpe`s Ratio is a measure that gives an indication on how high the returns are compared to the riskiness of the portfolio. Below, the Sharpe`s Ratio for each fund is presented in table 4, which shows both results and the ranking for each fund in the different periods.

Table 4: Sharpe´s Ratio

Funds	Whole period		Period 1		Period 2		Period 3	
	SR	Rank	SR	Rank	SR	Rank	SR	Rank
OSEFX	0,0288	-	-0,1083	-	0,1471	-	0,2020	-
Alfred Berg Gambak	0,0814	2	-0,0660	5	0,1598	3	**0,4052**	**1**
Danske Invest Norske Aksj. Inst. II	0,0805	3	-0,0489	2	0,1619	2	0,3122	3
Delphi Norge	0,0718	4	-0,0541	3	0,1513	5	0,2733	5
Eika Norge	0,0205	8	-0,0655	4	0,0598	9	0,1852	9
Fondsfinans Norge	**0,0831**	**1**	**-0,0109**	**1**	0,1247	6	0,2388	8
Holberg Norge	**0,0165**	**10**	-0,0751	7	**0,0095**	**10**	0,2612	6
KLP AksjeNorge	0,0478	7	-0,0729	6	0,1217	7	0,2459	7
Nordea Norge Verdi	0,0716	5	**-0,1162**	**10**	**0,2243**	**1**	0,2768	4
Pareto Aksje Norge A	0,0197	9	-0,0902	9	0,0967	8	**0,1286**	**10**
Pereto Investment Fund A	0,0694	6	-0,0780	8	0,1593	4	0,3669	

Source: Data was retrieved using Datastream (2018) *& Oslo Børs* (2018)

According to the Sharpe`s Ratios for the whole period, Fondsfinans Norge is the top-performing fund with a ratio of 0,0831 with Alfred Berg Gambak and Danske Invest Norske Aksjer Institusjon II trailing just below with the ratios of respectively 0,0814 and 0,0805. In contrary to the best performing funds, Holberg Norge, Pareto Aksje Norge A and Eika Norge all had lower ratios relative to the benchmark.

In the first period, all of the funds, including the benchmark obtained negative ratios with Nordea Norge Verdi being the bottom-performing fund and the only fund with a lower ratio than the benchmark. The negative ratios might be explained by The Financial Crisis, where all of the funds, including the benchmark had negative excess returns. The top-performing fund in this period is Fondsfinans Norge with a ratio of negative 0,0109.

The ratios in the second period illustrates that Nordea Norge Verdi went from being the bottom-performing fund in the previous period to the top-performing fund in this period with a ratio of 0,2243, while Holberg Norge is the fund with the lowest ratio of 0,0095. The benchmark performed better than several of the funds in this period. All of the funds, including the benchmark managed to get positive Sharpe`s Ratios in this period, compared to the previous period.

In the last period, Alfred Berg Gambak is the top-performing fund with a ratio of 0,4052, up from 0,1598 in the previous period. Pareto Aksje Norge A has been among the worst performing funds throughout the previous periods and is the bottom-performing fund in the last period.

To summarize, the findings from the Sharpe´s Ratio are quite similar to the findings obtained from the Jensen´s Alpha with the top- and bottom-performing funds being the same for both of the measurements.

5.3.3 The Sortino´s Ratio

Sortino´s Ratio is derived from the Sharpe`s Ratio but focuses on the downside risk instead of the overall risk. Table 5, shows the results and the ranking for each fund, including the benchmark, in the different periods.

Table 5: Sortino´s Ratio

Funds	Whole period		Period 1		Period 2		Period 3	
	SO	Rank	SO	Rank	SO	Rank	SO	Rank
OSEFX	0,0266	-	-0,1224	-	0,2093	-	0,2207	-
Alfred Berg Gambak	0,0704	4	-0,0694	4	0,1936	5	**0,4735**	**1**
Danske Invest Norske Aksj. Inst. II	0,0809	2	-0,0593	2	0,2049	4	0,3169	5
Delphi Norge	0,0718	3	-0,0606	3	0,2112	2	0,3546	3
Eika Norge	0,0206	9	-0,0736	5	0,0794	9	0,2148	9
Fondsfinans Norge	**0,0869**	**1**	**-0,0126**	**1**	0,1840	6	0,2856	8
Holberg Norge	**0,0180**	**10**	-0,0900	8	**0,0139**	**10**	0,3232	4
KLP AksjeNorge	0,0484	7	-0,0849	6	0,1673	7	0,2985	6
Nordea Norge Verdi	0,0680	5	**-0,1277**	**10**	**0,3154**	**1**	0,2979	7
Pareto Aksje Norge A	0,0208	8	-0,0998	9	0,1406	8	**0,1997**	**10**
Pereto Investment Fund A	0,0644	6	-0,0871	7	0,2079	3	0,4658	2

Source: Data was retrieved using Datastream (2018) *& Oslo Børs* (2018)

The Sortino´s Ratios for the whole period shows that Fondsfinans Norge has the highest ratio of 0,0869, with Danske Invest Norske Aksjer Institusjon II trailing just below with a ratio of 0,0809 indicating that the funds are performing well and is not facing large losses. Holberg Norge, Eika Norge and Pareto Aksje Norge A all underperformed relative to the benchmark.

In the first period, all of the funds, including the benchmark obtained negative ratios where Fondsfinans Norge is the top performing fund with a Sortino´s Ratio of negative 0,0126. The negative ratios might be explained by The Financial Crisis, where all of the funds, including the benchmark had negative excess returns. Nordea Norge Verdi is the only fund that underperformed relative to the benchmark with a ratio of negative 0,1277.

In the second period, Fondsfinans Norge, which was the top-performing fund in the previous period, is now in a neutral position with a ratio of 0,1840. Nordea Norge Verdi went from being the bottom-performing fund in the previous period to the top-performing fund with a ratio of 0,3154. The benchmark performed better than the majority of the funds with Holberg Norge being the bottom-performing fund with a ratio of negative 0,0139.

In the last period, Alfred Berg Gambak obtained the highest ratio of 0,4735, while Pareto Aksje Norge A obtained the lowest ratio of 0,1997. All of the funds performed better than the benchmark in this period, with the exception of Pareto Aksje Norge A and Eika Norge.

The findings from the Sortino´s Ratio are relatively similar to the previous measurements with the same top- and bottom performing funds.

5.3.4 The Treynor´s Ratio

Table 6 shows Treynor`s Ratio and the ranking for the different funds in different periods. The ratio measures the excess return per unit of systematic risk (beta).

Table 6: Treynor´s Ratio

Funds	Whole period		Period 1		Period 2		Period 3	
	TR	Rank	TR	Rank	TR	Rank	TR	Rank
OSEFX	0,0019	-	-0,0113	-	0,0074	-	0,0060	-
Alfred Berg Gambak	0,0056	2	-0,0071	4	0,0086	2	**0,0167**	**1**
Danske Invest Norske Aksj. Inst. II	0,0054	3	-0,0052	2	0,0083	4	0,0096	6
Delphi Norge	0,0049	5	-0,0058	3	0,0081	5	0,0098	5
Eika Norge	0,0014	9	-0,0071	5	0,0031	9	0,0061	9
Fondsfinans Norge	**0,0057**	**1**	**-0,0012**	**1**	0,0066	6	0,0081	7
Holberg Norge	**0,0011**	**10**	-0,0081	7	**0,0005**	**10**	0,0100	4
KLP AksjeNorge	0,0032	7	-0,0078	6	0,0062	7	0,0075	8
Nordea Norge Verdi	0,0050	4	**-0,0129**	**10**	**0,0121**	**1**	0,0102	3
Pareto Aksje Norge A	0,0014	8	-0,0100	9	0,0054	8	**0,0049**	**10**
Pereto Investment Fund A	0,0046	6	-0,0081	8	0,0084	3	0,0145	2

Source: Data was retrieved using Datastream (2018) *& Oslo Børs* (2018)

The Treynor´s Ratios for the whole period shows that Fondsfinans Norge has the highest ratio of 0,0057, with Alfred Berg Gambak and Danske Invest Norske Aksjer Institusjon II trailing just below with ratios of respectively 0,0056 and 0,0054, indicating that the funds obtained

excess returns per unit of systematic risk. Holberg Norge, Eika Norge and Pareto Aksje Norge A all underperformed relative to the benchmark with the ratios of respectively 0,0011, 0,0014 and 0,0014.

In the first period, we can observe that all of the funds obtained negative ratios where Fondsfinans Norge is the fund with the highest ratio of negative 0,0012, while Nordea Norge Verdi is the fund with the lowest ratio of negative 0,0129. As with the previous ratios, the Treynor´s Ratio also obtained negative results in period 1, which might be explained by The Financial Crisis where all the funds had negative excess returns.

In the second period, Nordea Norge Verdi went from being the bottom-performing fund to the top-performing fund with a ratio of 0,0121, while Holberg Norge went from being in a neutral position in the previous period to the bottom-performing fund with a ratio of 0,0005. Half of the funds underperformed relative to the benchmark.

In the third period, Alfred Berg Gambak went from being one of the best performing funds in the previous periods to becoming the top-performing fund with a ratio of 0,0167, while Pareto Aksje Norge A is the bottom-performing fund with a ratio of 0,0049.

The findings from the Treynor´s Ratio give the same ranking for the top- and bottom-performing funds as the previous measurements.

5.3.5 The Information Ratio

Table 7 shows both results and ranking for each fund in the different periods. The Information Ratio measures the fund managers' ability to generate excess returns relative to the benchmark.

Table 7: Information Ratio

Funds	Whole period		Period 1		Period 2		Period 3	
	IR	Rank	IR	Rank	IR	Rank	IR	Rank
Alfred Berg Gambak	0,1634	3	0,2077	6	0,0170	5	0,2754	2
Danske Invest Norske Aksj. Inst. II	**0,2252**	**1**	0,3345	2	0,0691	2	**0,3219**	**1**
Delphi Norge	0,1292	5	0,2859	3	0,0230	4	0,1010	7
Eika Norge	-0,0342	9	0,2181	4	-0,2615	9	-0,0536	9
Fondsfinans Norge	0,1730	2	**0,4943**	**1**	-0,0451	6	0,1478	5
Holberg Norge	**-0,0402**	**10**	0,1503	8	**-0,3954**	**10**	0,0687	8
KLP AksjeNorge	0,0771	7	0,1760	7	-0,1294	7	0,2102	3
Nordea Norge Verdi	0,0850	6	**0,0504**	**10**	**0,0895**	**1**	0,1403	6
Pareto Aksje Norge A	-0,0297	8	0,1007	9	-0,1449	8	**-0,0831**	**10**
Pereto Investment Fund A	0,1526	4	0,2125	5	0,0634	3	0,1991	4

Source: Data was retrieved using Datastream (2018)

According to the Information Ratios for the whole period, Danske Invest Norske Aksjer Institusjon II is the fund with the highest Information Ratio of 0,2252, which suggest that the fund managed to generate excess return relative to the benchmark. In contrary to the top-performing fund, Holberg Norge has the lowest Information Ratio of negative 0,0402, meaning that the fund did not manage to generate excess returns relative to the benchmark.

In the first period, all of the funds managed to get positive ratios with Fondsfinans Norge having the highest Information Ratio of 0,4943, which can be explained by the fact that the benchmark had among the sharpest decrease in returns under The Financial Crisis. Nordea Norge Verdi has the lowest ratio compared to the other funds.

In the second period, Fondsfinans Norge went from being the fund with the highest Information Ratio in period one to a more neutral position, with a ratio of negative 0,0451, while Nordea Norge Verdi went from being the bottom-performing fund in the previous period to become the top-performing fund with the highest Information Ratio of 0,0895. Holberg Norge is the bottom-performing fund with a ratio of negative 0,3954.

In the last period, Danske Invest Norske Aksjer Institusjon II went from being one of the best performing funds in the previous periods to become the top-performing fund with a ratio 0,3219, while Pareto Aksje Norge A went from being the fund with one of the lowest Information Ratios in the previous periods to become the fund with the lowest Information Ratio in the last period with a ratio of negative 0,0831.

To summarize the Information Ratio, this measurement obtained different results for the top-performing funds in the whole period and period 3. Danske Invest Norske Aksjer Institusjon II is now the top-performing fund, both in the whole period and in period 3.

5.3.6 The Modigliani Risk-Adjusted Performance Measure (M^2)

Table 8 shows the M^2 measure and the ranking of the funds in the different periods. The Modigliani Risk-Adjusted Performance Measure (M^2) is derived from the Sharpe`s Ratio and focuses on total volatility as a measure of risk.

Table 8: The Modigliani Risk-Adjusted Measure (M^2)

Funds	Whole period		Period 1		Period 2		Period 3	
	M^2	Rank	M^2	Rank	M^2	Rank	M^2	Rank
Alfred Berg Gambak	0,3365 %	2	0,4312 %	4	0,0562 %	4	**0,5980 %**	**1**
Danske Invest Norske Aksj. Inst. II	0,3183 %	3	0,5751 %	2	0,0720 %	2	0,3178 %	3
Delphi Norge	0,2627 %	5	0,5162 %	3	0,0259 %	5	0,2047 %	5
Eika Norge	-0,0632 %	8	0,4186 %	5	-0,4331 %	9	-0,0524 %	9
Fondsfinans Norge	**0,3437 %**	**1**	**0,9734 %**	**1**	-0,1046 %	6	0,1230 %	8
Holberg Norge	**-0,1187 %**	**10**	0,2383 %	8	**-0,6979 %**	**10**	0,1691 %	6
KLP AksjeNorge	0,1159 %	7	0,3479 %	6	-0,1282 %	7	0,1330 %	7
Nordea Norge Verdi	0,2368 %	6	**-0,1740 %**	**10**	**0,3484 %**	**1**	0,2244 %	4
Pareto Aksje Norge A	-0,0961 %	9	0,0974 %	9	-0,2754 %	8	**-0,2089 %**	**10**
Pereto Investment Fund A	0,2629 %	4	0,3092 %	7	0,0687 %	3	0,4794 %	2

Source: Data was retrieved using Datastream (2018)

The results for the whole period reflects that Fondsfinans Norge has the highest M^2 of 0,3437 % with Alfred Berg Gambak trailing just behind with a M^2 of 0,3365%, indicating that the funds are able to generate higher returns with the same level of risk as the benchmark. Holberg Norge obtained the lowest M^2 of negative 0,1187 %.

In the first period, Fondsfinans Norge has the highest M^2 of 0,9734 %, while Nordea Norge Verdi has the lowest M^2 of negative 0,1740 %. A negative M^2 suggests that the fund is not able to generate excess returns when having the same level of risk as the benchmark.

In period two, Nordea Norge Verdi went from having the lowest M^2 in the first period to having the highest M^2 of 0,3484 %, while Holberg Norge underperformed relative to the benchmark with a M^2 of negative 0,6979 %, making it the bottom-performing fund in this period.

In the last period, Alfred Berg Gambak is the fund with the highest M^2 of 0,5980 %, while the fund with the lowest M^2 is Pareto Aksje Norge A with a M^2 of negative 0,2089 %.

5.3.7 Summary of the measurements

To summarize, the ranking from the different measurements turned out to be almost identical, with the exception of the Information Ratio, where the winner in the whole period and in the third period were different. This being said, we expected the performance measurements to have some similarities since most of the measurements are based on the CAPM.

5.4 Overall Ranking

Table 9 shows the ranking for each fund in the different periods.

Table 9: Overall Ranking of the Funds

Fund ranking				
Funds	**Whole period**	**Period 1**	**Period 2**	**Period 3**
Alfred Berg Gambak	2	4	4	**1**
Danske Invest Norske Aksj. Inst. II	3	2	3	3
Delphi Norge	4	3	5	5
Eika Norge	8	4	9	9
Fondsfinans Norge	**1**	**1**	6	8
Holberg Norge	**10**	6	**10**	6
KLP AksjeNorge	7	5	7	7
Nordea Norge Verdi	6	**8**	**1**	4
Pareto Aksje Norge A	9	7	8	**10**
Pareto Investment Fund A	5	6	2	2

The overall ranking is conducted separately for each period by looking at how an individual fund performed in each performance measurement in the different periods. For instance, if a fund is ranked as the top-performing fund according to all the measurements in one period, it will have an average ranking of 1 in that period. Given all the similarities between the different measurements, it was expected that Fondsfinans Norge was the top-performing fund, while Holberg Norge was the bottom-performing fund in the whole period.

In the first period, a time with unstable financial markets, Fondsfinans Norge still managed to perform better than all the other funds according to all the different performance measurements. Alfred Berg Gambak, Eika Norge, Holberg Norge and Pareto Investment Fund A were all ranked in neutral positions due to similar performance in this period. Nordea Norge Verdi is the fund with the lowest overall performance in this period.

In the second period, Fondsfinans Norge fell from first position to sixth position, while Nordea Norge Verdi went from being the bottom-performing fund in the previous period to becoming the top-performing fund in this period. Holberg Norge performed lowest of all the other funds in the second period.

In the last period, Holberg Norge went from being the worst performing fund to a neutral position, while Alfred Berg Gambak went up from neutral position in the previous period to first position in this period. Pareto Aksje Norge A was among the worst performing funds throughout the different periods and became the bottom-performing fund in this period.

The results from the different performance measurements are in line with the findings in figures in section 5.1 and the descriptive statistics in section 5.2. From the results we can observe that Fondsfinans Norge is the overall top-performing fund, especially in the first period, where there was a financial crisis. In the second and the third period, Fondsfinans Norge was not close to being among the best performing funds. Alfred Berg Gambak and Danske Invest Norske Aksjer Institusjon II are the most stable funds in terms of performance throughout the chosen time period. Holberg Norge, Pareto Aksje Norge A and Eika Norge are the funds with the lowest performance throughout the chosen time period.

5.5 Regression Alpha´s

Table 10 presents the results that are derived from the regression model for the whole period, while the results for the sub-periods are provided in table 11. The alpha´s reflects, as with Jensen´s Alpha, whether the fund managers possess stock picking abilities by generating risk-adjusted excess returns relative to the benchmark. Furthermore, the p-values help determining whether the alpha´s are statistically significant, while the adjusted R-squares tells if the model fits the data.

Table 10: Regression Alpha´s - Whole Period

Funds	Whole period		
	α	P-Value	Adj. R^2
Alfred Berg Gambak	**0,0035**	**0,048**	90,822 %
Danske Invest Norske Aksj. Inst. II	**0,0033**	**0,001**	96,532 %
Delphi Norge	**0,0033**	**0,036**	91,932 %
Eika Norge	-0,0003	0,857	92,793 %
Fondsfinans Norge	**0,0036**	**0,032**	91,499 %
Holberg Norge	-0,0011	0,547	86,959 %
KLP AksjeNorge	0,0012	0,332	95,166 %
Nordea Norge Verdi	0,0031	0,054	89,255 %
Pareto Aksje Norge A	-0,0005	0,821	83,844 %
Pereto Investment Fund A	0,0022	0,145	93,327 %

Source: Data was retrieved using Datastream (2018)

The regression results for the whole period reflects that some of the fund managers possess statistically significant stock picking ability, highlighted in green. Fondsfinans Norge obtained the highest alpha, while Alfred Berg Gambak, Danske Invest Norske Aksjer Institusjon II and Delphi Norge are among the other funds with positive and significant alpha´s.

The Regression Alpha´s for the sub-periods in table 11, shows that only Fondsfinans Norge has a positive and a highly significant alpha in period 1, with others relatively close to being statistically significant at 5 % level. Eika Norge and Holberg Norge are the only funds in the

regression results that are statistically significant with negative alpha´s in period 2, indicating that these funds were not able to generate risk-adjusted excess returns relative to the benchmark. In the last period, Alfred Berg Gambak and Danske Invest Norske Aksjer Institusjon II obtained positive and statistically significant alpha´s.

Table 11: Regression Alpha´s - Sub-periods

Funds	Period 1			Period 2			Period 3		
	α	P-Value	Adj. R^2	α	P-Value	Adj. R^2	α	P-Value	Adj. R^2
Alfred Berg Gambak	0,0038	0,331	94,96%	0,0011	0,625	89,05%	**0,0099**	**0,014**	52,74%
Danske Invest Norske Aksj. Inst. II	0,0056	0,051	96,89%	0,0012	0,344	96,78%	**0,0039**	**0,010**	92,58%
Delphi Norge	0,0051	0,093	96,42%	-0,0000	1,000	87,34%	0,0046	0,100	74,13%
Eika Norge	0,0037	0,281	95,70%	**-0,0053**	**0,031**	90,44%	0,0007	0,744	83,52%
Fondsfinans Norge	**0,0085**	**0,005**	96,76%	-0,0018	0,499	88,02%	0,0029	0,351	79,07%
Holberg Norge	0,0016	0,686	92,09%	**-0,0083**	**0,002**	88,46%	0,0037	0,270	60,91%
KLP AksjeNorge	0,0026	0,503	94,80%	-0,0020	0,169	98,22%	0,0016	0,212	95,40%
Nordea Norge Verdi	-0,0011	0,781	92,84%	0,0035	0,101	87,39%	0,0052	0,129	67,94%
Pareto Aksje Norge A	0,0004	0,943	88,25%	-0,0007	0,803	82,09%	-0,0036	0,377	57,34%
Pereto Investment Fund A	0,0021	0,409	97,84%	0,0001	0,954	91,39%	0,0069	0,056	54,35%

Source: Data was retrieved using Datastream (2018)

The adjusted R-squared is a measure that shows the percentage of the variable variation that is explained by the regression model, where a high adjusted R-squared represents a robust model. All of the adjusted R^2 in the different periods are relatively high, indicating that the model fits the data, with the exception of period 3 where the adjusted R-squares are somewhat lower, which suggests that the regression model is not that robust for this period.

To summarize, Fondsfinans Norge, Alfred Berg Gambak, Danske Invest Norske Aksjer Institusjon II and Delphi Norge all obtained positive and significant alpha´s in the whole period, indicating that the fund managers possess stock picking ability. In period 1, Fondsfinans Norge is the only fund that were able to generate statistically significant risk-adjusted excess return relative to the benchmark, in a period where The Financial Crisis took place. In the second period, when The Debt Crises took place, Holberg Norge and Eika Norge both obtained statistically significant negative alpha´s, meaning that they were not able to generate excess returns relative to the benchmark. In the last period, Alfred Berg Gambak and Danske Invest Norske Aksjer Institusjon II were the only two funds that generated statistically significant risk-adjusted excess returns relative to the benchmark.

The results from table 10 and table 11 are consistent with the overall ranking of the funds in table 9. As expected, the findings from the Jensen´s Alpha are quite similar to the results from the Regression Alpha´s, as both of the alpha´s measure whether the fund managers possess stock picking ability by generating risk-adjusted excess returns relative to the benchmark.

5.6 Market Timing

Table 12, shows the timing variables, p-values and the adjusted R-squares for each fund for the whole period. Timing the market means that the fund managers possess the ability to move out of risky securities in a bear market and in to treasury-bills (risk-free investments) and vice versa.

Table 12: Market Timing - Whole Period

Funds	Whole period		
	Timing Variable	P-Value	Adj. R^2
Alfred Berg Gambak	-0,2152	0,0048	91,14 %
Danske Invest Norske Aksj. Inst. II	0,0844	0,0541	96,66 %
Delphi Norge	-0,0075	0,9127	91,86 %
Eika Norge	-0,0012	0,9864	92,66 %
Fondsfinans Norge	**0,1471**	**0,0398**	91,80 %
Holberg Norge	0,1099	0,1641	87,04 %
KLP AksjeNorge	0,1049	0,0593	95,16 %
Nordea Norge Verdi	-0,0658	0,3577	88,94 %
Pareto Aksje Norge A	-0,0138	0,8770	83,51 %
Pereto Investment Fund A	-0,0320	0,6367	93,15 %

Source: Data was retrieved using Datastream (2018)

To see whether the fund managers possess the ability to time the market, the timing variable has to be positive and significant. As the results in table 12 shows, some of the timing variables are positive. However, only Fondsfinans Norge has a positive and significant timing variable in the whole period. Danske Invest Norske Aksjer Institusjon II and KLP AksjeNorge are also close to having both positive and significant timing variables. There is no significant evidence of market timing ability in the sub-periods, as shown in Appendix C.

The adjusted R-squares suggests that the regression model for the whole period is robust. In the first period, the adjusted R-squares are higher than for the whole period, which also suggests that the variable variation is explained by the regression model, while the adjusted R-squares in the second- and third period have declined, which suggests that the regression model is not that robust. These results are shown in Appendix C.

Looking at table 12 compared to the table in Appendix C, we can see that the results for the whole period compared to the sub-periods shows evidence on market timing ability for only one fund, with others relative close to the significance level.

6 Conclusion and Further research

6.1 Conclusion

Most of the previous studies have only included fund performance analyses for the whole period. It should however be mentioned that, if this was the case for this study, the conclusion might have been straightforward showing the fund that performed best throughout the whole period.

Here follows a summary of the most interesting findings from the study performed in this thesis:

- For the whole period, Fondsfinans Norge was the best performing fund according to the cumulative returns, the performance measurements and the regression analyses. Holberg Norge was the worst performing fund in this period. The regression analyses suggested that the fund managers in Fondsfinans Norge possessed significant stock picking ability and significant market timing ability in the whole period. Moreover, the regression alpha´s suggested that Alfred Berg Gambak, Danske Invest Norske Aksjer Institusjon II and Delphi Norge had significant stock picking abilities. However, none of these funds possessed significant market timing ability.
- For the sub-periods, the top- and bottom-performing funds were different in each period. According to all the performance measurements, Fondsfinans Norge was the best performing fund in period 1. Moreover, the regression analyses showed that the fund managers possessed highly significant stock picking ability. In period 2, the performance measurements suggested that Nordea Norge Verdi was the best performing fund compared to the previous period where it was the worst performing fund. Fondsfinans Norge was ranked 6th in this period. The regression analyses did not show any evidence of stock picking- and market timing ability. However, the regression analyses further suggested that Holberg Norge and Eika Norge possessed negative and significant alpha's, indicating significant underperformance relative to the benchmark. In the last period, Alfred Berg Gambak obtained the highest rank in all the measurements with the exception of the Information Ratio. The regression analyses suggested that Alfred Berg Gambak and Danske Invest Norske Aksjer Institusjon II were the only funds to obtain significant stock picking ability in this period. However, none of the funds possessed significant market timing ability.

The research questions to be answered in this thesis were:

- Do the fund managers possess stock picking- and market timing ability and how did the funds perform during the different market events?
- Is the best performing fund in one period consistent with the best performing fund in the next period?

Regarding the first research question, the answer is that only one fund possessed both significant stock picking- and market timing ability in the whole period. However, there were few other funds that obtained significant stock picking ability, but none of these funds had significant market timing ability. There were also evidence of significant underperformance relative to the benchmark for two of the funds in period 2. Considering the different market events, all of the funds had a decrease in their performance, especially during The Financial Crisis. All of the funds in this study decreased in monthly returns between 26-36 % during the crisis, including the benchmark. The Euro Debt Crisis and The US Credit-Rating Downgrade both led to a decline in the performance of the funds, but only for a short span of time. The Oil Crisis did not have the impact on the funds' performance as we expected. This may be explained by the fact that the energy sector went from amounting 50 % of the total market value of the Oslo Stock Exchange in 2014 to 30 % in 2015. In other words, the funds and the benchmark are lesser exposed to fluctuations in the oil price than what we expected

Considering the second research question, the answer is that there is no evidence for the best performing fund in one period being consistent with the best performing fund in the next period. These findings are consistent with Malkiel (2003), who argued that there is a small correlation between the winners in one period and the winners in the next period.

6.2 Suggestions for further research

It is apparent that there still exist some interesting questions which can be further explored based on the findings from this paper. For example, in order to get a better estimate on the funds' performance, one can further look into each fund's assets under management (AUM). This way, changes in AUM can be examined to better explain why the same funds performed differently from a period to another. Another interesting research area on the funds overall performance could be to examine any changes in the fund's portfolio management team. Moreover, it can be tested whether investors get what they pay for when choosing actively managed funds over passively managed funds. To better assess the impact of the different market events, one could include macro-economic data such as; GDP, interest rates and regulatory changes.

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Appendix A – Description of the funds

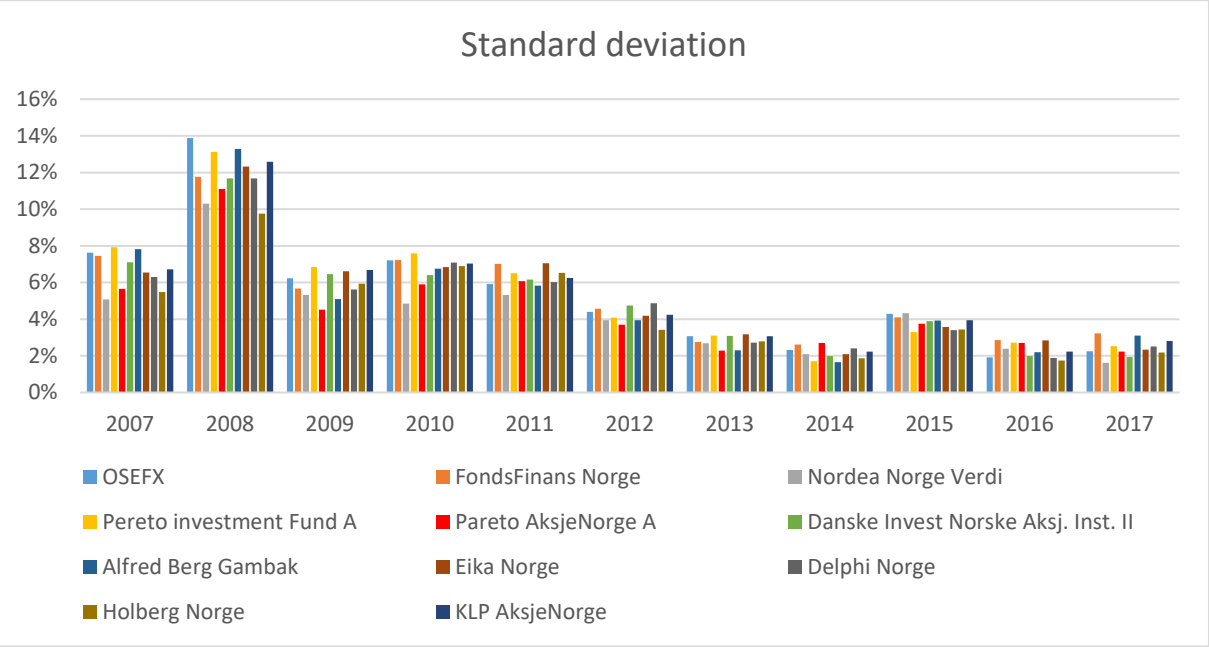
Table 13: Description of the funds

Funds	Description of the funds	Morningstar Rating
Alfred Berg Gambak	• *Actively managed fund* • *Founded in 1990* • *Portfolio consists of 30-50 stocks* • *Subjected to the UCITS regulations*	★★★★★
Danske Invest Norske Aksj. Inst. II	• *Actively managed fund* • *Founded in 2006* • *Portfolio consists of 25-35 stocks* • *Subjected to the UCITS regulations*	★★★★
Delphi Norge	• *Actively managed fund* • *Founded in 1994* • *Portfolio consists of 30-40 stocks* • *Subjected to the UCITS regulations*	★★★★
Eika Norge	• *Actively managed fund* • *Founded in 2003* • *Portfolio consists of 40-50 stocks* • *Subjected to the UCITS regulations*	★★
Fondsfinans Norge	• *Actively managed fund* • *Founded in 2002* • *Portfolio consists of 25-35 stocks* • *Subjected to the UCITS regulations*	★★★★
Holberg Norge	• *Actively managed fund* • *Founded in 2000* • *Portfolio consists of 25-35 stocks* • *Subjected to the UCITS regulations*	★★★
KLP AksjeNorge	• *Actively managed fund* • *Founded in 1999* • *Portfolio consists of 55-65 stocks* • *Subjected to the UCITS regulations*	★★★
Nordea Norge Verdi	• *Actively managed fund* • *Founded in 1996* • *Portfolio consists of 50-60 stocks* • *Subjected to the UCITS regulations*	★★★★
Pareto Aksje Norge A	• *Actively managed fund* • *Founded in 2001* • *Portfolio consists of 20-30 stocks* • *Subjected to the UCITS regulations*	★★
Pareto Investment Fund A	• *Actively managed fund* • *Founded in 1985* • *Portfolio consists of 25-35 stocks* • *Subjected to the UCITS regulations*	★★★★

Source: Fund information retrieved from Morningstar (2018)

Appendix B – Annual Standard Deviation – Whole Period

Figure 13: Annual Standard Deviation - Whole Period



Source: Data was retrieved using Datastream (2018) *& Oslo Børs* (2018)

Appendix C – Market Timing – Sub-periods

Table 14: Market Timing - Sub-periods

Funds	Period 1			Period 2			Period 3		
	Timing Variable	P-Value	Adj. R^2	Timing Variable	P-Value	Adj. R^2	Timing Variable	P-Value	Adj. R^2
Alfred Berg Gambak	-0,1972	0,1287	95,48 %	-0,2631	0,0471	89,15 %	-0,2976	0,3809	53,47 %
Danske Inv. Nor. Aksj. Inst. II	0,1527	0,0989	97,28 %	-0,1026	0,1494	96,98 %	-0,2909	0,0164	93,67 %
Delphi Norge	0,0065	0,9499	96,37 %	-0,2164	0,1417	88,14 %	-0,2005	0,4380	70,35 %
Eika Norge	-0,0221	0,8600	95,22 %	-0,2463	0,0648	90,80 %	0,0437	0,8341	81,68 %
Fondsfinans Norge	0,1362	0,1648	96,92 %	-0,0418	0,7803	88,06 %	-0,1178	0,6866	76,60 %
Holberg Norge	0,1398	0,2982	92,16 %	-0,0808	0,5722	87,71 %	-0,2777	0,3510	60,85 %
KLP AksjeNorge	0,1410	0,2884	94,91 %	-0,0386	0,6372	96,06 %	0,1167	0,3749	93,75 %
Nordea Norge Verdi	0,0642	0,6310	92,69 %	-0,0661	0,5747	87,43 %	-0,8333	0,0047	71,50 %
Pareto Aksje Norge A	-0,0605	0,7190	88,44 %	-0,1037	0,5089	81,99 %	-0,0209	0,9547	55,51 %
Pereto Investment Fund A	0,0285	0,7617	97,60 %	-0,1117	0,3732	91,57 %	-0,0853	0,7874	53,71 %

Source: Data was retrieved using Datastream (2018)