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TITLE:

**An event study into dividend payments and possible profitable trading strategies,
in the Norwegian stock market**

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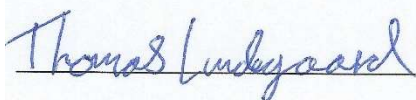
Preface

This thesis was written during the final semester of my Master of Science in Business Administration program at the UiS Business School in 2018.

As a result of the work with my thesis in the academic field of finance, I have obtained deeper knowledge of the financial markets and how to conduct empirical analysis based on large data samples. It has also been interesting to experience writing a relatively extensive academic analysis and report. One is rarely given the chance to perform such extensive writing process in other parts of the degree because of the weight put on analysis of numbers and mathematical models. Because of this, the writing of a thesis is both challenging and highly educational.

The completion of this thesis would not have been successful had it not been for my exceptionally skilful and patient supervisor Kristoffer Wigestrands Eriksen. I also want to thank my family and friends, which have contributed with firm encouragements that was of tremendous help in the process.

Stavanger, 15/06-2018

A handwritten signature in blue ink that reads "Thomas Lundegaard". The signature is written in a cursive style with a horizontal line underneath the name.

Thomas Lundegaard

Executive Summary

This Thesis contains a detailed event analysis where market efficiency in the event of dividend pay-outs in the Norwegian stock market is analysed. The event analysis uses two introduced main hypothesis' in the form of trading strategies to establish whether either can obtain abnormal returns. This is, excess return beyond the normal return that is to be expected based on the stocks previous correlation to the market movements.

Hypothesis 1, the dividend inclusive strategy targets the period between the dividend announcement and the ex-dividend date. This follows from the assumption that abnormal stock price movements happen after the announcement of dividend, and that investor preferences might influence the efficiency of the stock price in this period. Hypothesis 2, the ex-dividend strategy targets the period after the ex-dividend date. The hypothesis is that stocks is inefficient after the ex-dividend date due to investor preferences and that the stock price returns to efficiency after an unknown time period. The ending date for the ex-dividend strategy is calculated using the risk adjusted return of the stocks in the sample. The optimal ending time is calculated to be nine days after the ex-dividend date as it has the highest cumulative abnormal return.

The analysis shows that both individual trading strategies as well as both collectively has positive cumulative average abnormal returns. However, the CAAR's are small and paired with the respective standard deviations, the significance tests reveal that they are not significant at a meaningful level of confidence.

Although the abnormal returns for the trading strategies were not significant, the event study give additional support to existing theories such as the market efficiency theory (1970) and dividend irrelevancy (Miller & Modigliani, 1961). The data material also revealed elevated volatility in the days following the ex-dividend date. This justifies a strong encouragement for future research to establish the cause and implications of such. Finally, the recent introduction of new taxation arrangement concerning private investors in Norway might change investors preferences concerning dividend going forward. This is also an important subject for future research in the field when sufficient data becomes available.

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1. Introduction

Ever since the birth of market places people have invested time, money and effort in the hope of developing a method that can be used to “beat the market”. To “beat the market” consistently over time you will have to be able to get higher returns than the risk you have taken on should allow. According to the efficient market hypothesis (Fama, 1970) this is, however, not possible in an efficient market. Many people do, however, believe that the market is not always efficient and that profitable trading with abnormal returns can be carried out – at least over shorter periods of time. Suggestions of profitable trading strategies have been plentiful over the years. One of the problem with these strategies is that they often simply do not provide the promised returns. Another problem is that if such a strategy should prove to be efficient, the market would eventually become aware of the possibility and exploit it such that the market became efficient once again. Despite of the usually short utilization period for the strategy, large gains can still be earned from a developed working strategy. These incentives ensure the continuous search for imperfections in the market efficiency and should lead to increased efficiency over time.

Even though the markets have grown more international and digital over the years, the human factors and interactions still have the potential to make the market “imperfect”. Irrational behaviour by investors can often arise because of fear, greed, confirmation bias or other behavioural finance factors which a machine cannot understand. The co-existence of humans alongside trading machines in the market place have often in the past made the stock prices make irrational moves. It is often claimed that trading algorithms makes the market much more inclined to overreact in both market rallies and -crashes. This software most often makes trading decisions based on actual market movements and human trades. “Fat fingers” or such basic mistakes made by humans can prompt a flash crash of the market. The existence, and whether they increase or decrease market efficiency as well as appropriate regulations for these algorithms, is currently an ongoing discussion. Although this research problem is not part of this thesis, I think it is important to understand that the liquidity caused by these algorithms can impact the market efficiency.

In this thesis I am going to look at the efficiency of the Norwegian stock market in the event of dividend payments. In this process I am going to look at two trading strategies that might yield abnormal returns given that there are inefficiencies in the market. Such inefficiencies can occur due to several known human behaviour phenomena. Dividend payments is an interesting incident in many ways. Normally, the stock price is comprised of mostly

assumptions about the future earnings of the company as well as the assumed market value of their assets. Once a dividend is announced to the market, the market knows with almost full certainty that investors will receive dividend payments on their investment at a given date. When the investors are no longer eligible to receive dividend, we say that the stock trades ex-dividend. In this case, the stock price should fall to reflect the amount paid out to investors. In other words, we can say that after a dividend is announced there is also a known payment included in the investment. According to the dividend irrelevancy theory this should not have any impact on the pricing of the stock or have any other influence on the investor behaviour (Miller & Modigliani, 1961). This is one of the specifics about the event that makes it interesting to investigate the effects of dividend payments on the stock prices.

1.1 Main Research Problem

I have chosen to approach this thesis in the form of an event study where I seek to answer the question:

«Does the event of dividend payouts in the norwegian stock market result in predictable and abnormal returns?»

To give an adequate answer to this I have chosen to construct event studies based on two trading strategies which seek to exploit possible significant abnormal returns around the time of stock dividend pay-outs in the Norwegian stock market. The best way to introduce these hypothesis' and trading strategies is by presenting a graph consisting of the theoretical "correct" path for the stock price and the stock price development that is implied by the hypothesis'. The orange area on the chart represents the stock price movements between the announcement of dividend and the last day of trading inclusive right to receive dividend (dividend inclusive). The blue area represents the time the stock trades exclusive the right to receive dividend. We say that the stock trades ex-dividend. The hypothesis' and connected strategies are graphically illustrated below in two charts:

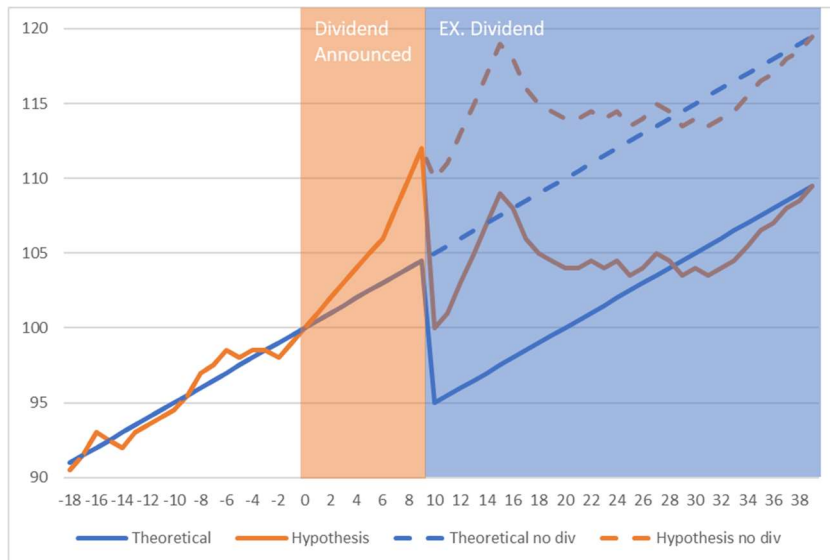


Figure 1 Hypothesis Dividend Event: The blue line representing theoretical “Correct” stock price path, and the orange line representing a graphic picturing of the suggested stock price movement. The x-axis show time in days since dividend announcement.

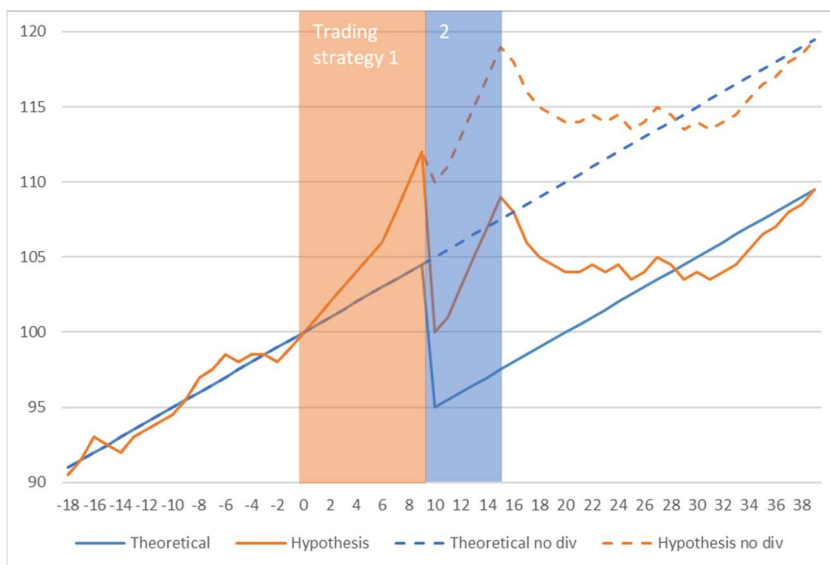


Figure 2 Trading Strategies: The blue line representing theoretical “Correct” stock price path, and the orange line representing a graphic picturing of the suggested stock price movement. The x-axis show time in days since dividend announcement.

The graph illustrates my hypothesis on how prices may act versus the theoretical path as it should be according to EMH (Fama, 1970). The numbers are for illustration purpose only, and not to be interpreted as any research result. The hypothesis graph is drawn “by hand” and is only a suggestion as to how the stock price might move in the event of dividend payments. The strategies are defined so they best can confirm or reject my hypothesis for the stock price

movements. The hypothesis is based on mostly personal observations and experiences. My personal observations and experiences is not based on empirical calculations, but merely on qualitative suspicion on how the stock market tend to act in dividend pay-out events. There are several theories that might provide answers as to how such stock movements and inefficiencies can occur. They could be driven by investor's preferences related to dividend pay-outs or investor behaviour that differ between professional- and amateur investors. The latter can be the case because amateur investors might be more receptive to news articles and analyst reports that might seek to influence the market in a beneficial way to the publisher. The graphs have a positive gradient to reflect that the stock should be priced such that it allows the investor to gain a fair risk premium.

Hypothesis/Trading Strategy 1 – Dividend Inclusive Strategy:

My hypothesis is that stock prices rises more sharply than they should in theory in the period between the dividend announcement and the day before the stock is traded ex-dividend. It is commonly accepted that the dividend announcement day is likely to have high volatility in prices due to possible change in dividend and/or surprise reaction because of quarterly report. Because of this, I have chosen to use the closing price on the day of announcement to give the market one entire day of trading to give time for the market to incorporate the possible new information into the stock price. As the ending point of the strategy I have chosen the close of the day before the stock trades ex-dividend. This is because the stock price falls more than the payed out dividend on the ex-dividend day according to my hypothesis. A confirmation of this hypothesis might suggest that investors have some kind of preference for owning a stock after a dividend have been announced. This preference can be driven by different behavioural finance phenomena such as the preference for certain outcomes from prospect theory that is presented in the theory chapter.

Hypothesis/Trading Strategy 2 - Ex-Dividend Strategy:

The ex-dividend strategy starts on the closing of the ex-dividend trading day. This because it seeks to exploit the hypothesis that the stock price falls more than it should in theory on the ex-dividend day. This might happen because of overreaction due to investors preferring stocks that have announced dividend. The ending point for this strategy is, however, not intuitive. The ending point will have to be calculated based on what turns out to be the optimal duration considering the cumulative abnormal returns for all events. Consequently, it will

have to be determined based on calculations in the analysis part of the thesis. The hypothesis anticipates positive return following the ex-dividend return based on previous research suggesting anchoring (Chang, Lin, Luo, & Ren, 2006) as the explanation for the abnormal return observed in the post ex-dividend days in the referred article.

From these foundations we can derive the H_0 and H_a hypothesis for both strategies:

CAAR=Cumulative Average Abnormal Return

$H_0^1: CAAR_1=0$

$H_a^1: CAAR_1 \neq 0$

$H_0^2: CAAR_2=0$

$H_a^2: CAAR_2 \neq 0$

$H_0: CAAR_1 = CAAR_2 = 0$

$H_a: [CAAR_1 \vee CAAR_2] \neq 0$

1.2 The Thesis' Structure

This thesis is mostly structured in a traditional fashion. The theory chapter describes the different relevant terms and theories that is mentioned or in other ways utilized in other parts of the thesis. The subsequent chapter goes more in the debt of the methodology used in connection with the analysis. The data chapter following the methodology includes information on the data collection and -sample descriptive statistics. The analysis chapter contains the data analysis for both strategies and some brief intuitive remarks on the results found during the analysis. In addition to this, the possible relationship between abnormal returns and the relative size of dividends is analysed. This is done due to the fact that previous research have discovered a positive relationship, and such a relationship could be a relevant factor to discuss in the context of the event study findings. In the final part of the chapter, the possible sources of error are covered. This is by many considered one of the most important parts of the analysis. The final interpretations and conclusion on the results of the analysis will be drawn in the conclusion chapter. Here I will also touch on some final personal remarks and comments on both the results and the analysis.

2. Theory

2.1 Efficient Market Hypothesis – Eugene Fama(1970)

2.1.1 Definition

The efficient market hypothesis, EMH for short, was first stated by Eugene Fama in 1970. He defined an efficient financial market as one in which security prices always fully reflects the available information. He was convinced that the real-world stock and bond market was efficient after his definition. This will imply that it is simply impossible for an investor to expect abnormal returns on his investments in an efficient market.

Market Efficiency is often divided into three magnitudes. Strong or full market efficiency is a market where all prices are efficient due to all information, both public and private, is incorporated into the market prices. Insider trading cannot exist in this market because all private information is already incorporated. Private information is in other words worthless because it is effectively public information. This degree of efficiency is by some considered as a theoretical world that cannot exist in real world markets, mainly due to the existence of inside trading. Even Fama have later surrendered somewhat to this opinion. The most realistic degree of efficiency is perhaps semi-strong and weak form. In these degrees there can be profitable insider trading, and in fairness, most of the empirical proof and evaluations considering EMH is biased towards the market having semi-strong- or even weak efficiency (Ackert & Deaves, 2010). In the semi-strong form of efficiency, all the public information as well as historical information is incorporated into the security pricing. This implies that you cannot make abnormal returns from public information or historical information. In the weakest form of market efficiency there is only incorporated historical information. In this kind of market, everyone that has any form of relevant information about the stock that is not considered historical information can make abnormal returns.

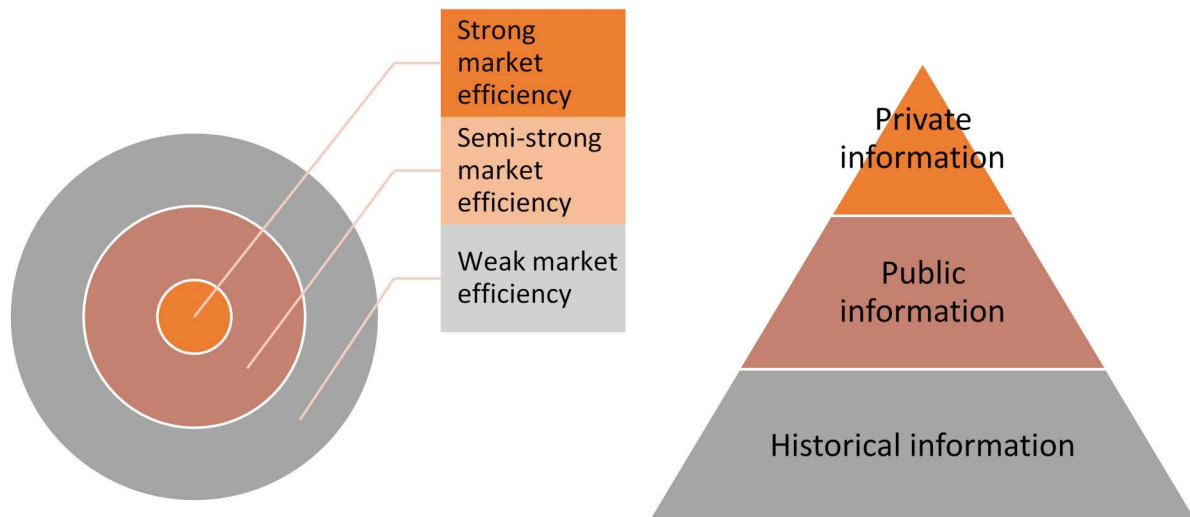


Figure 3 Levels of Market Efficiency

For the market efficiency theory to be true, Eugene Fama points to several factors which has to be present to achieve even weak market efficiency. The first of which is the presence of short-selling opportunities. By short-selling is meant the procedure of being able to sell a borrowed stock. Another crucial factor is that there exists a portfolio that recreates the performance of the individual security. This is important to arbitrageurs as it makes it easier to spot arbitrage opportunities and exploit them. These factors are amongst the ones that is mentioned in critique of the efficient market hypothesis.

The graph below shows one of the main principle of market mechanisms of the EMH. According to EMH, new information should be incorporated into the stock price instantly and precisely. In this case, the new information makes the stock jump +20 instantly and have no extra volatility in the coming days. This chart is only hypothetical and resembles no actual stock price movements, but merely a visualisation of the theory presented in the EMH.

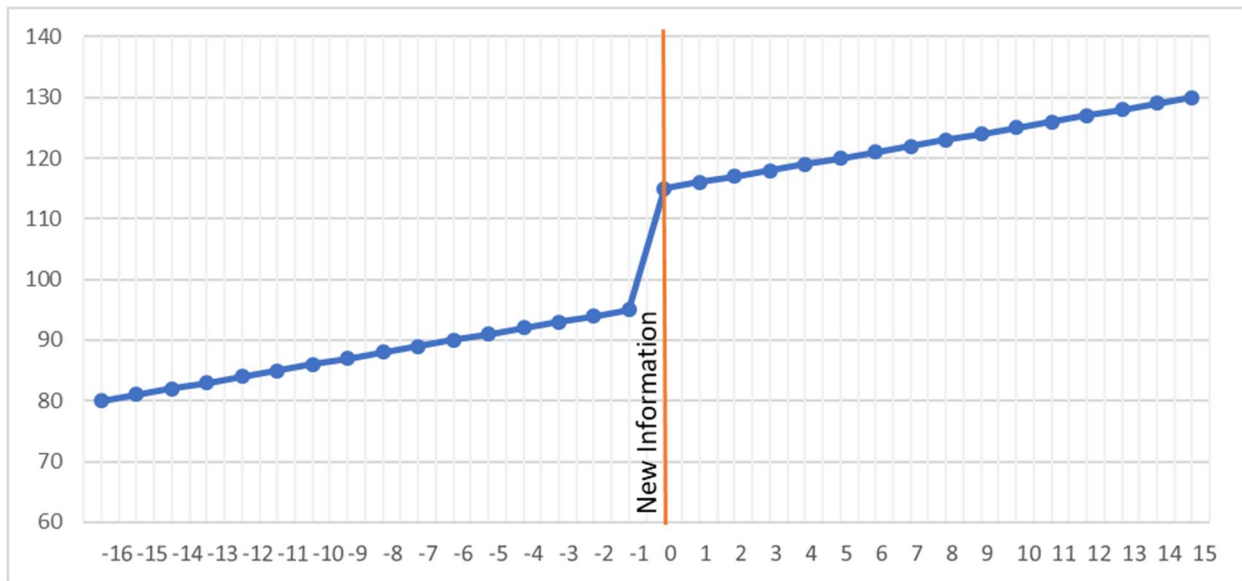


Figure 4 Illustration of "New Information"-Event

2.1.2 Criticism

Maybe the most important academic paper that assumes serious challenge to the EMH theory is the article "Does the market overreact?" (Bondt & Thaler, 1985). They claim to have proved that the market undervalues stocks with previously weak performance and overvalue stocks with earlier robust performance. This theory clearly violates the EMH theory stating that the investor should not be able to foresee the future direction based on previous stock price fluctuations. Also, higher return than risk imply cannot exist. This theory also competes with the famous momentum theory. Other criticism of the EMH is that, in many cases, the substitute portfolio necessary for arbitrageurs does not exist. This mean that irrational investors can misprice instruments without the arbitrageurs being able to correct it. Fama claims that this is not a problem because irrational investors trade with each other, therefore cancelling each other out. Many people have pointed out however that irrational investors often have a correlated behaviour. In addition, social trading platforms means that the investors make recommendations to each other and often do the same trades. Finally, the criteria that the market does not react to non-information is perhaps the most apparent fault with the EMH model. Most people agree that markets do move a lot on no news at all. In fact, a study undertaken by Cutler et al. (1991) found that many of the 50 largest intraday stock movements took place on days with no major news at all.

Using event studies, Richard Rendleman, Charles Jones and Henry Latane (1982) discovered that the market incorporated new earnings information more slowly than EMH suggests for semi-strong form. The following graph show their findings in the form of cumulative average returns around earnings announcement showing different deciles corresponding to the relative surprise factor for the earnings.

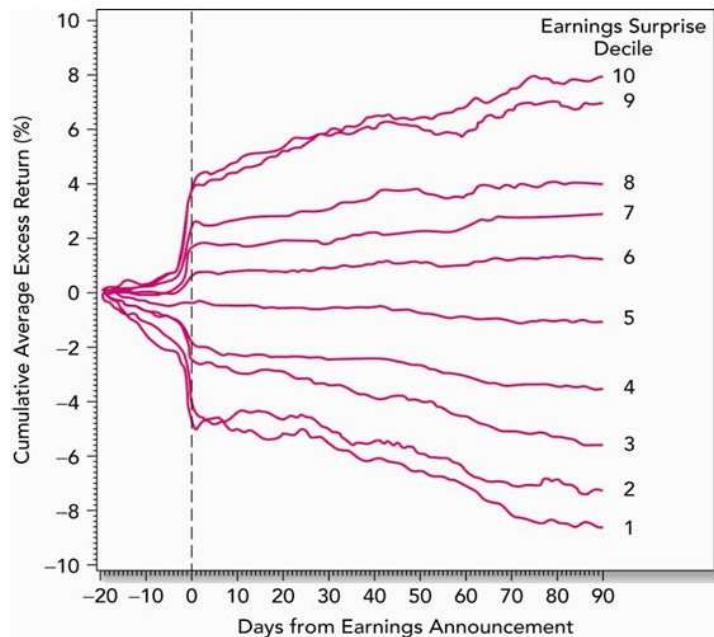


Figure 5 CAER for Event Study (Rendleman et. al., 1982)

Lagging reactions to earnings announcements as shown in these findings cannot be consistent with the EMH. In fact, the findings suggest that investors can gain abnormal returns simply by buying stocks with stronger than expected earnings announcement and (short) sell on weaker than expected earnings. These findings can also be interpreted as a support of other theories, for example theories claiming abnormal returns from buying stocks with strong momentum.

Momentum theory in finance builds on empirical studies suggesting that rising stocks have a tendency to rise further (Jegadeesh & Titman, 1993). This would imply that abnormally profitable trading strategies can be found by analysing historic stock price movements. This can be seen as a violation of the weak form of market efficiency in the EMH.

Despite of these substantial critics, the Efficient Market Hypothesis remains the most important theory in terms of theoretical explanations of market efficiency. Many of the market overreaction hypothesis that criticises the EMH have themselves been met with some critique (Maheshwari & Dhankar, 2014). Eugene Fama has often been called “The Father of

Finance”. He is probably most known for his article introducing the efficient market hypothesis and his collaboration with Kenneth French in forming the Fama-French Three Factor Model that competes with the more traditional Capital Asset Pricing Model (Traynor, Sharpe, Lintner, & Mossin, 1961-1966) in describing portfolio return based on risk. He has also contributed in numerous other academic articles and models in the field of finance.

2.2 The Random Walk Hypothesis

The random walk theory was first defined in a book from 1863 published by a French stock broker (Regnault, 1863). Despite of the appearance in numerous books and publications over the years, the random walk model is today most often associated with the well-known popular publication “A Random Walk Down Wall Street” (Malkiel, 1973). The basic principle of the theory is that stock prices fluctuates randomly, and that future movement cannot be predicted using historic stock price movements. The hypothesis is as this statement suggests entirely consistent with the efficient market hypothesis covered in previous chapter.

In “A Random Walk Down Wall Street” an experiment is conducted to show how humans tend to react to a totally random stock price pattern. The initial stock price was set to fifty dollars and then a coin was flipped where heads resulted in a closing price one point higher, and one point lower for tails. This results in a totally random stock price pattern where there is no overall trend. A chartist was then asked to predict the most likely future stock price under the assumption that “history tends to repeat itself”. The chartist argued that a strong trend existed that resulted in a buy rating for the stock. This can be seen as an indication of the presence of random stock price movements. People who believe that stock prices does not follow a random walk path can often become victims of the commonly known phenomena that humans, most often unconsciously, tries to create trends and patterns even where none exists (Miscellaneous, 2018). The chart below is randomly created by using the odd/even values of pi. There is no overall trend present. However, many people will perceive clear trends that may predict the future. Arrows is added to suggest how a person might perceive trends that in reality does not exist because the movements are totally random.

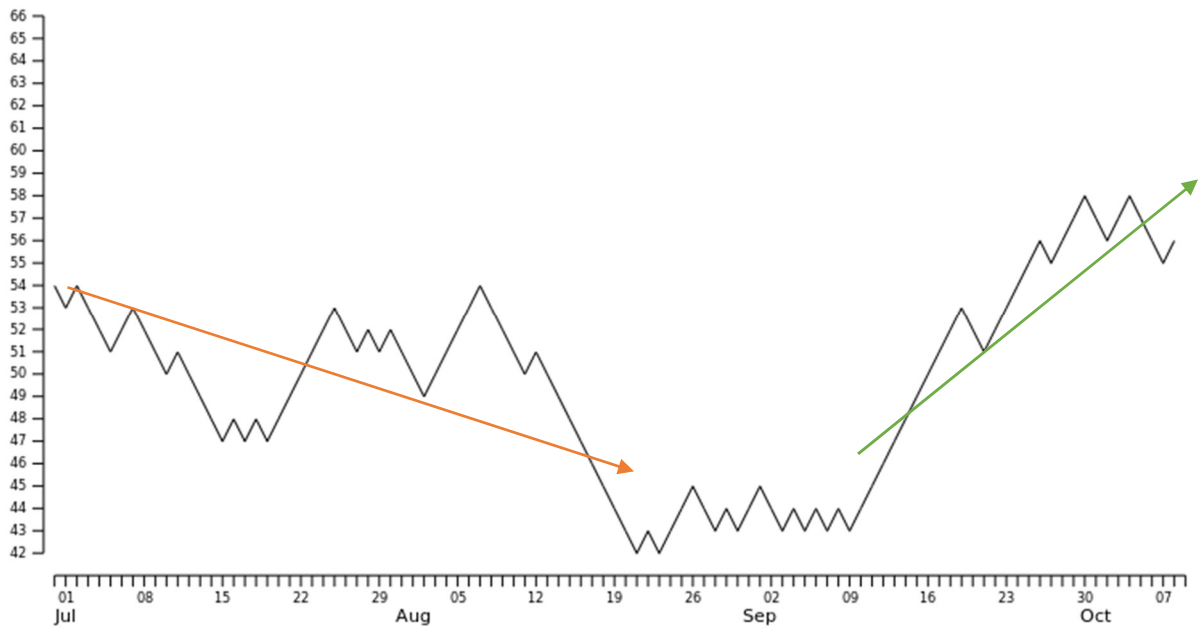


Figure 6 Random Stock Chart Resemblance

The random walk hypothesis is an interesting contribution to the hypothesis' arguing that the market is more or less efficient and have contributed significantly to the popularity and support of this.

2.3 Dividend Policy Irrelevancy Theory – Franco Modigliani and Merton Miller

The scientific articles of Franco Modigliani and Merton Miller is today considered the baseline in terms of understanding how the capital structure and other company-specific financial events of a company works (Miller & Modigliani, 1961). Although they have faced a lot of criticism for not always being correct in the “real world”, their standings as theoretical models of a “perfect world” is largely undisputed. In this thesis I use a lot of time writing about dividend payments and how it influences the movement of stock prices. I therefore think it is important to be familiar with Miller and Modigliani’s theory on the implications the dividend policy has (or should have) on the pricing of the company’s stock.

In Miller and Modigliani’s theory about dividend irrelevancy it is first important to note that tax is not considered in the models. Tax could however be considered important because the individual country’s specific tax policy might influence the investors preference for dividend. Secondly, the signalling-effect or other psychological phenomenon that might influence the behaviour of investors is not considered. The signalling-effect is the effect that the company’s

dividend and -policy announcing has on investors behaviour, and therefore valuations of stocks.

The theory suggests that investors should be indifferent between receiving a cash dividend or not. Miller and Modigliani points to the fact that the investors have the alternative to sell the amount of stock that equals the dividend, achieving the same effect as if dividend was paid out of the company. Because of this alternative for investors, Miller and Modigliani reach the conclusion that investors should be indifferent to dividend policy for the company. However, in the “real world” there are many factors that is not considered in this theory. Some of which is mentioned in the previous paragraph. In addition to these, it is important to remember that the available investment opportunities for the company and the composition of investors often influence the choice of dividend policy. It is also a commonly accepted theory that a company should not accumulate cash unless they have profitable investment opportunities or financial and operational risks that calls for it. Finally, in many cases investors are unable to sell their stocks because of strategic ownership, lack of mandate to sell stock or simply cannot find buyers. This is an important argument that companies should pay out cash dividend.

2.4 Behavioural Finance: Anchoring Effect

Anchoring is suggested by Chang, Lin, Luo & Ren (2006) as a plausible explanation for the abnormal ex-day returns they observed in their research article. Anchoring is a well-known effect in the field of behavioural finance. Anchoring effect can be explained by describing an experiment first introduced by Amos Tversky and Daniel Kahneman in their book; “Judgement under uncertainty: Heuristics and biases” (Tversky & Kahneman, 1974).

When faced with the product of the eight numbers:

$$1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8$$

Most people will multiply the first numbers and then use it as an anchor to arrive at their answer. In an experiment people answered a median value of 512 – the correct answer being 40 320. When we compare to a group of people faced with the same numbers in the opposite sequence:

$$8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$$

The anchoring effect becomes evident as this group has 2 250 as their median answer. The product of the numbers is of course the same for both sequences. The fact that the answer is still far away from the correct answer is in this case less important to prove the point. This result shows that the numbers that appear first in a sequence is more important for people when they use intuitive calculation. This can be interpreted as a proof of the anchoring effect. As human behaviour is also present in the financial markets, it is reasonable to assume that anchoring can be used as a reasonable explanation to similar observations to that of the mentioned experiment.

Other experiments also show that in addition to this, people tend to anchor on visually total random irrelevant numbers presented to them around the time the question is presented to them. In one experiment a wheel with numbers 1 to 100 was presented, and the participants was told to imagine the numbers as percentage (Ackert & Deaves, 2010). After the wheel stopped at a totally random number, the participants were asked the question: "What is the percentage of countries coming from Africa in the U.N.?" Clearly the percentage on the wheel should have no relevancy and therefore no impact on the answer given by the participants. The experiment showed however, that the number on the wheel had significant influence on the answer given. For those seeing 10(%) on the wheel the median answer was 25 %, and from those seeing 65(%) on the wheel the median answer was 45 %. For the record, the correct answer was 28 %. If the knowledge from these experiments is applied to the financial markets, it would seem plausible that anchoring can affect stock prices in the form of anchoring towards possibly irrelevant historic price levels or other measures. Anchoring have also been blamed for slow reaction to new information or -factors by many researchers.

2.5 Behavioural Finance: Prospect Theory

The prospect theory's suggestions of preference to certain- over uncertain outcomes is highly interesting for our search for a possible explanation of irrational behaviour by investors in our analysis. The fact is that stocks that pay dividend, effectively, have a more or less known component added to it when a dividend payment is announced. As people according to prospect theory have this preference for certain outcomes, it might mean that investors also have a special preference for dividend payments. This would be a direct violation of the dividend irrelevancy theory (Miller & Modigliani, 1961).

The prospect theory attempts to explain people's behaviour when faced with a lottery prospect. The theory claims that the widely known expected utility theory (Ackert & Deaves, 2010) does not explain the irrational nature of people's greed and fear. Amongst the many findings within this theory is that when faced with the following two lotteries with two alternative prospects:

Question 1:

Prospect A	Prospect A*
\$ 1 000 000 100 %	0 1 % \$ 1 000 000 89 % \$ 5 000 000 10 %

Question 2:

Prospect B	Prospect B*
0 89 % \$ 1 000 000 11 %	0 90 % \$ 5 000 000 10 %

Table 1 Allais Paradox

Most people would choose A on the first question and B* on the second question. Such behaviour is inconsistent with the expected utility theory, as it breaks several of the axioms and thus cannot be explained using that theory. This prospect is known as the Allais paradox and it can only be explained using prospect theory. It is one of the most well-known violations of the expected utility theory. The prospect theory defines key aspects which explain how people choose when faced with lottery prospects:

1. People sometimes exhibit risk aversion and sometimes risk seeking, depending on the nature of the prospect.
2. Peoples' valuations of prospects depend on gains and losses relative to a reference point. This reference point is usually the status quo.
3. People are averse to losses because losses loom larger than gains.

When going back to the lottery prospects presented in Allais paradox we can see that the first choice has a prospect which is 100 % certain. According to prospect theory, people tend to prefer the certain- over the uncertain outcomes. In many cases, even if the expected utility is theoretically higher in the prospect with uncertain outcome. In our case, the A* prospect is clearly more desirable according to the expected utility theory, but it is not selected because people overly fear the small possibility for not gaining anything. A* is more desirable because it has a higher expected utility than the safe option:

$$U[\$ 1\,000\,000] < U[(\$ 0 \times 0,01) + (\$ 1\,000\,000 \times 0,89) + (\$ 5\,000\,000 \times 0,10)]$$

$$U[\$ 1\,000\,000] < U[\$ 1\,390\,000]$$

$$U[A] < U[A^*]$$

The following graph illustrates the experienced utility that make the basis for loss aversion for most people (loss looms larger than gains).

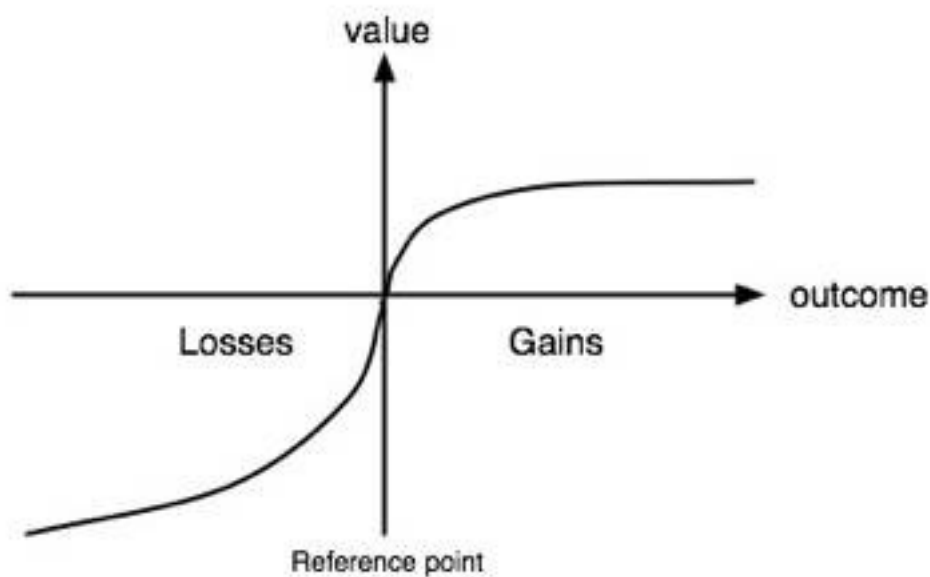


Figure 7 Graphic illustration of Loss Aversion. Please observe that the initial fall on the loss domain is twice as steep as the increase in the gain domain.

In prospect theory, the reference point is key as to explain the individual person's risk-taking profile. The key aspects establish that people are averse to losses, but that they might be risk seeking in certain prospects. Prospect theory suggest that people that is faced with a prospect which involve a large possibility for losing money, most people will be risk seeking out of fear of the negative outcome. The same is the case for people when the prospect gives them a minute chance of making a large gain.

The prospect theory can by the introduction of risk aversion (π) into the utility equation use the following value function to calculate people's preferences for different prospect:

Given prospect: $P(x, p: y, q)$, where $p + q = 1$

EUT:

Equation 1 EUT

$$U(P) = p \times u(x) + q \times u(y)$$

Prospect theory:

Equation 2 Prospect Theory

$$V(P) = \pi(p) \times v(x) + \pi(q) \times v(y)$$

The most promising parts of the prospect theory that might serve as a plausible explanation for a change in investor preference in relation to dividend payments is investors preference to known outcomes. This is because one can imagine the stock price to suddenly include a more or less certain compound as future dividend payment is announced. If this leads to a particular preference for a stock that pays dividend in the near future it should be captured by the dividend inclusive model. If such were to be the case, prospect theory could help explain the inefficient stock markets in dividend pay-out situations.

2.6 Other Previous Research

2.6.1 Ex-Day Returns of Stock Distributions: An Anchoring Explanation, Chang, Lin, Luo and Ren (2006)

If any of the hypothesis that is tested in this thesis should turn out to be significantly true, then it would make sense to develop a theory on what might cause the market to be inefficient. Chang, Lin, Luo and Ren wrote an interesting academic paper on a possible explanation for this in 2006. Here they look at the return of stocks on the ex-trading day for dividend, stock splits and reverse splits. This is all events that should result in equivalent effects for the stock price. That is of course with the exception that stock price should increase in reverse splits, and that there are normally no payments to investors at ex-split and reverse split days. Furthermore, all these events should be irrelevant to investors (Miller & Modigliani, 1961).

As the title heading suggests, the paper seek to use anchoring as an explanation for the abnormal returns they claim to have found in their research. They point out that the price including dividend appears to be a naive anchor and results in the observed abnormal returns on the ex-day. Their research also suggest that the size of the dividend makes the abnormal returns more significant than the smaller dividends. This possibility is also assessed in the analysis chapter in this thesis as this could also be a factor in our event study.

Even though this article seems to support much of the hypothesis that is suggested in this thesis, it is important to notice some key differences. This paper focus on the one-day returns, whereas my thesis focuses on the announcement period and the multiple-day ex-dividend return. In fact, the first day ex-dividend is not considered as the ex-dividend strategy starts on the closing price on that day. The reason for this is as previously mentioned to give the market adequate time to price in the loss of right to dividend payment.

2.6.2 Tax-induced Trading Around Ex-dividend Days, Lakanishok & Vemaelen(1986)

The article titled “Tax-induced trading around ex-dividend days” (Lakanishok & Vermaelen, 1986) seek to uncover abnormal trading around stock-specific events such as dividend payments, stock splits and -reverse splits. In their research they discover that there is indeed abnormal trading volume in connection with the ex-dividend day. As this is not significantly observed on the two other events, they suggest that the investors are driven by tax benefits which influences the preferences of the investors. This discovery can be seen as a direct

violation of the dividend irrelevancy theory (Miller & Modigliani, 1961), and can lead to inefficient markets according to EMH (Fama, 1970). Although tax is not analysed and discussed at length in this thesis, some country-specific tax regulations are discussed in the conclusion chapter.

As the article authors suggest that the short-term dividend capturing investors drive the stock price above the fundamental and reasonable levels, it would mean that there are abnormal earnings to be exploited using the correct trading strategy. Therefore, this article brings significant support for this thesis' hypothesis and both the trading strategies. As an ending point, it is also important to note that the article also discovers that the size of the dividend seems to decide the magnitude of the mispricing or inefficiency. This is a most interesting observation that is also touched upon in this thesis.

2.6.3 Ex-Dividend Stock Price Behaviour and Arbitrage Opportunities, Heath & Jarrow (1988)

This article examines stock price behaviour in connection with ex-dividend days, in the search of possible arbitrage opportunities that arises from this event. In this paper however, they cannot successfully prove that there is a trading strategy that results in arbitrage returns. They do however prove that the stock prices move differently on the ex-dividend day to that what is expected due to the EMH (Fama, 1970). Because these moves are not consistent and predictable, there is no arbitrage opportunity.

It is important to note that although this article and our thesis has many similarities, it has a key difference concerning the search for arbitrage opportunities. Arbitrage opportunities is in basic finance theory defined as: Risk-free abnormal return. This means that there can be no risk for your strategy to get a negative return. In the case of this thesis, I would not be able to conclude that there is arbitrage opportunities if even one observation in the data-sample yield negative returns. In addition, it would be practically impossible to exclude the risk associated with the strategies.

3. Methodology

3.1 Event Study

3.1.1 EMH and Event Studies

One way of providing support for the semi-strong efficiency theory of markets is event studies. These studies look at the movement in stock price before and after an event. This event could be bid for takeover, dividends and other firm specific events that should move stock prices. Below I have included a chart which demonstrates an example of a typical event which might be used as a basis for an event study. According to the semi-strong efficiency EMH criteria the pricing of the stock should quickly and precisely incorporate the new available information to reflect the post-information value. This can be observed in the chart, as the price jumps up on the day of the announcement and stay quite steady the following days.

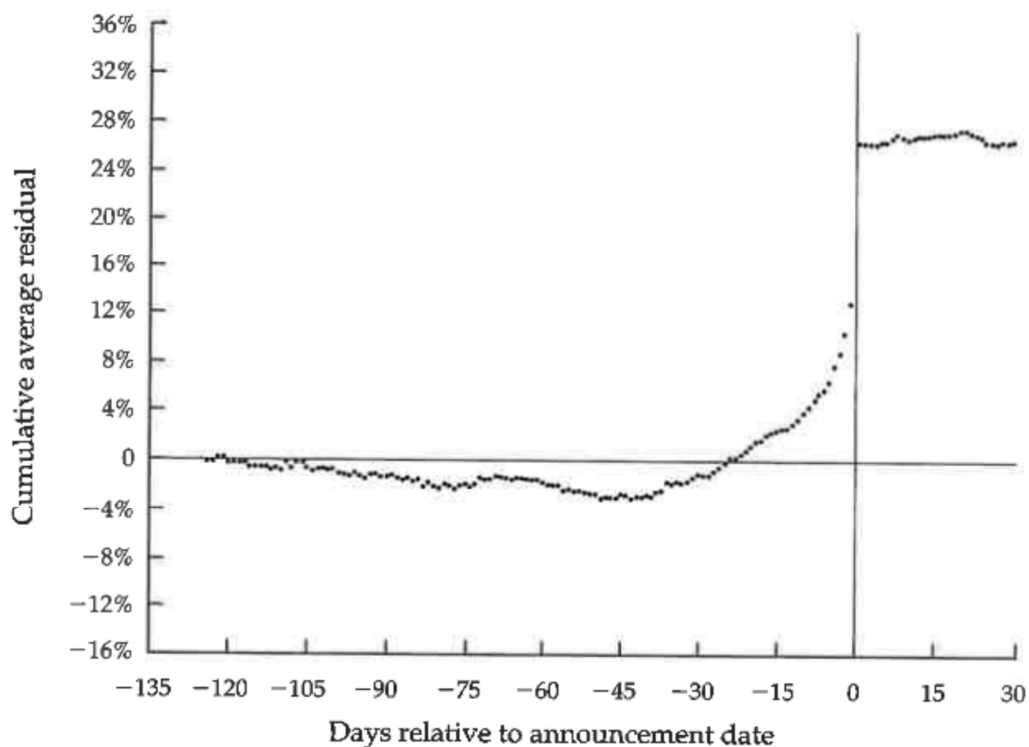


Figure 8 Cumulative abnormal returns to shareholders of targets of takeover attempts around the announcement date. (Keown & Pinkerton, 1981)

Similarly, a graph of events such as the dividend events mentioned in this thesis should be equally stable following the ex-dividend date as for this takeover announcement. If that is the

case, no abnormal return can be earned from the ex-dividend trading strategy. In this graph one should also note that the stock price rises sharply in the days leading up to the announcement. This can indicate a semi-strong form of market efficiency. There could be several reasons for this. In the worst case, someone has traded on the inside information they have on the upcoming takeover. Most often, there will at least exist rumours in the market place that drive prices before the announcement. These rumours can be set out by people with inside information but does not exclusively mean that trading on insider information has occurred.

3.1.2 Framework

After the event to be the subject for the study is precisely specified, the estimation window have to be determined. The estimation window is the period of which is used to compute the model which is used to calculate the normal return. The estimation window commonly proceeds the event window. The event window is the period of which the returns from the event to be analysed is collected. The post event window following the event window can be used post analysis to challenge the reliability of the result. The post event window is not considered in this thesis.

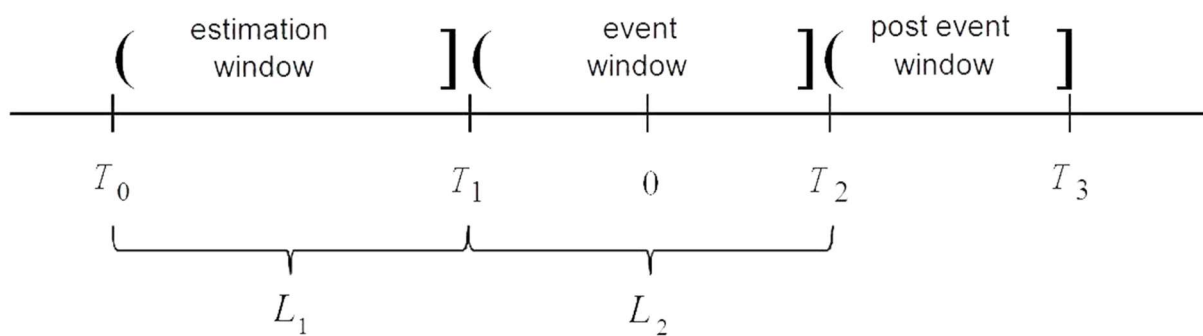


Figure 9 Illustration of Event Windows (Eventstudymetrics, 2018)

3.1.2.1 Calculation of Normal Returns

For the calculation of the normal returns there are a large number of different models that can be used. When considering the model to be used for the calculation, one should be acquainted with the advantages and shortcomings of the individual models. Some of the models that can be considered for calculation of the normal returns are (McKinlay, 1997):

- Market Model (MM)
- Market Adjusted Model (MAM)
- Comparison Period Mean Adjusted Model (CPMAM)
- Market Model with Scholes-Williams beta estimation (MMSW)
- Fama-French 3 Factor Model (FF3)
- Fama-French-Carhart Momentum 4 Factor Model (FF4)

The first 4 models mentioned above is characterized as statistical expected return models which use several different statistical historic data to compute the return to be expected for the security during the event window. The models are all different versions and modifications of the basic market model.

The Fama-French models is characterized more as economic expected return models because they consider the different characteristics of the companies in question to a much larger degree. These models should be considered especially in event theories where the companies in the sample is vastly different in size and growth strategy. The Fama-French models builds on the CAPM-model (Traynor, Sharpe, Lintner, & Mossin, 1961-1966) as well as the market model, however, it includes several additional factors. The factors considered in the model is (French & Fama, 1993) (Carhart, 1997):

- Systematic risk: $\beta_{mkt}(R_{mkt} - R_f)$ | (R_f =Risk-free return R_m =Market index return)
- Company size: $\beta_s \times SMB$ | (SMB =SmallMinusBig)
- Book/price ratio: $\beta_v \times HML$ | (HML =HighMinusLow)
- Momentum: $\beta_U \times UMD$ | (UMD =UpMinusDown) – **Only considered in 4-factor model**

Fama-French 3 Factor Model:

$$R = R_f + \beta_{mkt}(R_m - R_f) + \beta_s \times SMB + \beta_v \times HML + \alpha$$

Fama-French-Carhart 4 Factor Model:

$$R = R_f + \beta_{mkt}(R_m - R_f) + \beta_s \times SMB + \beta_v \times HML + \beta_U \times UMD + \alpha$$

The table below sums up the most important differences between the different models for calculation of normal return:

Table 2 Advantages and Disadvantages of Normal Return Models

Normal Return Model:	Advantage	Disadvantage
MM	Precise for stocks with strong index correlation, well documented and easy to use. Consider market movements in the event window.	Unprecise for stocks with weak index correlation and do not consider company-specific differences.
MAM	Requires little knowledge to use. Saves time because of simplified calculations	Overly simplified market model, does not consider company-specific differences and market movements in event window.
CPMAM	Requires little knowledge to use. Saves time because of simplified calculations	Overly simplified market model, does not consider company-specific differences and does not consider market movements in event window.
MMSW	Additional statistics utilized in the model leads to high degree of precision. Consider market movements in the event window.	More complex model which require more knowledge to operate. Assumes non-synchronous trading.
FF3	Consider differences in company descriptive. Good for analysing companies with variations in Market Cap and growth strategy.	More complex and time consuming than the market model. Significance of factors may vary.
FF4	Even more precise than FF3 as momentum is added to the considered factors.	More complex and time consuming than the market model. Significance of factors may vary.

In the case of this event study, the choice has been made to use the basic market model for the calculation of the normal return. The choice stood between the three models MM/FF3/FF4 as they seem to provide the best estimate for normal return. Although the multifactor-models in some cases is more precise in calculating the normal return, the presumed high correlation to the market index- as well as the relatively small difference in market capitalization for all the stocks in the sample means that the added complexity of the multifactor-models is considered not to produce a more precise and reliable result.

The market model uses the relationship between a representable market index- and the stock return in the estimation window to calculate the normal return in the event window from the actual market index returns in the same period. For this particular thesis, the Oslo Stock Exchange Benchmark Index (OSEBX) is used as a benchmark for the calculation. This can be justified because the companies that make out our data set is the seven largest companies, apart from Statoil, in the index. Thus, the correlation is expected to be high.

When using the market model for calculations of normal return, it is assumed that the relationship between the market return and the security in question is equal for both the estimation window and the event window.

To be able to compute the normal return the alpha and beta have to be computed from within the estimation window.

Equation 3 Alpha estimation

$$\hat{\alpha}_i = \hat{\mu}_i - \hat{\beta}_i \hat{\mu}_{mt}$$

Where $\hat{\mu}$ is the average daily return for the population of stocks; i, and the market index; mt. $\hat{\beta}_i$ is given by the following formula:

Equation 4 Beta Estimation

$$\hat{\beta}_i = \frac{Cov(r_{mt}, r_i)}{Var_{mt}}$$

The calculated alpha and beta is then incorporated into the market model to arrive at the normal return for the security in the event window.

Equation 5 Market Model

$$R_{it} = \alpha_i + \beta_i \times R_{mt} + \varepsilon_{it}$$

Where ε_{it} is the error term which represent the part of the return that the estimated model does not explain.

The estimated market model with the estimated return based on the estimators $\hat{\alpha}_i$ and $\hat{\beta}_i$.

Equation 6 Estimated Market Model

$$\hat{R}_{it} = \hat{\alpha}_i + \hat{\beta}_i \times R_{mt}$$

Once the normal return is calculated for all events and companies, we arrive at the abnormal return by subtracting the estimated normal return from the actual observed return of the stock in the event window. The cumulative abnormal returns for the individual event and stock is notated CAR for short.

Equation 7 Abnormal Return Calculation

$$AR_{it} = R_{it} - \hat{R}_{it}$$

Equation 8 Cumulative Abnormal Return

$$CAR(\tau_1, \tau_2) = \sum_{\tau=\tau_1}^{\tau_2} AR_{it}$$

3.1.2.2 Testing for Significance

After calculating CAR values for all events in the sample, the significance of the findings has to be assessed. To do this for the full sample we use the Cumulative Average Abnormal Returns (CAAR). This is the average of the CAR for all events in the sample for each individual trading strategy. Sometimes the notation \overline{CAR} is used instead of CAAR. In this thesis, however, CAAR is used exclusively to minimize the risk of confusing CAAR and CAR.

To calculate the test statistic, the following formula is used:

Equation 9 Calculation of Test Statistic

$$\theta = \frac{CAAR_{(\tau_1, \tau_2)}}{Var(CAAR_{(\tau_1, \tau_2)})^{1/2}} \sim N(0,1)$$

Then θ is applied to a two-tailed t-distribution table and returns the p-value. A two-tailed test is used because we want to know whether the mean is larger or smaller than 0. If we only

wanted to know higher than- or lower than zero respectively, we would use a one tailed test. The p-value tells us at what level of significance the sample mean is different from zero. A p-value above 0,15 can be considered a weak form of significance, corresponding to a confidence level of 85%. For further details on hypothesis and significance testing, see appendix A.

3.2 Data

3.2.1 Choice of Stocks

Defining the collection of stocks to include in the data set is the case of setting boundaries as to what kind of stocks it is reasonable to include in the dataset. To make it easier to pick a representative sample, an important geographical restriction is put in the defined research question:

*«Does the event of dividend payouts **in the norwegian stock market** result in predictable and abnormal returns?»*

As this restriction severely limits the possible candidates the rest of the election process becomes a question of which stocks to exclude from our sample. Some important factors that should be considered in this matter is stock liquidity, market capitalization and dividend payout regularity, as well as level of obtainable and reliable stock price- and dividend history.

The Oslo Stock Exchange is Norway's only stock exchange after the inclusion of the last minor regional exchanges in 2000 (Børs, 2018). Today the stock exchange is comprised of 230 stocks of varying market capitalization and liquidity. As is the case of most minor exchanges, the Oslo Stock Exchange is less balanced in terms of sector representation than other major exchanges such as the London- and New York Stock Exchange. At OSE specifically, 60 stocks representing 851 billion kroner (approx. 34%) belong to the energy sector. The five largest equities with equity worth about 1 300 billion kroner represent about 52 percent of the exchange total worth of equities. All these particulars are important to keep in mind when concluding on the analysis, as well as for other people comparing the results from OSE with their own results for other exchanges using equal framework.

After extensive considerations taking all factors from the two previous paragraphs into consideration, some absolute requirements for stocks to be chosen for the sample is defined:

- Minimum market cap: 75 Billion NOK
- Minimum number of available events (dividend history): 10
- Minimum available price history: 5 Years
- Minimum daily trading volume (liquidity): 25 Million NOK
- Dividend: all-cash-dividend

The companies that fulfil these requirements on Oslo Stock Exchange is Dnb, Norsk Hydro, Orkla, Telenor, Yara and Marine Harvest. It might seem strange that Statoil is not included in this sample. As the largest company by far on the exchange, many people would think that it was natural to include it in a representative sample of the exchange. The reason for the exclusion is that the company have an uncommon structure of dividend where the investors have a choice between receiving cash dividend or receiving new stocks in a new stock issuance from the company. This makes the model and calculations unnecessary complicated and time-consuming. Despite of the importance of Statoil because of its size-relative influence on the index, I argue that the exclusion does not weaken the data sample. This is because the inclusion of Statoil would mean to compare two completely different dividend structures, which could threaten the consistency of the data sample. It is therefore considered best to exclude Statoil entirely from the data sample.

As the different dividend structure of Statoil was commented on in the previous paragraph, it is also important to note some key differences in the chosen data material. Firstly, Marine Harvest pays quarterly dividends, while the others paying annual dividends. Secondly, the dividend yield will also vary between the companies. This should be expected due to the difference between growth and value companies or the company's general ability to pay dividend. In addition, the degree of maturity of the firm may also influence their ability and willingness to do so. Finally, it is important to note that Telenor has paid semi-annual dividend the last three years. These events are excluded from the sample because both dividends are announced at the same time early in the year. This makes the event windows interfere with each other and is inconsistent with the rest of the data material. The nature and exclusion of these events is graphically illustrated in the brief company presentation in the next sub-section.

All historic stock price data is gathered from "netfonds.no", while dividend records is gathered from the individual company's website. Historic dividend information provided by the companies on the company's website generally tends to be more reliable and precise than

that found elsewhere. By choosing the two sources solution, it is easier to ensure that the information or data is always consistent and correct.

3.2.2 Brief Presentation of the Companies

Here follows a brief introduction of the individual companies as well as graphs showing both stock performance and dividend pay-outs. The width of the columns representing the dividends shows the amount of days from the dividend announcement to the ex-dividend date. In our case, this is the event window for the dividend inclusive strategy. The typical length of this event window for each company will also be disclosed. As the estimation window for both strategies and the event window for the ex-dividend strategy is constants, it is not included on the graphs.

3.2.2.1 DNB

Dnb is Norway's largest bank and the largest finance institution represented on Oslo Stock Exchange. The company's equity is valued at approximately 250 billion NOK and is the third largest company listed on the exchange. The company have paid out dividend every year for the past 20 years, apart from 2009 during the global financial crisis. The annual dividend yield ranges between 2 and 9 percent. Average trading volume for the instrument is 1.8 M shares- or well above 200 M NOK per day. The event window for the dividend inclusive strategy ranges from 37 to 56 days with an average of 49 days.

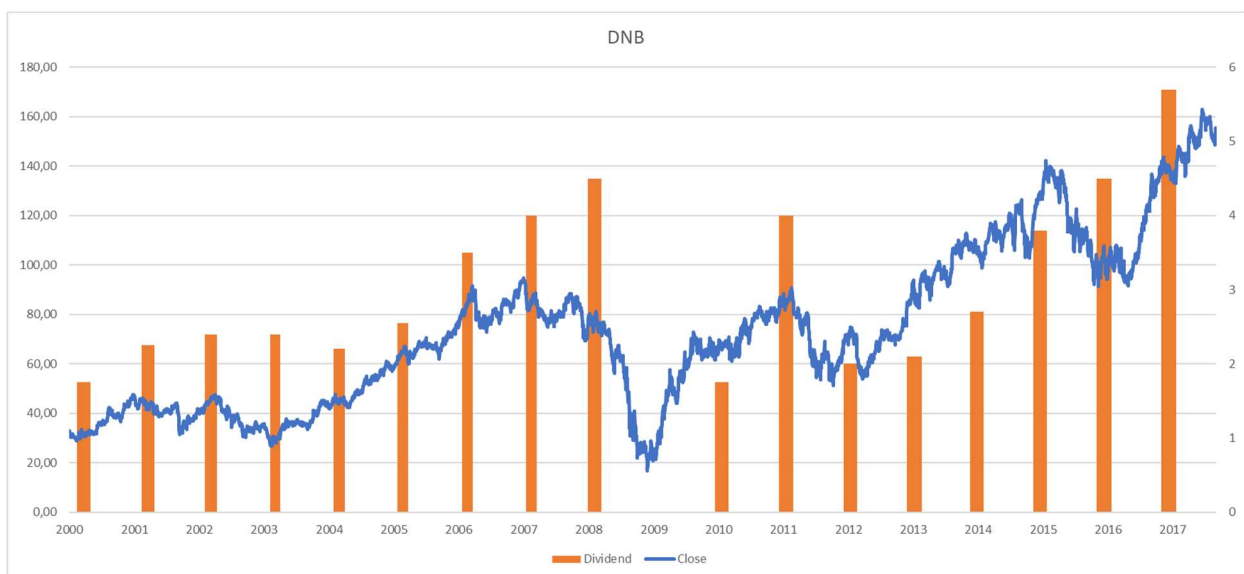


Figure 10 Dnb Chart, Datapoints by Netfonds

3.2.2.2 Norsk Hydro

Norsk Hydro is a large producer of aluminium products. Hydro owns and operates factories in the entire value chain; from Bauxite mining and alumina extraction to melting and casting of aluminium products. The company's equity is valued at approximately 117 billion NOK. Despite of the company operating in a highly cyclical industry with expected high variation in earnings between the cycles, the occurrence of dividend pay-outs has been relatively consistent the past 20 years. As was the case with Dnb, Norsk Hydro also did not pay dividend in 2009. Average trading volume for the instrument is 5 M shares- or well above 250 M NOK per day. The dividend yield for Norsk Hydro ranges between 1 and 12 percent per annum which could be said to be one of the characteristics of a heavily cyclical stocks. This is because the dividend does not necessarily represent the predicted future development, but merely the current performance. This means that the dividend yield may vary as current conditions and future predictions is different. The event window for the dividend inclusive strategy ranges from 50 to 59 days with an average of 55 days.

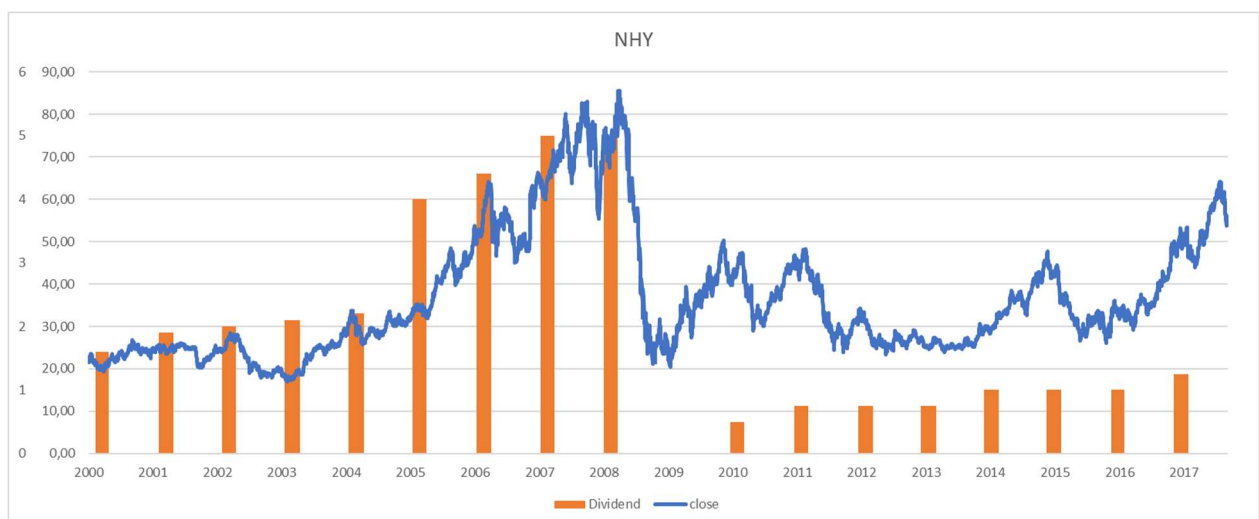


Figure 11 Norsk Hydro Chart, Datapoints by Netfonds

3.2.2.3 Orkla

Orkla is a leading supplier of groceries and branded consumer goods. The company supply all the major supply chains for groceries in Norway. The company's equity is valued at approximately 85 billion NOK. The company have paid dividend to its shareholders annually without fail for over 20 years. Orkla can be considered as a mature value firm, with little cyclical factors interfering with its earnings. This type of firm is often forced and expected to pay out much of its net profits to investors as the company often have little profitable investment opportunities relative to its size. Average trading volume is 1.5 M shares- or well above 120 M NOK per day. Orkla's dividend yield ranges between 2 and 15 percent. This is

however heavily influenced by extraordinary items, such as pay-outs in connection with the sale of a portion of the enterprise. If the two extraordinary dividend payments are ignored we have a much flatter range of 2 to 6 percent, which is more typical for this kind of enterprise. The event window for the dividend inclusive strategy ranges from 13 to 60 days with an average of 42 days.



Figure 12 Orkla Chart, Datapoints by Netfunds

3.2.2.4 Telenor

Telenor is a large telecom operator based in Norway. The company's main operation is concentrated in Norway and Scandinavia, but it also has large world-wide operations. The company's equity is valued at 260 billion NOK at the Oslo stock exchange. The average trading volume is 1,7 Million shares- or well above 300 Million NOK per day. Apart from 2009, the company has paid dividend consistently every year since 2002. The last three years the company has paid semi-annual dividends. These dividends are both announced on the same date. As the overlapping of event-window for the dividend inclusive strategy might jeopardize the credibility of the analysis, the three last years is not included in our analysed data material. This is illustrated by the dark area in the chart. The annual dividend yield between 2002 and 2014 ranges between 1 and 6 percent. The event window for the dividend inclusive strategy ranges from 56 to 69 days with an average of 62 days.



Figure 13 Telenor Chart, Datapoints by Netfonds

3.2.2.5 Yara

Yara is a large worldwide provider of products and solutions for the agricultural industry, amongst which fertilizer is the most important product. The company has operations in several separate locations around the globe and has costumers in 150 countries. The company's equity is valued at approximately 95 billion NOK. The average trading volume is 600K shares- or well above 190M NOK per day. The security has had an annual dividend yield in the range of 1-5 percent for the years 2005-2017. The company have paid dividend once every year across our time perspective. The event window for the dividend inclusive strategy ranges from 54 to 64 days with an average of 59 days.



Figure 14 Yara Chart, Datapoints by Netfonds

3.2.2.6 Marine Harvest

Marine Harvest is among the world largest seafood producers and the largest producer of Atlantic salmon (Harvest, Marine Harvest, 2018). The company's equity is valued at approximately 75 billion NOK. Average trading volume is 2.7M shares- or well above 375M

NOK per day. The company has a dividend yield ranging between 4-14 %. The company can be said to be the result of main owner John Fredriksen's mergers and acquisitions of salmon farming facilities over the many years. Because of the extensive M&A activity, the stock price development prior to 2007 is very noisy and not representable for historic development. Therefore, it is not included in the analysed data material. The event window for the dividend inclusive strategy ranges from 6 to 25 days with an average 13 days.

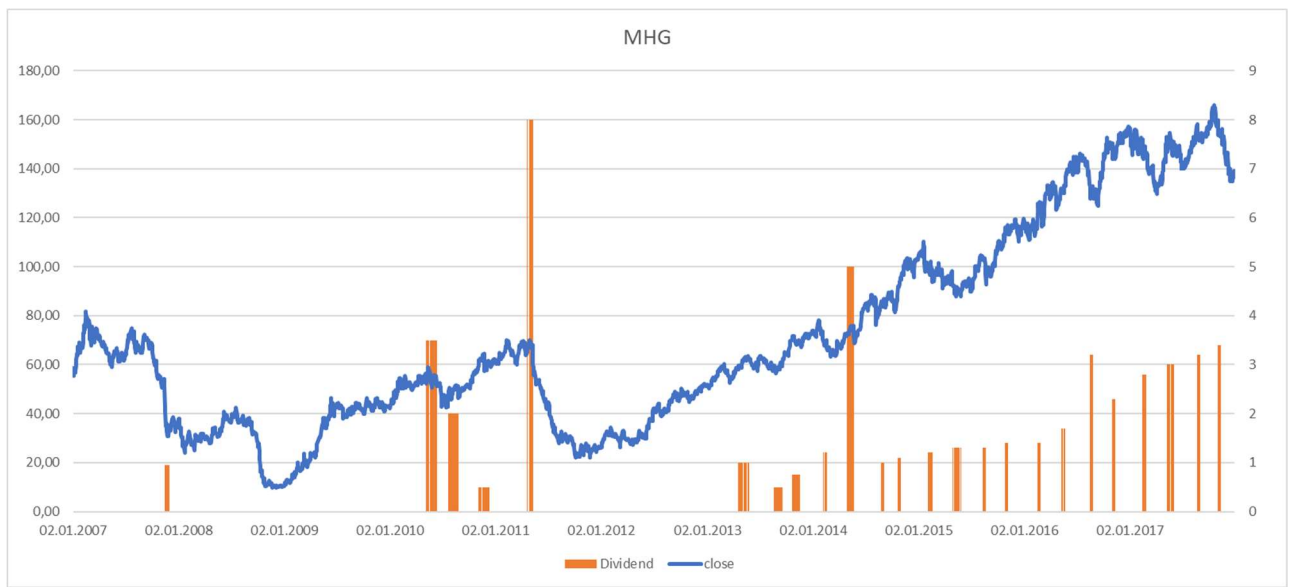


Figure 15 Marine Harvest Chart, Datapoints by Netfonds

3.2.2 Time Horizon and Number of Events

When the range of companies for our dataset is selected we have to determine how far back in time the data material and subsequently dividend events should stretch. All of the companies in the data sample has long price and dividend history. Some of which have history stretching back well into the 20th century. Naturally, the longer period one chooses, the more complex the operation of uncovering and extracting ex-dividend dates and modified historic prices gets. Such events as company fusion, fission or stock split and reverse split operations needs to be corrected for so that the data material truly represents the actual development of the stock prices and dividend events.

Other things that impacts the choice of time horizon is the number of stocks that make up the sample. It is a given that a data consisting of fewer stocks need to have a longer time horizon than a larger selection in order to meet the requirement for number of events to be analysed. In similar event studies the number of events that is analysed normally ranges between about 80 to 150, but most use 100 as an adequate size to support a conclusion. To achieve this with our stock selection, the year 2000 is used as a baseline time horizon. For Yara, the full

available data that stretches back to 2004 is used. Although Marine Harvest have long available stock price history, the data before 2007 is not representative of the company's development because of special extraordinary company events. In addition, the dividend history is not easily available prior to this date. As Marine Harvest pay quarterly dividend, there are similar number of events as for the other companies and the shorter history is not considered a problem for the reliability of the analysis.

By using the time horizon for the dataset specified above, we end up with a total of 103 dividend events. This should be sufficient to make us able to end up with a reliable conclusion to our hypothesis'.

Table 3 Sample stocks

Company	Dnb	Norsk Hydro	Orkla	Telenor	Yara	Marine Harvest
Market capitalization	250B NOK	117B NOK	85B NOK	260 B NOK	95B NOK	75B NOK
Ordinary annual dividend yield	2-9 %	1-12 %	2-6 %	1-6 %	1-5 %	4-14 %
Time horizon and event count	2000- 2017(17 events)	2000- 2017(17 events)	2000- 2017(20 events)	2000- 2014(12 events)	2005- 2017(13 events)	2007- 2017(24 events)
Incl. dividend event window, Average	37-56, 49	50-59, 55	13-60, 42	56-69, 62	54-64, 59	6-25, 13
Volatility (1y daily stdev.)	1,19 %	1,73 %	0,95 %	1,14 %	1,59 %	1,46 %
Company characteristics	Finance, non- cyclical, Mature	Industrials, highly cyclical, Mature	Consume, non- cyclical, Mature	Telecom, non- cyclical, Mature	Materials, non- cyclical, Mature	Consume, non- cyclical, Mature

4. Analysis

4.1 Dividend Inclusive Strategy

In the event study of the dividend inclusive strategy we define $T_{1,0}$ to be 30 days prior to the dividend announcement date. The duration of the estimation window is set to 30 days because a longer estimation window would overlap the event window for the ex-dividend strategy in some parts of the data sample. Additionally, a longer window might cause representativeness issues as well as seasonality issues. $T_{1,1}$ represents the dividend announcement date and $T_{1,2}$ is the ex-dividend date. The post event window is not considered in this thesis. The timeline below illustrates the relationship between the event- and estimation windows for the dividend inclusive strategy.

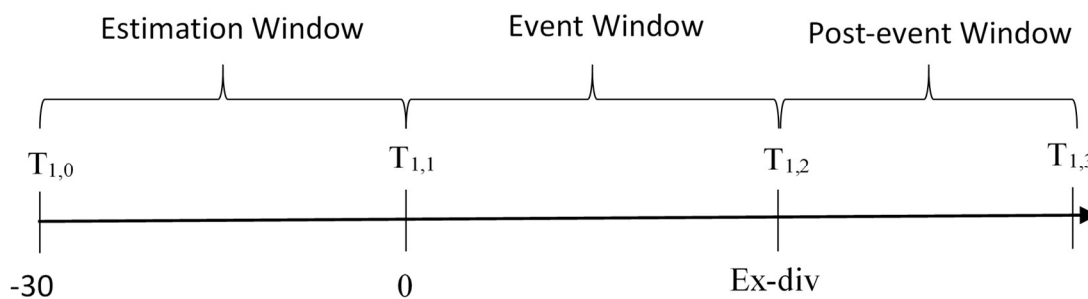


Figure 16 Illustration of event window on timeline for strategy 1: Incl. Dividend

4.1.1 Calculation of Returns

To calculate the abnormal returns on the events we first have to calculate the normal returns through estimation of alpha and beta coefficients in correspondence with the method previously discussed in chapter 3.1.2.1. for further details on the calculation of the beta and alpha coefficients please see appendix C. The normal return that is calculated for the individual periods by the use of these coefficient is subtracted from the actual cumulative returns produced by the strategy to arrive at the cumulative abnormal returns. The actual cumulative returns for this strategy are the return for the period from the closing price of the dividend announcement date to the closing price on the last day of trading inclusive dividend. The calculated cumulative actual returns and cumulative abnormal returns are summarized in the table and histogram below:

Table 4 Actual return, Alpha, Beta, Normal return and Cumulative Abnormal Return for all events for dividend inclusive strategy.

Dividend Inclusive Strategy													
Event nr.	Stock	Return	Alpha	Beta	Normal Return	CAR	Event nr.	Stock	Return	Alpha	Beta	Normal Return	CAR
1	DNB	11,22 %	-0,29 %	0,46	-3,14 %	14,36 %	53	ORK	-4,35 %	0,07 %	0,09	-0,08 %	-4,27 %
2	DNB	-4,61 %	-0,14 %	0,10	-0,57 %	-4,04 %	54	ORK	0,85 %	-0,10 %	0,58	0,89 %	-0,04 %
3	DNB	6,71 %	0,33 %	0,76	4,48 %	2,24 %	55	TEL	0,61 %	-0,29 %	0,85	5,93 %	-5,33 %
4	DNB	18,82 %	-0,52 %	0,75	8,62 %	10,20 %	56	TEL	11,46 %	0,14 %	1,00	14,67 %	-3,20 %
5	DNB	2,25 %	-0,09 %	0,88	-4,35 %	6,60 %	57	TEL	-2,72 %	0,18 %	1,23	1,70 %	-4,42 %
6	DNB	1,98 %	0,15 %	0,18	-0,12 %	2,10 %	58	TEL	-5,17 %	-0,17 %	1,26	-0,12 %	-5,05 %
7	DNB	12,27 %	0,16 %	0,50	7,53 %	4,74 %	59	TEL	10,99 %	-0,12 %	0,69	4,78 %	6,21 %
8	DNB	-0,91 %	0,02 %	0,70	2,10 %	-3,00 %	60	TEL	-1,88 %	0,13 %	0,83	2,85 %	-4,74 %
9	DNB	-0,91 %	-0,03 %	0,76	7,88 %	-8,79 %	61	TEL	9,78 %	-0,21 %	0,61	12,43 %	-2,65 %
10	DNB	8,37 %	0,22 %	1,18	13,99 %	-5,62 %	62	TEL	9,12 %	0,10 %	0,77	1,19 %	7,92 %
11	DNB	8,49 %	-0,05 %	1,03	1,71 %	6,78 %	63	TEL	4,81 %	-0,21 %	0,58	-0,65 %	5,46 %
12	DNB	3,60 %	-0,10 %	1,66	1,65 %	1,95 %	64	TEL	9,50 %	-0,27 %	0,78	-2,24 %	11,74 %
13	DNB	15,93 %	0,09 %	1,12	2,69 %	13,24 %	65	TEL	8,90 %	0,08 %	0,73	2,53 %	6,37 %
14	DNB	-3,60 %	0,08 %	0,92	4,36 %	-7,96 %	66	TEL	15,78 %	-0,19 %	1,30	11,59 %	4,19 %
15	DNB	18,91 %	-0,03 %	0,89	5,57 %	13,34 %	67	YAR	8,14 %	0,33 %	1,03	0,42 %	7,72 %
16	DNB	4,66 %	-0,04 %	1,17	8,96 %	-4,30 %	68	YAR	-4,20 %	-0,39 %	0,96	18,21 %	-22,41 %
17	DNB	1,24 %	0,24 %	0,99	0,88 %	0,36 %	69	YAR	4,17 %	0,17 %	1,53	2,51 %	1,65 %
18	NHY	0,33 %	-0,31 %	0,72	-4,24 %	4,57 %	70	YAR	35,65 %	0,79 %	0,94	19,20 %	16,45 %
19	NHY	2,21 %	0,22 %	0,27	-0,37 %	2,58 %	71	YAR	29,87 %	0,32 %	1,35	30,43 %	-0,56 %
20	NHY	14,86 %	0,03 %	0,71	6,20 %	8,66 %	72	YAR	-6,51 %	0,12 %	1,29	10,86 %	-17,37 %
21	NHY	7,17 %	-0,03 %	0,64	8,87 %	-1,71 %	73	YAR	-4,59 %	0,01 %	1,16	-2,10 %	-2,49 %
22	NHY	-14,45 %	0,02 %	1,34	-3,22 %	-11,23 %	74	YAR	1,38 %	-0,05 %	1,52	-0,02 %	1,40 %
23	NHY	-0,78 %	-0,13 %	1,33	-4,74 %	3,96 %	75	YAR	-6,80 %	0,19 %	0,75	3,01 %	-9,82 %
24	NHY	27,73 %	0,17 %	1,23	27,58 %	0,15 %	76	YAR	11,52 %	0,09 %	0,91	5,71 %	5,81 %
25	NHY	11,02 %	-0,08 %	1,14	3,11 %	7,91 %	77	YAR	-1,48 %	0,49 %	0,36	3,50 %	-4,98 %
26	NHY	10,74 %	0,76 %	1,11	14,23 %	-3,49 %	78	YAR	0,64 %	-0,09 %	0,88	13,40 %	-12,76 %
27	NHY	12,90 %	-0,15 %	1,65	11,13 %	1,76 %	79	YAR	-0,12 %	-0,01 %	0,90	3,04 %	-3,17 %
28	NHY	-8,07 %	0,07 %	1,11	-3,82 %	-4,26 %	80	MHG	-18,82 %	-0,70 %	0,21	-0,61 %	-18,21 %
29	NHY	-18,83 %	-0,12 %	1,37	-6,33 %	-12,50 %	81	MHG	1,46 %	0,32 %	1,00	-4,97 %	6,43 %
30	NHY	2,24 %	-0,29 %	1,15	3,64 %	-1,40 %	82	MHG	7,29 %	-0,82 %	0,76	0,28 %	7,01 %
31	NHY	9,29 %	0,19 %	1,07	7,13 %	2,16 %	83	MHG	2,36 %	0,23 %	1,12	4,61 %	-2,25 %
32	NHY	-17,96 %	0,03 %	0,78	5,49 %	-23,45 %	84	MHG	5,99 %	0,20 %	1,10	1,67 %	4,32 %
33	NHY	5,98 %	-0,22 %	1,19	9,78 %	-3,80 %	85	MHG	5,70 %	0,11 %	0,60	2,68 %	3,02 %
34	NHY	1,98 %	0,46 %	1,32	2,21 %	-0,23 %	86	MHG	0,00 %	-0,19 %	0,34	0,38 %	-0,38 %
35	ORK	1,47 %	0,07 %	0,95	0,16 %	1,31 %	87	MHG	-0,57 %	0,33 %	1,24	4,11 %	-4,68 %
36	ORK	-6,46 %	0,08 %	-0,20	0,51 %	-6,97 %	88	MHG	-1,49 %	0,06 %	0,15	0,21 %	-1,70 %
37	ORK	3,30 %	-0,08 %	-0,39	-3,35 %	6,65 %	89	MHG	4,26 %	0,30 %	0,42	1,63 %	2,63 %
38	ORK	10,91 %	0,16 %	1,45	15,69 %	-4,78 %	90	MHG	-0,82 %	0,11 %	1,96	0,91 %	-1,72 %
39	ORK	4,17 %	-0,01 %	0,64	-2,60 %	6,77 %	91	MHG	6,89 %	0,40 %	1,07	3,02 %	3,87 %
40	ORK	11,52 %	0,01 %	0,92	4,35 %	7,17 %	92	MHG	-1,89 %	0,04 %	0,45	0,17 %	-2,05 %
41	ORK	17,74 %	-0,01 %	0,63	7,77 %	9,97 %	93	MHG	-5,61 %	-0,28 %	1,30	-0,59 %	-5,02 %
42	ORK	7,97 %	0,24 %	0,94	-1,33 %	9,30 %	94	MHG	-3,17 %	0,55 %	0,75	-2,96 %	-0,22 %
43	ORK	1,68 %	-0,93 %	1,11	6,87 %	-5,19 %	95	MHG	6,17 %	0,35 %	0,68	1,73 %	4,44 %
44	ORK	6,00 %	0,11 %	0,99	6,68 %	-0,67 %	96	MHG	9,53 %	0,20 %	0,48	2,40 %	7,14 %
45	ORK	9,49 %	-0,34 %	1,08	12,12 %	-2,63 %	97	MHG	-0,46 %	0,03 %	0,02	0,07 %	-0,53 %
46	ORK	4,52 %	-0,24 %	0,51	0,09 %	4,43 %	98	MHG	0,99 %	-0,15 %	0,64	0,88 %	0,11 %
47	ORK	6,71 %	-0,32 %	0,90	6,59 %	0,12 %	99	MHG	-4,18 %	0,21 %	1,01	1,22 %	-5,40 %
48	ORK	-1,85 %	0,04 %	0,81	0,91 %	-2,75 %	100	MHG	-2,43 %	-0,08 %	0,52	-0,66 %	-1,77 %
49	ORK	5,46 %	-0,10 %	0,75	-0,62 %	6,08 %	101	MHG	-1,31 %	0,20 %	0,71	0,17 %	-1,48 %
50	ORK	4,66 %	0,16 %	0,19	0,35 %	4,31 %	102	MHG	-1,85 %	0,35 %	0,79	1,51 %	-3,36 %
51	ORK	7,62 %	0,13 %	0,88	7,13 %	0,49 %	103	MHG	-3,32 %	0,06 %	0,31	0,22 %	-3,55 %
52	ORK	8,21 %	0,27 %	0,64	9,45 %	-1,24 %							

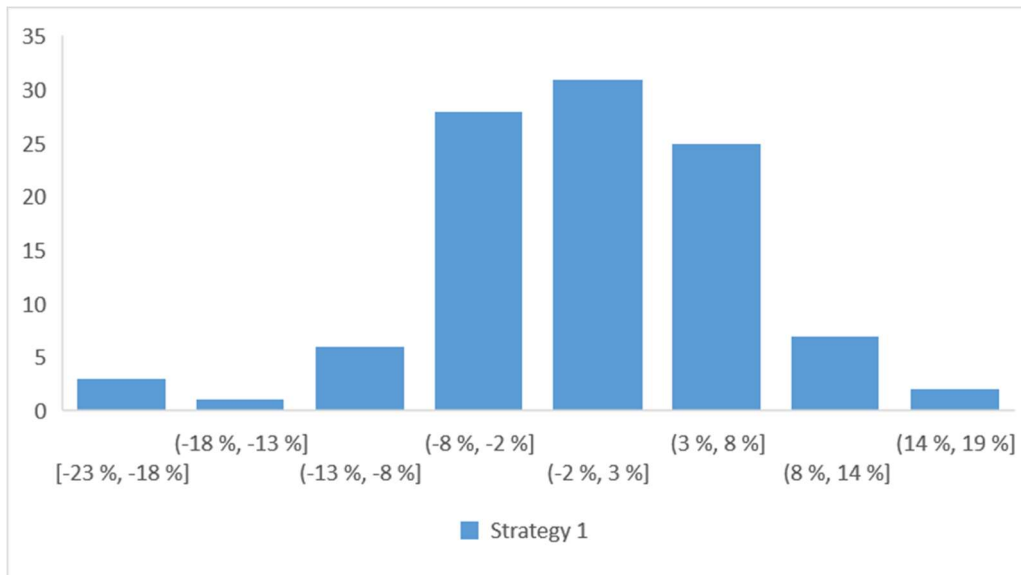


Figure 17 CAR's Histogram the dividend inclusive strategy

Average CAR(CAAR)	0,03 %
Positive Cumulative Abnormal Return for Strategy 1:	48,54 % of the events

We note that the strategy rewards the investor with positive abnormal return in 48,54 percent of the events. Intuitively, this result seems consistent with our H^1_0 hypothesis. We are however reliant on the results from the t-test to determine whether the CAAR is significant. It is also important to note that the data material holds some extreme data points on both the positive and negative side. One possible reason for this could be that the market does not manage to completely incorporate the new information in the quarterly or annual report, which is often presented on the dividend announcement date, in the trading day leading to the closing which is the starting point for the event analysis. In the design of the hypothesis and trading strategies for this thesis, we made the assumption supported by the EMH (Fama, 1970) that this information would be incorporated by time the market closed on the day in question. The most likely reason is however that higher volatility should be expected due to the event window being considerable larger than the nine days window for the ex-dividend strategy.

4.1.2 Significance- and Hypothesis Testing

Through calculating the significance of the CAAR for the first trading strategy by the use of student's t-test we seek to reach a conclusion on whether the alternative hypothesis we have defined is correct and whether the null hypothesis can be rejected.

CAAR= Cumulative Average Abnormal Return

$H^1_0: CAAR_1=0$

$H^1_a: CAAR_1 \neq 0$

If the CAAR turns out to be insignificant, in other words not significantly different from zero, we fail to reject the null hypothesis for the benefit of the alternative hypothesis. We can only reject the null hypothesis for the benefit of the alternative hypothesis if the CAAR is significantly different from zero. Failing to reject a wrong null hypothesis or reject a true null hypothesis would lead to a type 1 or -2 error.

$$\theta_1 = \frac{CAAR_{1(\tau_1, \tau_2)}}{Var(CAAR_{1(\tau_1, \tau_2)})^{1/2}} \sim N(0,1)$$

$$\theta_1 = \frac{0,0003}{0,071331} = 0,0042$$

$$P_{1,Two-tails} = 0,9716$$

The p-value of 0,9716 means that the CAAR is not significantly different from zero at levels of confidence that is considered required for such analysis. As a consequence of this we have to conclude that we cannot reject H^1_0 at any meaningful level of confidence.

4.2 Ex-Dividend Strategy

4.2.1 Determining the Event Window for Ex-Dividend Strategy

Before starting the analysis of the ex-dividend strategy, we have to determine the ending point of the event window. As mentioned earlier, the ending point for this strategy is not intuitive because the hypothesis specifies the ending point as an unknown number of days post ex-dividend.

The ending date is chosen based on the duration which results in the highest risk adjusted return within a month past the ex-dividend date. To find the optimal duration for the strategy we first have to calculate the cumulative abnormal returns for our events use the following formula:

Equation 10 CAR's for ex-dividend strategy

$$CAR_{\tau_{2,1}-2,2} = \sum_{\tau=\tau_{2,1}}^{\tau_{2,2}} AR_{i\tau}$$

After the CARs have been calculated we calculate the average for all events CARs for each day post ex-dividend (CAAR).

After the returns have been computed we need to take the standard deviation between the CARs for each day post ex-dividend in the sample into account. This have to be done because higher volatility between the returns would have a negative impact on the significance of the analysis. The most common way to consider return in relation to risk is the SHARPE-ratio (Sharpe, 1966). The version of the ratio that is used follows from the following formula:

Equation 11 SHARPE-Ratio

$$\text{Sharpe ratio} = \frac{\text{Cumulative average abnormal returns} - \text{period risk free rate}}{SD_{\text{cumulative abnormal returns}}}$$

The highest Sharpe-ratio represents the highest risk adjusted return. As can be seen from the illustrations below, the closing price of the 9th ex-dividend day gives us the highest risk adjusted return. It is also interesting to see that we get the definitive highest return between day three and five. This duration is however not optimal due to the elevated volatility in the subsequent days following the ex-dividend date. Below follows a chart which graphically shows the nature of the average returns and standard deviation. For the risk-free rate in the

calculation of the Sharpe ratio we use the one-month Norwegian Interbank Offered Rate (NIBOR1M) which is currently (02/03-18) trading at 0,95 percent. For more details about the calculation of returns please see the analysis chapter and appendix B.

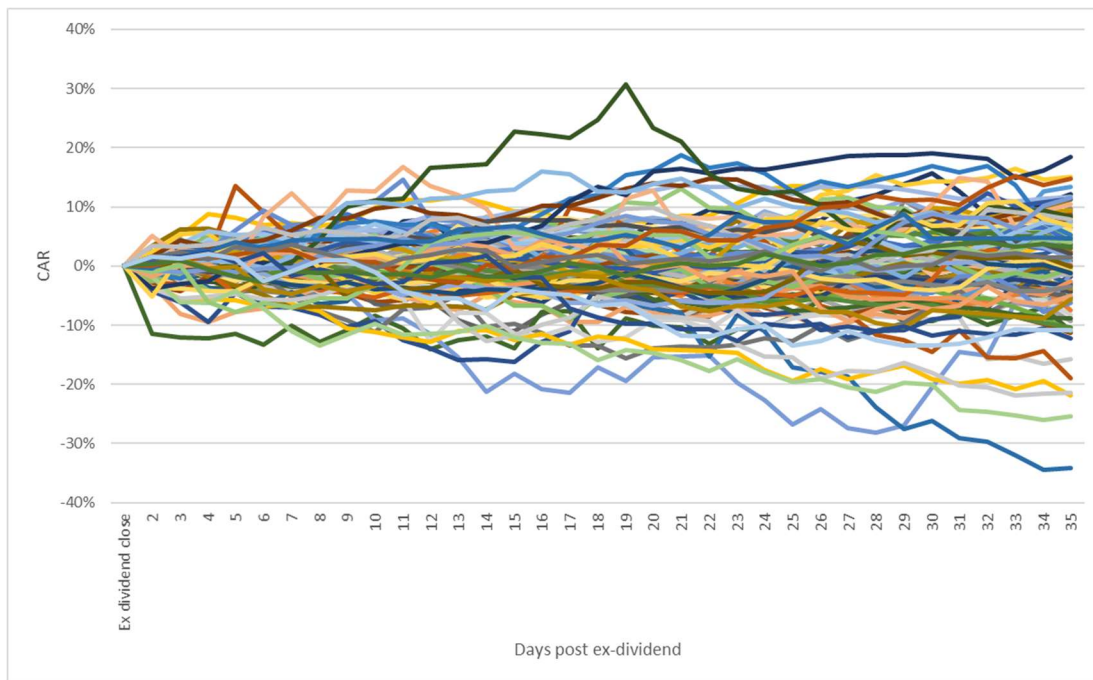


Figure 18 CARs for all events post Ex-dividend

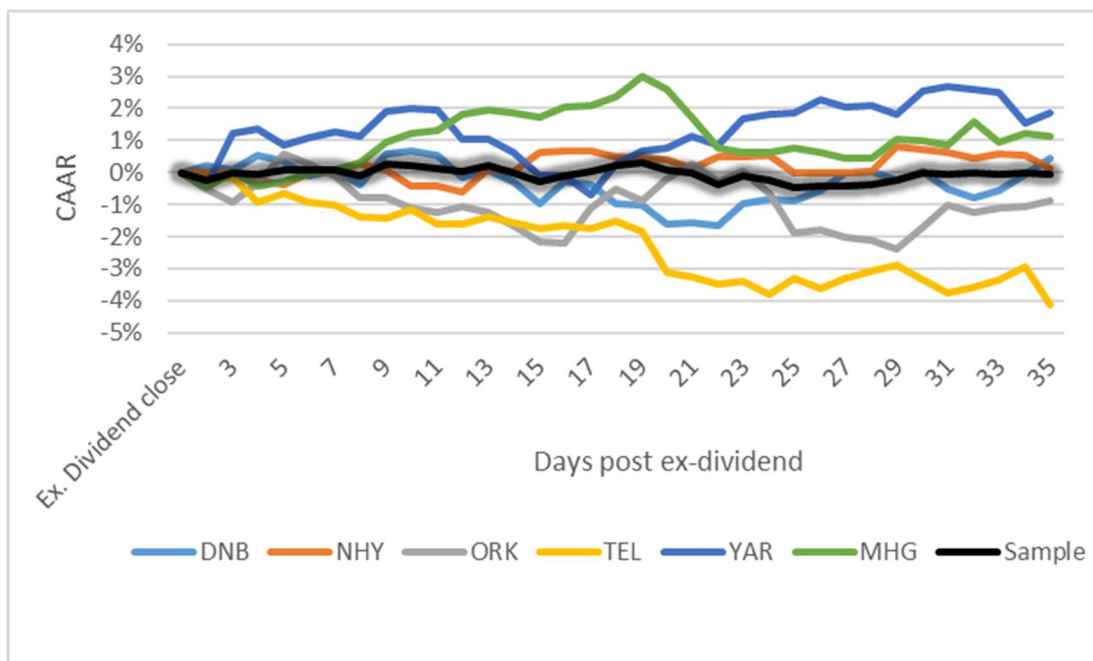


Figure 19 CAARs for individual companies and the sample average post ex-dividend

Table 5 Calculation of optimal duration

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CAAR	0,00 %	-0,26 %	-0,03 %	-0,05 %	0,09 %	0,06 %	0,06 %	-0,11 %	0,25 %	0,22 %	0,14 %	0,02 %	0,22 %	-0,03 %	-0,29 %
SD	0,00 %	2,05 %	2,76 %	3,21 %	3,38 %	3,72 %	3,73 %	4,01 %	4,66 %	4,78 %	5,28 %	5,56 %	5,53 %	5,79 %	5,86 %
SHARPE	N/A	-0,13	-0,01	-0,01	0,03	0,02	0,02	-0,03	0,053	0,046	0,03	0,00	0,04	-0,01	-0,05
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
CAAR	-0,09 %	0,03 %	0,23 %	0,31 %	0,10 %	-0,02 %	-0,37 %	-0,10 %	-0,24 %	-0,49 %	-0,43 %	-0,42 %	-0,40 %	-0,24 %	-0,03 %
SD	5,90 %	6,19 %	6,40 %	6,81 %	6,71 %	6,84 %	6,77 %	6,72 %	6,96 %	7,16 %	7,38 %	7,63 %	7,88 %	8,12 %	7,99 %
SHARPE	-0,02	0,00	0,04	0,05	0,02	0,00	-0,05	-0,02	-0,03	-0,07	-0,06	-0,06	-0,05	-0,03	0,00

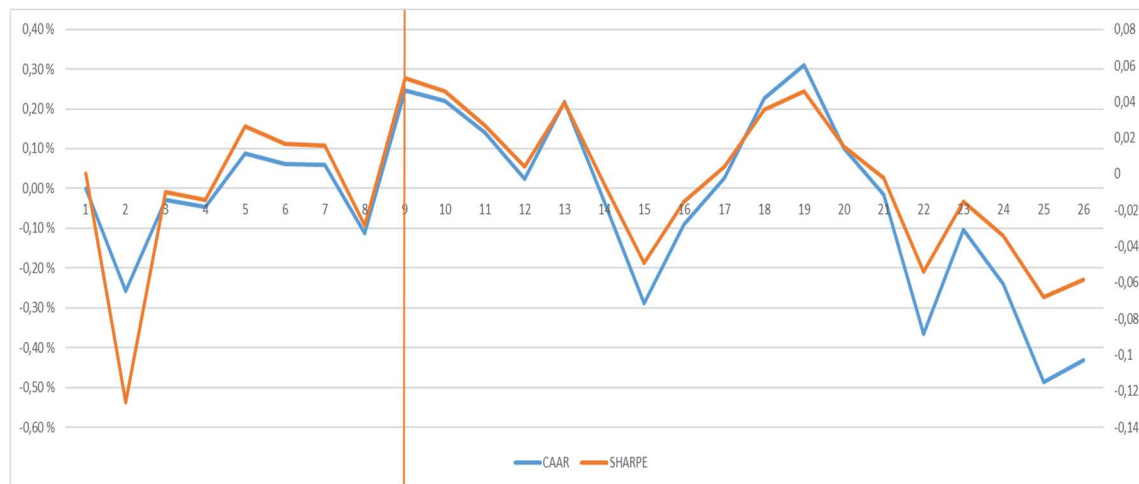


Figure 20 Graphic of optimal duration.

As can be seen in table 5 and figure 20 above, the 9th day post ex-dividend has the highest sharpe-ratio and is therefore the best ending point for calculation of positive return when taking the volatility into account. This point is optimal because it is the most likely to produce a significant positive result because it has the relative highest return corrected for the volatility in the sample. Please note the standard deviation sharp increase from ex-dividend day 1 to 2. This is an indication that the stock prices fluctuate more the first days ex-dividend than for the rest of the considered dates.

Important note: The CAAR's calculated for determining the duration of the strategy's event window is slightly different from the one calculated later in the analysis. This is the case because the numbers used in the duration calculation is continuously rounded to the nearest 1/100. Whereas in the later conclusive analysis, all decimal numbers are carried forward and rounded to the nearest 1/100 at the end. This is, however, not considered a problem because the rounding methods are held consistent within the two separate mentioned items and the rounding method used in the final part of the analysis to conclude on the research problem is considered to be the most precise.

As we have defined the ending point of the event window, we can define the relevant time-windows for the event:

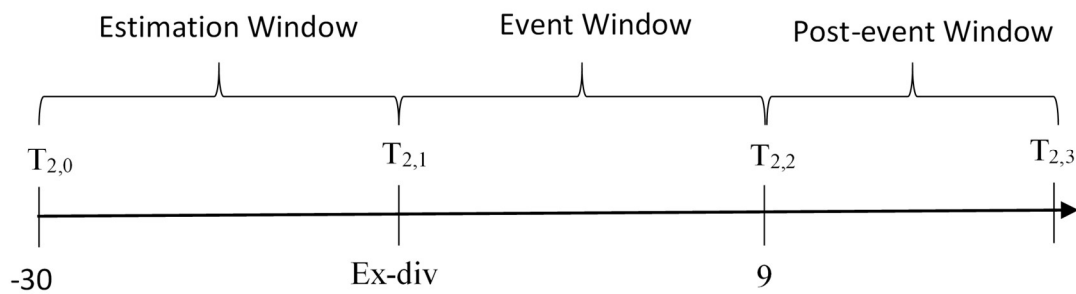


Figure 21 Illustration of Event Windows on Timeline for strategy 2: Ex-dividend

The Estimation window is as for the first strategy defined as 30 days prior to the ex-dividend date. This is as mentioned earlier to avoid overlapping and to attempt to find the best compromise between representative- and seasonality issues for long estimation windows and over-exposure to short term “noise” for shorter estimation windows. The event window stretches from the closing price on the first day ex-dividend and ends on the closing price on the 9th day ex-dividend. The post-event window is not considered in this study. We note that the estimation window for the ex-dividend strategy overlaps with the event window of the dividend inclusive strategy. This is, however not an issue because the two strategies is analysed and assessed separately.

4.2.2 Calculation of Returns

To calculate the abnormal returns on the events we first have to calculate the normal returns through estimation of alpha and beta coefficients in correspondence with the method previously discussed in chapter 3.1.2.1. for further details on the calculation of the beta and alpha coefficients please see appendix C. The normal return that is calculated for the individual periods by the use of these coefficient is subtracted from the actual cumulative returns produced by the strategy to arrive at the cumulative abnormal returns. The actual cumulative returns for this strategy are the return for the period from the closing price one the ex-dividend date to the closing price on the 9th day of trading ex-dividend. The calculated cumulative actual returns and cumulative abnormal returns are summarized in the table and histogram below:

Table 6 Actual return, Alpha, Beta, Normal return and Cumulative Abnormal Return for all events for ex-dividend strategy.

		Ex-Dividend Strategy											
Event nr.	Stock	Return	Alpha	Beta	Normal Return	CAR	Event nr.	Stock	Return	Alpha	Beta	Normal Return	CAR
1	DNB	3,18 %	0,20 %	0,40	1,94 %	1,25 %	53	ORK	5,78 %	-0,02 %	0,30	0,76 %	5,03 %
2	DNB	1,75 %	0,06 %	0,48	1,06 %	0,69 %	54	ORK	0,81 %	-0,21 %	0,98	2,75 %	-1,93 %
3	DNB	6,61 %	0,11 %	-0,02	0,07 %	6,54 %	55	TEL	-0,31 %	-0,28 %	1,18	-2,44 %	2,14 %
4	DNB	12,08 %	0,10 %	1,02	4,71 %	7,37 %	56	TEL	1,76 %	0,05 %	1,18	-0,38 %	2,14 %
5	DNB	0,00 %	0,05 %	0,65	-1,28 %	1,28 %	57	TEL	1,32 %	-0,04 %	0,98	-0,65 %	1,97 %
6	DNB	1,20 %	0,14 %	0,59	-2,00 %	3,20 %	58	TEL	-6,48 %	-0,10 %	1,20	4,04 %	-10,52 %
7	DNB	2,60 %	0,13 %	0,66	0,74 %	1,86 %	59	TEL	10,42 %	0,27 %	0,58	1,70 %	8,71 %
8	DNB	-4,18 %	-0,10 %	1,04	0,31 %	-4,49 %	60	TEL	1,99 %	0,10 %	1,28	2,20 %	-0,21 %
9	DNB	3,92 %	-0,66 %	1,45	6,91 %	-2,99 %	61	TEL	2,09 %	-0,19 %	1,09	8,11 %	-6,02 %
10	DNB	1,21 %	-0,14 %	0,90	-2,47 %	3,68 %	62	TEL	1,79 %	0,32 %	0,87	2,30 %	-0,52 %
11	DNB	-5,28 %	0,07 %	0,92	-2,26 %	-3,01 %	63	TEL	-1,04 %	0,22 %	0,56	0,51 %	-1,55 %
12	DNB	-17,21 %	0,12 %	1,45	-6,81 %	-10,40 %	64	TEL	-7,60 %	0,12 %	0,56	-0,48 %	-7,12 %
13	DNB	2,10 %	0,04 %	1,56	3,97 %	-1,87 %	65	TEL	-3,06 %	0,06 %	0,73	0,46 %	-3,52 %
14	DNB	4,10 %	-0,17 %	1,19	4,61 %	-0,51 %	66	TEL	-0,70 %	0,07 %	1,32	1,96 %	-2,66 %
15	DNB	0,37 %	0,07 %	1,05	-1,60 %	1,97 %	67	YAR	7,61 %	0,05 %	1,09	2,83 %	4,78 %
16	DNB	-1,73 %	-0,11 %	1,33	-2,76 %	1,03 %	68	YAR	-8,13 %	-0,52 %	0,58	-5,14 %	-2,99 %
17	DNB	10,01 %	-0,04 %	1,42	4,22 %	5,79 %	69	YAR	8,82 %	-0,18 %	1,16	5,82 %	3,00 %
18	NHY	7,86 %	0,33 %	0,42	3,12 %	4,74 %	70	YAR	4,06 %	0,72 %	0,80	3,89 %	0,16 %
19	NHY	-0,40 %	0,06 %	0,58	0,76 %	-1,16 %	71	YAR	13,02 %	0,33 %	1,01	2,45 %	10,56 %
20	NHY	1,53 %	0,15 %	1,15	2,61 %	-1,07 %	72	YAR	-6,12 %	-0,57 %	0,78	-5,00 %	-1,12 %
21	NHY	-1,02 %	-0,01 %	0,87	2,59 %	-3,61 %	73	YAR	4,93 %	0,49 %	1,78	-2,29 %	7,21 %
22	NHY	3,97 %	-0,03 %	1,38	4,83 %	-0,86 %	74	YAR	-8,54 %	0,05 %	0,95	-3,95 %	-4,60 %
23	NHY	2,33 %	0,08 %	1,14	3,64 %	-1,31 %	75	YAR	0,96 %	0,01 %	0,94	1,43 %	-0,46 %
24	NHY	-12,30 %	-0,14 %	1,41	-16,12 %	3,82 %	76	YAR	4,23 %	0,29 %	0,59	1,38 %	2,85 %
25	NHY	2,12 %	0,19 %	1,18	4,03 %	-1,91 %	77	YAR	2,60 %	-0,28 %	0,98	-1,47 %	4,07 %
26	NHY	5,13 %	0,10 %	1,03	3,94 %	1,20 %	78	YAR	1,77 %	-0,14 %	0,80	2,09 %	-0,31 %
27	NHY	-8,32 %	0,17 %	1,29	-6,24 %	-2,08 %	79	YAR	4,80 %	-0,17 %	1,22	-0,58 %	5,38 %
28	NHY	-1,96 %	0,06 %	1,44	1,33 %	-3,29 %	80	MHG	10,95 %	-1,37 %	1,69	-1,80 %	12,75 %
29	NHY	6,35 %	-0,40 %	1,08	-0,43 %	6,78 %	81	MHG	-0,19 %	0,42 %	0,90	3,13 %	-3,32 %
30	NHY	-0,71 %	0,20 %	0,93	0,01 %	-0,72 %	82	MHG	2,22 %	0,45 %	0,83	5,63 %	-3,41 %
31	NHY	0,41 %	0,24 %	0,80	0,61 %	-0,20 %	83	MHG	-2,36 %	0,04 %	1,19	1,78 %	-4,15 %
32	NHY	5,52 %	-0,59 %	1,05	1,07 %	4,45 %	84	MHG	-13,01 %	0,15 %	0,72	-1,35 %	-11,66 %
33	NHY	-0,56 %	-0,11 %	1,11	2,29 %	-2,85 %	85	MHG	-2,89 %	0,30 %	0,49	-0,13 %	-2,76 %
34	NHY	6,16 %	-0,31 %	1,72	6,64 %	-0,47 %	86	MHG	8,68 %	-0,06 %	1,81	0,72 %	7,96 %
35	ORK	3,57 %	0,18 %	0,56	1,68 %	1,89 %	87	MHG	3,13 %	0,06 %	0,93	-0,13 %	3,26 %
36	ORK	-3,02 %	0,25 %	0,33	0,64 %	-3,66 %	88	MHG	-5,47 %	-0,27 %	-0,08	-0,11 %	-5,36 %
37	ORK	3,56 %	-0,08 %	0,09	-0,24 %	3,80 %	89	MHG	2,17 %	0,41 %	0,18	1,02 %	1,15 %
38	ORK	6,28 %	-0,07 %	0,98	3,86 %	2,42 %	90	MHG	0,23 %	0,02 %	2,02	-2,61 %	2,84 %
39	ORK	-0,91 %	-0,33 %	0,91	-2,21 %	1,31 %	91	MHG	5,13 %	0,41 %	1,01	1,38 %	3,75 %
40	ORK	-3,18 %	0,06 %	1,00	-4,37 %	1,19 %	92	MHG	1,20 %	-0,36 %	0,67	-1,17 %	2,36 %
41	ORK	-1,51 %	0,03 %	1,21	6,19 %	-7,70 %	93	MHG	6,77 %	-0,09 %	0,84	0,59 %	6,19 %
42	ORK	6,03 %	0,31 %	0,57	1,70 %	4,33 %	94	MHG	1,19 %	0,38 %	0,78	-0,07 %	1,26 %
43	ORK	7,92 %	-0,37 %	1,47	11,92 %	-4,01 %	95	MHG	1,85 %	0,14 %	0,68	0,17 %	1,68 %
44	ORK	5,71 %	-0,25 %	0,91	10,88 %	-5,17 %	96	MHG	-4,96 %	0,34 %	0,55	1,95 %	-6,91 %
45	ORK	-7,87 %	-0,14 %	0,57	-3,60 %	-4,27 %	97	MHG	4,88 %	0,06 %	-0,05	-0,62 %	5,50 %
46	ORK	2,44 %	0,14 %	0,65	1,44 %	0,99 %	98	MHG	1,17 %	-0,27 %	0,42	0,27 %	0,89 %
47	ORK	-6,40 %	-0,34 %	0,62	0,23 %	-6,63 %	99	MHG	5,35 %	-0,12 %	1,22	3,07 %	2,28 %
48	ORK	-2,44 %	-0,26 %	0,75	-0,11 %	-2,33 %	100	MHG	-5,03 %	0,02 %	0,87	0,54 %	-5,57 %
49	ORK	2,12 %	0,16 %	0,23	0,68 %	1,44 %	101	MHG	-2,62 %	0,14 %	1,54	-3,18 %	0,56 %
50	ORK	3,53 %	0,12 %	1,53	7,17 %	-3,63 %	102	MHG	1,12 %	0,20 %	0,69	1,52 %	-0,40 %
51	ORK	-3,90 %	-0,32 %	1,56	-1,09 %	-2,81 %	103	MHG	0,00 %	-0,15 %	0,67	-0,24 %	0,24 %
52	ORK	-0,07 %	-0,12 %	0,32	1,06 %	-1,13 %							

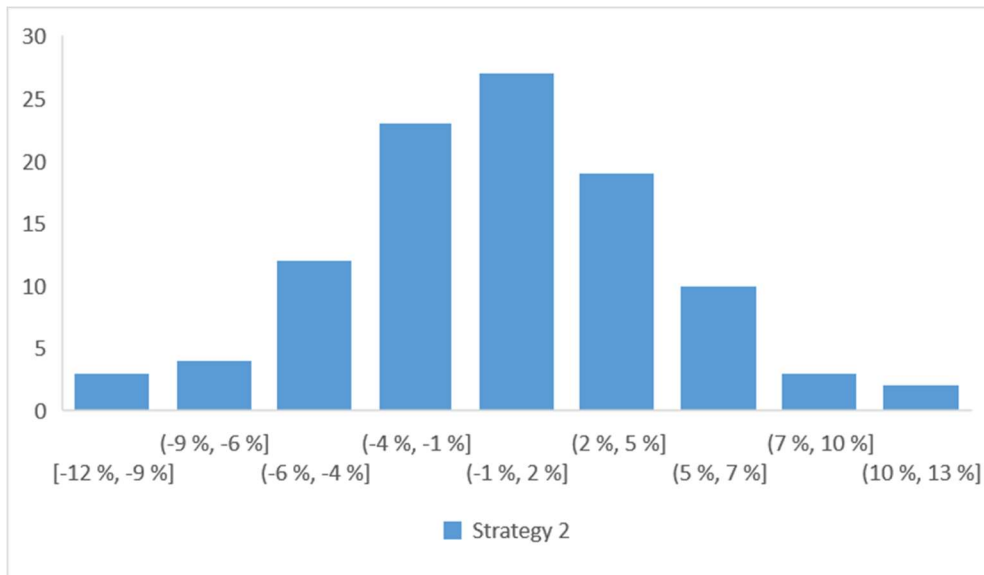


Figure 22 CARs Histogram for the ex-dividend strategy

Average CAR(CAAR)	0,12 %
Positive Cumulative Abnormal Return for Strategy 2:	50,49 % of the events

For the ex-dividend trading strategy, the investor gains positive abnormal return in 50,49 % of the events. This can be considered a small improvement over the dividend inclusive strategy. This is also evident due to the considerable lower standard deviation of 4,38 %, down from 7,13 % for the dividend inclusive strategy.

4.2.3 Significance- and Hypothesis Testing

Through calculating the significance of the CAAR for the second trading strategy by the use of student's t-test, we seek to reach a conclusion on whether the null hypothesis we have defined can be rejected to the benefit of the alternative hypothesis:

CAAR= Cumulative Average Abnormal Return

$$H^2_0: CAAR_2=0$$

$$H^2_a: CAAR_2 \neq 0$$

If the CAAR turns out to be insignificant, in other words not significantly different from zero, we fail to reject the null hypothesis for the benefit of the alternative hypothesis. We can only

reject the null hypothesis for the benefit of the alternative hypothesis if the CAAR is significantly different from zero. Failing to reject a wrong null hypothesis or reject a true null hypothesis would lead to a type 1 or -2 error.

$$\theta_2 = \frac{CAAR_{2(\tau_1, \tau_2)}}{Var(CAAR_{2(\tau_1, \tau_2)})^{1/2}} \sim N(0,1)$$

$$\theta_2 = \frac{0,0012}{0,0438} = 0,0274$$

$$P_{2,two-tails} = 0,780378$$

The p-value of 0,7804 means that the CAAR is not significantly different from zero at levels of confidence that is considered required for such analysis. As a consequence of this we have to conclude that we cannot reject H^2_0 at any meaningful level of confidence.

4.3 Dividend's Relative Size Impact on Abnormal Returns

As it is suggested from available previous research that the relative size of the dividend decides the magnitude of the mispricing, we have made a plot which shows the relationship between average abnormal for both strategies for the individual events in the total dataset:

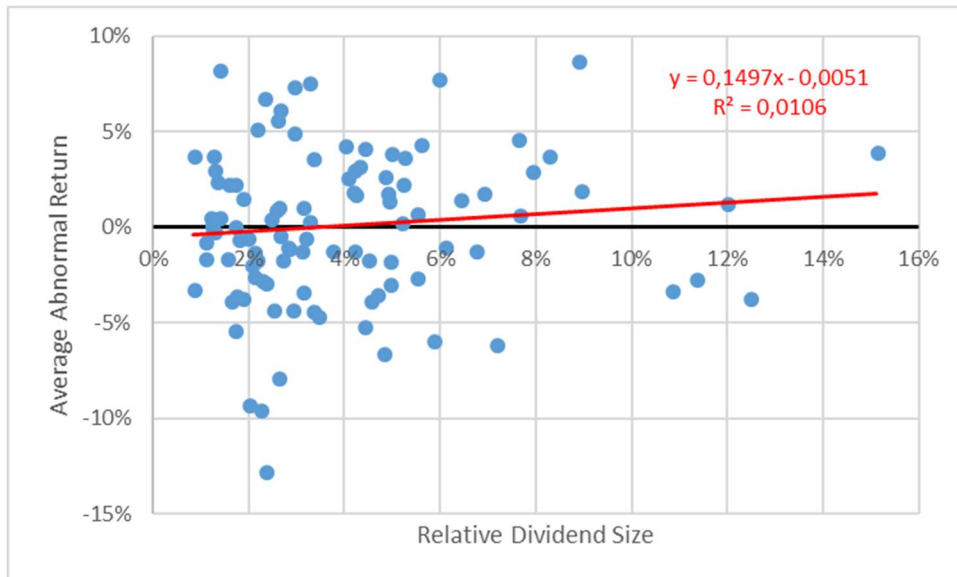


Figure 23 Plot of Average Abnormal Return/Relative Dividend Size

As can be seen from the regression line in the plot chart, there is a positive relationship between the larger dividends and higher abnormal return. However, the R^2 which measures the explanation power of the regression, is only 0,0106. This means that the regression explains just over one percent of the data points.

The significance of the relationship can be seen by the regression print-out:

Table 7 Regression summary print-out, Microsoft Excel

SUMMARY OUTPUT								
<i>Regression Statistics</i>								
Multiple R	0,10313							
R Square	0,010636							
Adjusted R	0,00084							
Standard E	0,039681							
Observatio	103							
<i>ANOVA</i>								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>ignificance F</i>			
Regression	1	0,00171	0,00171	1,085762	0,2999			
Residual	101	0,159036	0,001575					
Total	102	0,160746						
<i>Coefficientsandard Error t Stat P-value Lower 95% Upper 95%ower 95,0%pper 95,0%</i>								
Intercept	-0,00513	0,006849	-0,74877	0,455738	-0,01872	0,008459	-0,01872	0,008459
X Variable	0,149735	0,1437	1,041999	0,2999	-0,13533	0,434798	-0,13533	0,434798

From this we can see that the x-variable which represents the average dividend size has a p-value of 0,2999. This means that it is only significant at 70% confidence level. As we normally consider confidence levels below 85% to be insignificant, we have to conclude that the relationship is not significant at any meaningful levels of confidence. Consequently, we have to conclude that we are unable to establish any relationship between the size of dividend and the level of abnormal return for this material.

This result does not have any consequences for the rest of the analysis. It might, however, be an early sign that the data material collected for this analysis has differences from that of the earlier research. Consequently, the results of the analysis and conclusion may be different.

4.4 Possible Sources of Error

Once the analysis is completed it is important to point out some possible sources of error that might impact the reliability of the analysis and overall trustworthiness of the implications.

Minor issues that is extensively commented earlier on in this thesis is not covered under this chapter.

The maybe most crucial factor to consider in this matter is concerning the integrity of the data material. Although no indications of severe risk to such is discovered during the data collection and analysis, one always have to consider the possibility that the data material

might hold wrong- or missing information. If this was to occur in the extracted material for the event- or estimation window it would be most unfortunate. In such case, the analysis could produce false results and make us draw a wrong conclusion. Other concerns regarding the integrity of the data material includes the possibility for the data material to fail to incorporate corrections to stock splits and -reverse splits. During the collection of the data this was an ever-returning issue, as information about dividends was collected from external sources. In most cases, the information was clearly marked as being corrected for the relevant events.

When considering the possible sources of error concerning the analysis and the implications of it, one always has to keep in mind the possibility for causality issues. In wide event windows, the likelihood of company-specific event occurring and interfering with the return of the stock increases. The similar effect arises when extraordinary company-specific events happen in the estimation window. In both cases, the calculated normal return would be wrong because the relationship between the stock- and market movements is not representative for the event window. The representativeness of the estimation window for the event window is always an issue in event studies. Only major company news which moves the stock price more than 25 percent in either direction during the event window (of which there were none) has been considered due to the relative assumed level of importance with respect to the amount of work required. In addition to company news, external news events as well as new estimates from influential stock analysts might also influence the stock price developments. The occurrence of such new estimates releases from analysts is more likely in the event period of the dividend inclusive strategy as new earnings and guiding report from the company often is recently released.

In this context, it is also important to realize that the analysis does not distinguish between extraordinary- and ordinary dividend. As this is not specified in the research problem, it poses no risk to the analysis. However, it is important to keep in mind that investors might act differently between these events.

5. Conclusion

5.1 Results of the Analysis

The analysis showed a positive mean value for both the dividend inclusive- and the ex-dividend strategy. The analysis also revealed that the cumulative abnormal returns from the different strategies had varying standard deviations.

Table 8 CAR's Standard Deviation

	SD
Trading Strategy 1: Dividend inclusive	7,13 %
Trading Strategy 2: Ex-dividend	4,38 %

Here we can see that the dividend inclusive strategy has the highest standard deviation. The deviation is considerably higher than that of the ex-dividend strategy. This off course impacts the significance of the mean value for that strategy negatively. As the mean value of the CAR's for the dividend inclusive strategy is also the smallest at 0,03 %, we must conclude that it is the weakest strategy.

The significance testing of the mean values for both strategies shows that they are not significantly different from zero, which is our null hypothesis, on any meaningful level of confidence. Therefore, we cannot reject the null-hypothesis and adopt the alternative hypothesis.

In the analysis we also analysed the data for evidence of a positive relationship between the size of the dividends measured by size relative to the closing stock price on the last day including dividend rights and the abnormal returns the events produced. This was done because some earlier research covered in this thesis found that there existed a positive relationship in their data sample. Our analysis shows that a positive relationship does indeed exist in our data as well. However, the regression which suggest this relationship has such weak "explanation power" measured by R^2 and level of significance that we cannot consider this to be a reliable result.

5.2 Implications of the Results

Although the results did not manage to challenge the H_0 Hypothesis' it does not mean that there is no use or implications to be drawn from it. In fact, the results bring additional support to other well-known previous research on market efficiency (Fama, 1970) and dividend irrelevancy (Miller & Modigliani, 1961).

The event of dividend pay-outs can be considered a non-event in the meaning of the words used by Eugene Fama in the EMH. The result brings additional support to the theory from EMH that non-events should not yield abnormal return. Although we do not have enough data to conclude that the market efficiency is semi- or fully strong, we can say that much of the theory in the EMH seem to apply to the dividend events in our sample.

When it comes to the dividend irrelevancy, the event studies failing to detect significant abnormal return can indicate that investors are indeed indifferent between acquiring cash dividend and get "dividend" in the form of increased stock price. We cannot make an ultimate conclusion on this however, because it is possible that preferences vary between the companies. Until we are certain to have considered all the unknown factors that drives the investors' preferences regarding dividend we can only conclude that a preference for cash dividend over no dividend was not detected in these event studies.

The research on behavioural finance that was introduced in the theory chapter is not considered in the conclusions. This is because the abnormal returns from the trading strategies was not significant, thus an explanation in the form of application of research in behavioural finance is not needed.

Going back to our main research problem, we have to draw the conclusion that the stock market is efficient for our sample in the event of dividend payments. This does not, however, rule out the possibility for stocks from other market places and other time frames than the one explored in this thesis to be inefficient. The framework and methods described and used in this analysis should be easily utilized for other samples at later occasions in new event analyses.

As earlier mentioned, tax law specifics might influence the behaviour and preferences for investors. I therefore find it important to mention that a considerable change was done to private investors trading dynamics towards the very end of the timeframe for our dataset. On September 1. 2017, the Norwegian ministry of finance allowed for private investors to open special holding accounts that enables tax deferrals for profit made on closed positions, as

long as the profit is not withdrawn from the account (Government, 2018). The arrangement is only available for investments in publicly listed companies and funds with at least 80 % stock composition within the Europe Economic Area (EEA). This deferral benefit could earlier only be accomplished by registered companies. The new arrangement does have one unfortunate effect however. Namely, the dividends paid out by companies is taxed in the conventional manner. This implies that the investor following this arrangement should prefer to achieve returns in the form of increase of stock price rather than receiving dividend because he would achieve a tax deferral. This would be a direct valuation of the dividend irrelevancy theory (Miller & Modigliani, 1961). I strongly encourage future event studies for the period following the introduction of this arrangement to explore if any effects of this change can be detected. Currently, the data needed for such study is not available because the change is too recent.

5.3 Personal Remarks

Naturally, my initial reaction to the results was that they were disappointing as they did not prove my alternative hypothesis. However, it is equally interesting that the results brings support to many of the established theories of market efficiency and that they are also accurate for the period around dividend pay-outs. When it comes to the initial hypothesis, I might have been the victim to the phenomena described in the section about the random walk hypothesis myself. Namely that people, in this case me, have a tendency to see patterns and trends that does not exist.

While calculating the optimal duration for the ex-dividend strategy I discovered that there seem to be abnormal high levels of volatility in the stock prices following the commencement ex-dividend trading. This can be an indication that short term trading opportunities using other trading strategies, such as the ones that make use of technical analysis to identify optimal buying and selling levels can be used to obtain abnormal returns. It is important to point out that this is merely speculations. However, such strategies should be explored such that the possibility could be confirmed or disproved. I encourage further research on this possible strategy and the field in general. This is important research because it in the long run cause the financial markets to become increasingly efficient. Although fully efficient markets are a practical impossibility, people should always strive to make the markets as efficient as practically possible such that abnormal returns on large scales cannot be obtained.

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APPENDIX A – Hypothesis- and Significance Testing

To be able to draw a conclusion on the research problem, it has to be tested whether the null-hypothesis can be rejected at any given significance level. After doing this, one should be able to tell whether the alternative hypothesis is true, and how certain we are that we have reached the right conclusion. There are several different tests, all of which is designed for different types of data material. Among the most known is students t-test, F-test and Chi-squared.

In this thesis we use the students t-test as it is adequate test to spot significant difference between the average of two different datasets. This test can also be used in different configurations depending on your dataset or what you want to test. The t-test can be used for both independent or paired samples. Paired samples are data where one wish to compare before-and-after data, for instance when testing blood pressure before and after a medication is given. In this thesis however, the nature of the collected data is such that independent sample t-test is the correct choice.

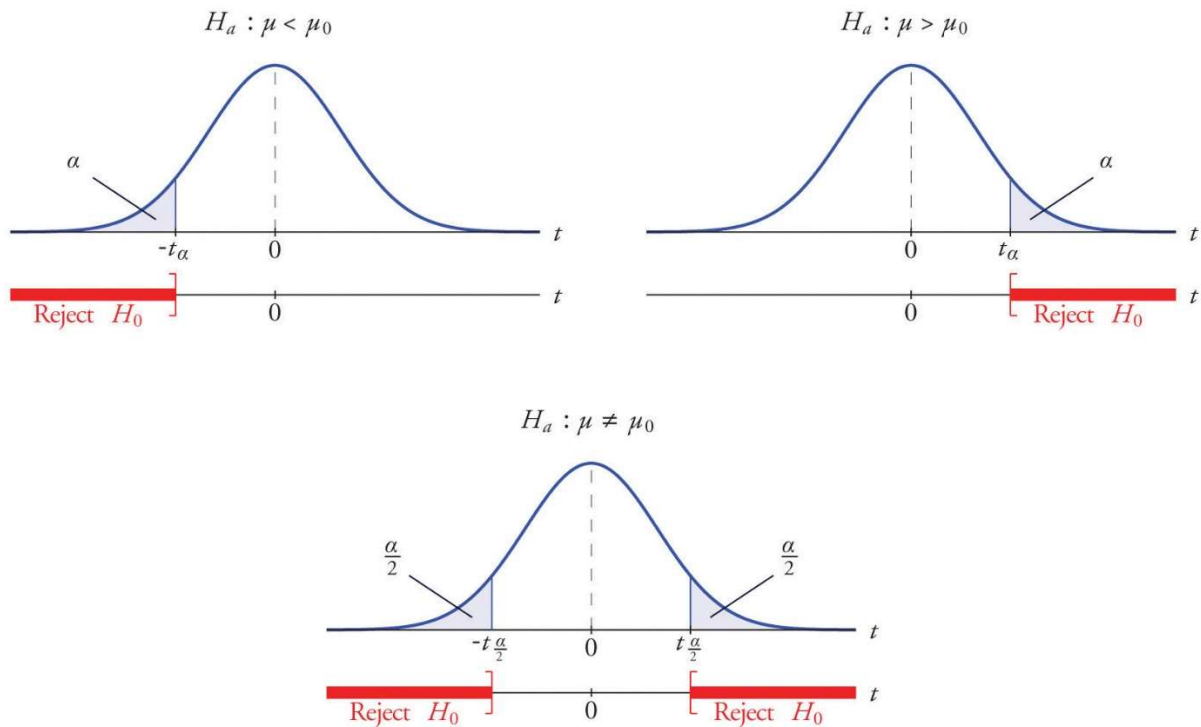
To be able to keep or reject the null-hypothesis we first have to compute a t-value. We use the following formula to compute the t-value:

\bar{x} = *sample average*

s = *sample standard deviation*

$$t = \frac{(\bar{x}_1 - \bar{x}_2)}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

After computing the t-statistic we need to know whether we want a one or two tailed test. This can easily be observed by looking at the alternative hypothesis. If it is a one-tail test the alternative hypothesis would include the symbol for either ‘larger than’ or ‘smaller than’. If it on the other hand has the sign ‘not equal to’, it is a two-tail test. The tails refer to the interval of t-value of which we reject the null hypothesis and adapt the alternative-hypothesis. The size of this area depends on the level of significance we desire for the test. In other words, how certain we want to be that we are right to reject the null-hypothesis.



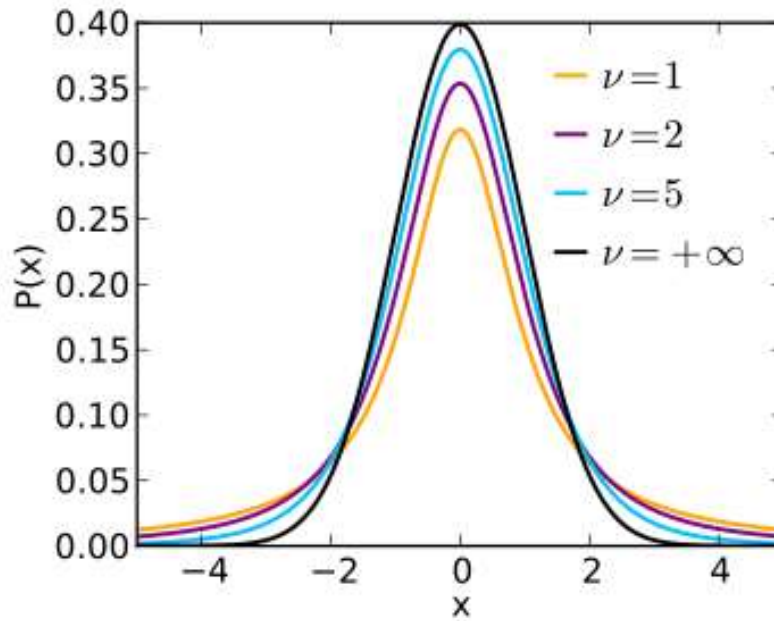
$\alpha = \text{level of significance}$

$t_\alpha = \text{critical values of } t \text{ given level of significance}$

Once the t-statistic is calculated it can be converted into a p-value. The p-value is a probability measure that makes it easy to see at what level the result is significant. For instance, a p-value of 0.02 would tell us that the null-hypothesis can be rejected at the 95 percent level of confidence, but not at the 99 percent level. The level of significance is the inverse of the confidence level. Usually we operate with level of significance of 1, 5, 10 or 15 percent. Higher levels than 15 percent is normally so high that it is considered pointless to be used in such a test. This is because the possibility for the alternative hypothesis to be true is very uncertain.

Degrees of freedom

Degrees of freedom is used instead of 'n' in smaller samples, typically when 'n' is lower than 50. For larger samples, the percentage change between 'n' and 'v' becomes so small that it does not matter. The impact of degrees of freedom on the t-distribution is illustrated below.



Types of error

When conducting this sort of hypothesis testing we say that one can make two types of error. They are simply called type 1 or type 2 error. Type one error arises when we make the error of incorrectly rejecting the null hypothesis, even though the null hypothesis is true. The type 2 error is when the researcher fails to reject a false null-hypothesis. Even though both types of error should be of genuine concern, one can argue that the type 1 error is more serious. This is because failing to reject the falls null hypothesis only results in a 'status quo' outcome, while a false rejection would lead to the rejection and replacement of the 'status quo' by the new false theory.

APPENDIX B – Determining Duration for the Ex-dividend Strategy

Input:

Instrument	Ex-dividend close	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
1 DNB	31.4	32.00	32.00	31.80	31.90	32.10	32.00	32.40	32.40	32.30	32.10	31.90	32.20	31.70	31.30	32.00	32.40	32.30	32.00	32.00	31.80	31.80	32.80	32.50	31.60	32.60
2 DNB	40.00	40.00	39.90	39.90	40.10	39.90	40.00	39.90	40.70	42.70	41.90	42.50	42.90	42.40	42.00	40.90	39.60	39.50	39.30	39.00	38.70	39.60	39.40	39.80	40.00	41.10
3 DNB	43.90	44.00	44.40	44.50	44.90	44.90	45.30	46.10	46.80	46.50	46.50	46.20	46.20	44.40	44.90	45.60	46.20	43.00	42.00	41.00	41.40	41.50	41.60	40.30	40.60	41.50
4 DNB	29.80	30.00	32.30	33.40	33.20	33.10	33.60	33.60	33.40	34.60	35.00	35.00	35.50	35.50	35.10	34.10	33.40	34.30	34.40	34.40	34.40	35.60	36.40	37.40	37.60	
5 DNB	43.90	43.50	44.20	44.60	44.60	43.80	43.60	44.00	43.50	43.00	42.80	42.40	43.40	43.00	43.00	42.80	42.10	42.90	42.60	42.40	43.60	43.40	43.60	44.30	44.80	
6 DNB	62.90	63.25	61.25	60.00	60.00	60.00	60.25	61.50	63.25	64.25	65.00	64.00	63.75	64.25	63.25	63.00	62.75	63.00	62.75	62.25	62.75	62.50	62.50	63.25	62.50	63.75
7 DNB	86.50	86.25	85.50	86.00	86.00	87.25	87.25	87.75	88.75	89.75	89.25	88.50	88.25	87.75	87.75	81.25	80.25	78.00	79.75	80.50	80.75	82.50	82.50	81.00	81.50	
8 DNB	83.70	85.80	84.70	83.50	84.90	82.00	82.00	82.60	80.20	79.00	79.00	79.30	79.90	82.40	81.80	82.00	82.10	81.40	81.10	80.60	80.00	79.80	81.00	81.40	81.30	
9 DNB	74.00	73.00	71.50	75.90	75.20	75.90	76.00	76.00	76.90	75.80	76.80	75.80	74.80	75.70	73.90	72.90	72.20	72.20	73.50	74.00	71.90	72.40	72.20	72.50	72.70	
10 DNB	66.20	69.20	70.45	70.95	68.40	66.60	64.00	62.05	67.00	66.90	68.00	64.95	64.45	63.05	62.00	60.95	63.30	66.00	65.05	64.50	63.90	63.60	65.85	63.90	64.00	
11 DNB	85.30	86.15	85.50	85.35	84.45	80.00	80.00	80.00	80.70	80.00	80.05	79.70	81.05	80.15	78.50	79.75	80.80	80.35	80.40	80.50	81.15	82.75	83.00	82.00	82.70	
12 DNB	70.30	62.80	61.70	61.90	62.10	61.35	61.35	59.70	58.20	60.00	60.05	57.70	56.80	57.75	55.85	57.20	58.85	56.15	56.50	56.35	56.20	55.05	55.10	54.20	54.00	
13 DNB	93.00	94.30	95.15	96.60	95.85	95.70	95.00	95.15	94.95	95.00	97.00	97.00	94.90	93.25	94.95	95.25	95.45	95.45	95.45	95.25	92.25	91.00	92.55	92.00	90.10	
14 DNB	102.40	102.60	103.90	105.10	104.30	104.30	104.40	104.50	106.60	108.00	109.00	108.50	109.30	109.40	109.50	109.70	109.00	109.80	110.00	111.00	110.60	111.90	112.60	112.30	114.30	
15 DNB	136.60	139.60	137.70	135.50	134.00	136.90	135.20	133.90	137.10	137.20	137.20	139.80	138.80	139.50	139.20	139.50	138.60	139.50	136.80	137.40	137.00	136.50	136.30	135.90	137.80	
16 DNB	101.00	105.60	103.10	102.00	99.90	100.70	99.75	98.80	99.25	98.60	97.90	97.50	100.20	98.85	100.40	100.70	101.40	105.20	107.30	107.80	109.70	107.30	105.90	106.10	105.50	
17 DNB	132.90	133.00	134.10	140.00	140.40	141.90	142.30	142.60	146.30	145.90	147.00	147.00	144.20	145.90	147.50	146.90	146.40	145.80	145.40	145.80	145.40	143.10	143.80	142.40	141.60	
18 HW	20.63	21.25	21.67	22.22	22.19	22.29	22.35	22.38	22.25	22.16	22.38	22.38	22.90	23.49	23.29	23.10	22.87	22.58	22.25	22.22	22.22	22.22	22.22	21.99	21.73	
19 HW	24.39	24.20	24.30	24.17	24.07	23.91	24.59	24.30	24.30	24.30	24.30	24.29	24.65	24.90	25.01	25.56	25.63	25.50	25.66	25.40	25.25	25.24	25.25	25.47	25.34	
20 HW	27.51	26.99	26.80	27.54	27.70	27.83	28.03	27.80	27.93	27.57	27.12	26.80	26.86	26.89	26.93	26.47	26.67	26.15	25.89	25.24	24.65	25.01	24.20	24.56	25.24	
21 HW	19.11	19.14	18.85	18.59	18.72	18.88	19.01	18.78	18.91	18.78	19.17	19.04	18.88	18.56	19.43	19.20	19.85	20.05	21.22	21.09	21.73	21.61	22.23	21.48		
22 HW	26.15	26.86	26.80	26.31	26.11	26.08	26.50	26.92	27.18	27.12	27.02	27.41	27.74	27.27	27.67	28.08	28.03	28.03	28.09	28.29	27.90	28.00	28.26	28.74	29.52	
23 HW	32.02	32.93	33.38	33.26	33.41	33.02	31.92	32.92	32.76	32.83	32.47	32.83	33.25	33.80	32.96	34.19	34.00	34.32	34.55	34.55	34.74	34.68	34.94	34.65	35.72	
24 HW	61.96	63.58	60.99	57.09	56.38	52.07	52.55	49.96	54.34	52.39	55.80	57.09	55.47	54.82	54.66	55.80	54.47	53.69	49.47	51.26	49.47	46.71	47.36	51.74	49.96	
25 HW	46.45	45.85	46.58	46.42	47.39	48.12	48.12	48.40	47.60	48.40	48.30	47.55	47.25	48.20	48.30	48.40	50.10	52.00	52.30	51.60	51.10	50.30	49.75	51.00	50.20	
26 HW	77.90	77.30	74.90	78.10	81.50	85.50	83.90	85.20	81.90	83.40	85.60	84.20	83.50	80.90	82.30	82.00	81.00	81.20	81.50	78.70	77.50	79.70	78.90	79.00	77.40	
27 HW	43.15	42.50	40.54	42.92	43.50	43.16	41.76	41.59	39.56	38.03	38.42	36.96	38.14	39.85	39.40	38.56	38.36	38.78	37.66	36.00	36.22	36.53	38.12	37.88		
28 HW	43.38	43.86	43.90	43.66	42.86	42.83	42.55	42.53	42.53	43.32	43.99	40.87	41.74	41.85	42.15	42.26	43.17	42.47	41.24	41.41	41.42	40.38	40.63	39.77		
29 HW	25.50	26.00	26.85	26.20	25.51	25.56	25.42	26.06	27.12	25.99	25.96	26.26	25.70	25.37	25.38	24.83	25.13	26.00	26.61	26.25	25.77	26.03	26.03	25.97		
30 HW	26.68	26.44	26.29	26.06	26.30	26.90	27.05	26.49	26.49	26.55	26.62	26.73	26.50	26.73	26.80	26.66	26.58	26.73	26.80	26.15	26.80	25.55	25.67	25.66		
31 HW	31.93	32.11	32.88	33.34	33.00	32.45	32.45	32.06	31.90	32.56	32.99	32.87	32.70	32.50	32.60	32.70	32.81	32.36	32.95	33.33	33.62	33.51	33.45	33.48		
32 HW	35.52	36.27	36.20	35.53	36.45	37.09	37.57	37.31	37.48	36.69	36.29	35.08	35.61	35.48	36.48	36.65	37.57	37.87	37.27	37.46	37.19	37.43	37.26	36.54		
33 HW	32.14	32.49	32.83	31.45	31.78	31.87	31.80	31.66	31.96	31.44	32.43	32.26	33.08	33.30	33.86	33.08	33.18	33.25	32.64	32.52	32.40	33.00	32.82	33.03		
34 HW	46.23	46.79	46.42	46.57	46.67	47.06	47.16	48.49	49.08	45.98	47.82	47.56	47.69	47.62	47.48	47.86	47.48	45.53	45.66	45.34	45.31	46.33	46.75	46.47		
35 OK	28.00	28.00	28.00	28.30	28.40	28.30	28.40	28.00	28.00	28.30	30.20	30.20	29.20	29.40	28.90	29.00	29.00	29.40	29.40	30.40	31.00	30.80	30.80	30.50		
36 OK	33.10	33.90	32.80	32.50	32.00	32.10	32.00	32.10	32.00	32.10	33.00	33.50	33.80	33.80	33.10	32.70	32.80	32.50	32.00	32.00	31.60	30.40	31.00	33.00		
37 OK	30.80	30.80	31.50	31.50	31.70	31.70	31.80	32.00	32.00	32.00	32.00	32.00	31.80	31.80	31.70	31.80	31.80	31.80	31.70	31.70	31.70	30.50	30.75			
38 OK	23.80	23.40	22.40	23.00	23.20	23.50	24.30	25.40	24.70	24.50	24.20	24.20	24.40	24.40	24.40	24.40	24.40	25.00	25.10	25.30	25.30	25.40	25.40			
39 OK	33.10	33.50	34.50	34.20	33.90	32.80	32.40	32.80	32.70	32.50	32.80	32.80	33.10	33.10	33.10	33.50	34.00	33.80	33.40	33.90	34.60	34.50	35.50			
40 OK	44.00	44.20	44.10	44.40	45.40	45.70	44.60	44.40	42.80	42.20	41.10	43.10	43.40	42.80	43.20	42.80	43.40	43.20	43.40	43.20	44.20	45.30	44.80			
41 OK	66.20	67.60	66.80	69.30	70.30	69.30	68.50	67.20	65.20	63.20	63.20	60.40	59.10	56.80	59.30	58.10	58.70	60.80	59.60	59.90	59.50	61.00	59.50			
42 OK	92.90	92.80	93.40	94.10	95.10	95.80	96.50	96.20	96.50	96.40	96.80	96.40	97.30	96.20	96.70	96.70										

Aggregate Returns (For formulas see method chapter):

Instrument	Endvidende close	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	
1DNB	0.00%	1.91%	1.91%	1.27%	1.59%	2.23%	4.78%	3.18%	3.18%	2.87%	2.23%	1.59%	2.55%	0.66%	-0.32%	1.81%	3.18%	2.87%	1.91%	1.27%	1.27%	4.46%	3.50%	0.64%	3.82%	5.73%	8.28%	12.4%	9.87%	10.31%	10.31%	10.31%	15.29%	15.29%		
2DNB	0.00%	0.00%	-0.25%	-0.25%	0.25%	-0.25%	0.00%	-0.25%	1.75%	6.75%	4.75%	6.25%	7.25%	6.00%	5.00%	2.25%	4.75%	3.18%	2.87%	1.91%	1.27%	1.27%	4.46%	3.50%	0.64%	3.82%	5.73%	8.28%	12.4%	9.87%	10.31%	10.31%	10.31%	15.29%	15.29%	
3DNB	0.00%	0.23%	1.14%	1.77%	2.28%	2.28%	3.19%	5.01%	6.61%	5.92%	5.92%	5.24%	5.24%	2.96%	2.28%	3.87%	1.37%	-2.02%	-1.53%	-1.53%	-1.53%	-1.53%	-1.53%	-1.53%	-1.53%	-1.53%	-1.53%	-1.53%	-1.53%	-1.53%	-1.53%	-1.53%	-1.53%	-1.53%	-1.53%	
4DNB	0.00%	0.67%	8.39%	12.08%	11.41%	11.07%	12.75%	12.75%	12.08%	16.11%	17.45%	17.45%	19.13%	19.13%	17.79%	14.43%	12.08%	15.30%	15.10%	15.44%	14.09%	19.46%	22.15%	25.50%	26.17%	26.51%	24.5%	24.5%	21.14%	21.48%	18.12%	16.44%	18.79%	23.15%		
5DNB	0.00%	0.00%	0.61%	2.53%	2.53%	0.99%	0.23%	1.15%	0.00%	-1.15%	-1.15%	-1.15%	-1.15%	-1.15%	-1.15%	-1.15%	-1.15%	-1.15%	-1.15%	-1.15%	-1.15%	-1.15%	-1.15%	-1.15%	-1.15%	-1.15%	-1.15%	-1.15%	-1.15%	-1.15%	-1.15%	-1.15%	-1.15%	-1.15%	-1.15%	
6DNB	0.00%	1.20%	-2.00%	-4.00%	-4.00%	-4.00%	-3.60%	-1.60%	1.20%	2.80%	4.00%	2.40%	2.00%	2.80%	1.20%	0.80%	0.40%	0.40%	0.40%	0.40%	0.40%	0.40%	0.40%	0.40%	0.40%	0.40%	0.40%	0.40%	0.40%	0.40%	0.40%	0.40%	0.40%	0.40%	0.40%	
7DNB	0.00%	-0.29%	-1.16%	-2.58%	-0.58%	0.87%	0.87%	1.45%	2.60%	3.76%	2.02%	0.00%	-3.76%	-3.18%	-10.12%	-6.07%	-9.83%	-7.23%	-9.83%	-7.23%	-9.83%	-6.94%	-8.96%	-9.54%	-8.67%	-6.36%	-10.40%	-9.25%	-13.01%	-9.83%	-12.72%	-13.58%	-12.72%	-9.54%	-9.83%	
8DNB	0.00%	2.51%	1.19%	2.15%	1.43%	-2.03%	-2.03%	-1.31%	-4.18%	-5.62%	-5.62%	-5.62%	-4.54%	-3.76%	-2.78%	-2.03%	-1.91%	-2.75%	-4.11%	-3.70%	-4.42%	-4.66%	-3.23%	-2.75%	-2.87%	-3.23%	-3.58%	-4.42%	-5.97%	-5.73%	-5.26%	-7.17%	-7.05%	-5.62%	-5.14%	
9DNB	0.00%	-1.35%	-3.88%	-0.14%	1.62%	2.57%	2.97%	2.70%	3.92%	2.43%	3.78%	2.43%	1.08%	2.30%	0.14%	-1.49%	-2.43%	-2.43%	-2.43%	-2.43%	-2.43%	-2.43%	-2.43%	-2.43%	-2.43%	-2.43%	-2.43%	-2.43%	-2.43%	-2.43%	-2.43%	-2.43%	-2.43%	-2.43%	-2.43%	
10DNB	0.00%	0.43%	6.42%	7.18%	3.27%	0.60%	3.27%	-2.77%	12.11%	10.67%	12.78%	-1.89%	-2.64%	-4.08%	-3.64%	-7.93%	-3.48%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
11DNB	0.00%	1.00%	0.23%	0.06%	1.00%	6.21%	5.28%	6.21%	5.28%	5.33%	6.21%	6.15%	6.57%	4.86%	6.04%	4.97%	6.51%	5.28%	5.80%	5.74%	5.63%	4.87%	2.99%	3.87%	6.10%	6.45%	7.36%	7.15%	8.62%	6.57%	-10.84%	-13.25%	-10.32%	-10.79%	-9.88%	
12DNB	0.00%	-10.67%	-12.23%	-11.95%	-11.66%	-12.73%	-12.73%	-15.08%	-17.21%	-14.65%	-14.58%	-17.92%	-19.20%	-17.85%	-20.55%	-18.65%	-16.29%	-15.08%	-16.29%	-15.08%	-16.29%	-15.08%	-16.29%	-15.08%	-16.29%	-15.08%	-16.29%	-15.08%	-16.29%	-15.08%	-16.29%	-15.08%	-16.29%	-15.08%	-16.29%	
13DNB	0.00%	1.40%	2.31%	3.87%	3.06%	2.90%	2.15%	2.31%	2.10%	2.15%	4.90%	4.90%	2.04%	0.27%	2.04%	4.89%	3.06%	2.42%	2.63%	2.85%	0.27%	-0.81%	-2.15%	-0.48%	-1.08%	-3.12%	-2.94%	-1.51%	-1.99%	0.00%	2.94%	0.65%	-2.63%	-2.85%	-2.78%	
14DNB	0.00%	0.20%	1.46%	2.64%	1.86%	1.86%	1.95%	2.05%	4.10%	5.47%	6.45%	5.96%	6.74%	6.84%	6.93%	7.13%	6.45%	7.23%	7.42%	8.40%	8.01%	9.28%	9.96%	9.67%	11.62%	12.21%	11.82%	12.70%	14.05%	13.28%	12.99%	12.79%	12.50%	11.82%	12.01%	
15DNB	0.00%	1.76%	0.81%	-0.81%	-1.90%	0.22%	-1.02%	-1.98%	0.37%	0.44%	1.39%	0.81%	2.34%	1.61%	2.12%	1.80%	2.22%	1.46%	2.12%	1.61%	0.55%	0.99%	0.29%	-0.07%	-0.22%	-0.51%	0.88%	1.17%	0.81%	0.73%	-0.95%	-1.76%	-0.88%	-2.71%	-2.93%	-2.84%
16DNB	0.00%	4.55%	2.08%	0.99%	-1.14%	-0.30%	-1.24%	-2.18%	-1.73%	-2.88%	-3.07%	-3.47%	-0.79%	-2.13%	-0.59%	-0.30%	0.40%	4.16%	6.24%	6.73%	6.83%	6.24%	4.85%	5.05%	4.46%	4.65%	5.84%	5.25%	4.08%	3.68%	-0.69%	-1.49%	-0.99%	-4.01%	0.99%	
17DNB	0.00%	0.08%	0.90%	5.64%	6.77%	7.07%	7.30%	10.01%	9.78%	10.53%	10.61%	11.29%	11.31%	8.50%	9.78%	10.99%	10.53%	10.16%	9.56%	9.71%	9.41%	7.67%	8.20%	7.15%	6.65%	6.66%	7.30%	8.20%	9.01%	8.35%	7.07%	7.75%	3.90%	5.99%		
18NHV	0.00%	2.99%	5.03%	7.07%	7.55%	8.02%	8.33%	8.49%	7.86%	7.39%	8.49%	8.49%	11.01%	13.84%	12.89%	11.01%	10.85%	9.49%	7.86%	7.07%	7.07%	7.07%	7.07%	6.60%	5.35%	4.09%	5.80%	4.87%	5.87%	7.86%	7.70%	9.75%	11.64%	11.32%	9.12%	
19NHV	0.00%	-0.80%	-0.40%	-0.93%	-1.33%	-1.99%	0.80%	-0.40%	-0.40%	-0.40%	0.00%	1.06%	2.39%	2.53%	4.79%	5.05%	4.32%	5.19%	4.12%	3.72%	3.46%	3.72%	3.46%	4.39%	3.86%	3.32%	3.86%	4.26%	4.39%	4.26%	4.39%	4.26%	4.39%	4.26%	4.39%	
20NHV	0.00%	-1.89%	-2.59%	0.12%	0.71%	1.18%	1.89%	1.06%	1.53%	0.24%	-1.42%	-2.59%	-2.36%	-2.24%	-2.12%	-3.77%	-3.77%	-4.85%	-5.08%	-5.25%	-10.38%	-9.08%	-11.67%	-10.73%	-8.25%	-7.25%	-8.25%	-12.08%	-10.14%	-9.79%	-9.79%	-10.88%	-11.56%	-12.88%	-13.56%	
21NHV	0.00%	0.17%	-0.26%	-2.04%	-1.94%	-0.51%	-1.70%	-1.02%	-2.72%	-0.17%	-0.34%	-1.94%	-2.89%	1.70%	0.51%	3.80%	4.48%	11.04%	10.36%	13.75%	13.07%	16.47%	13.75%	12.39%	10.14%	11.21%	22.24%	20.37%	18.08%	17.83%	20.37%	18.08%	17.83%	20.37%		
22NHV	0.00%	2.73%	2.48%	0.62%	-1.12%	-0.25%	1.36%	2.98%	3.97%	3.72%	3.35%	4.84%	6.08%	5.96%	3.87%	7.20%	7.20%	7.44%	8.18%	6.70%	7.07%	8.06%	9.93%	12.80%	11.66%	10.40%	12.78%	13.5%	14.0%	10.79%	12.03%	11.79%	12.16%	10.99%		
23NHV	0.00%	2.84%	4.26%	3.57%	4.36%	3.14%	4.00%	2.84%	2.33%	2.53%	1.42%	2.53%	4.15%	5.57%	6.08%	6.79%	6.18%	7.19%	7.90%	8.51%	8.31%	9.12%	8.21%	11.55%	11.04%	13.17%	12.78%	15.10%	14.14%	16.92%	17.93%	15.10%	14.14%	16.92%		
24NHV	0.00%	2.62%	-1.57%	-7.85%	-1.16%	-15.97%	-15.18%	-15.37%	-12.30%	-15.45%	-9.58%	-7.85%	-10.47%	-11.52%	-11.78%	-9.58%	-12.17%	-10.16%	-12.17%	-10.16%	-12.17%	-10.16%	-12.17%	-10.16%	-12.17%	-10.16%	-12.17%	-10.16%	-12.17%	-10.16%	-12.17%	-10.16%	-12.17%	-10.16%	-12.17%	
25NHV	0.00%	-1.42%	-1.38%	-3.42%	-2.00%	-0.94%	1.17%	1.06%	2.12%	2.24%	1.53%	-0.24%	-0.96%	-1.42%	1.53%	3.42%	3.77%	2.12%	3.30%	1.42%	0.94%	2.36%	0.71%	0.5%	2.83%	5.9%	5.42%	3.8%	6.2%	6.7%	6.37%	5.37%	1.89%	5.9%		
26NHV	0.00%	-1.77%	-3.85%	0.26%	4.62%	9.76%	7.70%	9.37%	5.13%	7.06%	9.88%	8.09%	7.7%	3.65%	5.65%	5.26%	3.98%	4.24%	4.62%	3.98%	-0.51%	2.31%	1.28%	1.4%	-0.64%	-1.1%	2.4%	1.67%	2.04%	1.67%	2.04%	1.67%	2.04%	1.67%	2.04%	
27NHV	0.00%	-0.11%	-0.05%	-0.53%	-1.14%	-1.02%	-2.22%	-3.62%	-3.12%	-11.87%	-10.96%	-14.35%	-10.21%	-7.65%	-6.69%	-10.64%	-11.10%	-13.11%	-12.72%	-16.57%	-16.06%	-14.41%	-11.66%	-12.21%	-9.2%	0.7%	1.07%	-10.57%	-10.14%	-10.78%	-8.00%	-14.7%	-13.38%	-21.31%	-24.21%	
28NHV	0.00%	-1.20%	1.00%	0.65%	1.00%	-1.27%	-1.91%	-1.96%	-1.96%	-2.44%	-5.11%	-5.79%	-3.78%	-3.53%	-2.84%	-2.35%	-4.00%	-4.93%	-4.54%	-4.52%	-6.92%	-6.29%	-8.32%	-8.60%	-11.09%	-11.85%	-11.30%	-12.28%	-9.67%	-10.63%	-13.39%	-14.03%	-12.22%	-10.44%		
29NHV	0.00%	1.96%	5.29%	2.75%	0.04%	-0.24%	0.31%	2.20%	3.65%	1.92%	1.80%	1.38%	0.78%	-0.51%	-0.47%	-2.63%	-1.45%	2.75%	4.35%	2.94%	1.06%	2.08%	3.22%	1.84%	6.4%	6.24%	7.3%	4.5%	4.5%	6.24%	7.3%	4.5%	4.5%	6.24%		
30NHV	0.00%	0.98%	-1.46%	-2.32%	-1.42%	0.82%	1.39%	-0.71%	-0.71%	-0.49%	-0.22%	0.19%	0.67%	0.19%	0.65%	0.07%	0.37%	0.19%	0.45%	-1.99%	-3.30%	-4.24%	-3.79%	-3.82%	-4.99%	-4.61%	-5.77%	-7.4%	-8.40%	0.70%	-7.72%	-8.66%	-8.41%	-9.51%	-8.25%	
31NHV	0.00%	0.88%	2.89%	3.77%	4.42%	3.35%	1.63%	1.63%	0.41%	0.49%	1.97%	3.13%	2.94%	3.26%	2.41%	1.79%	2.10%	2.41%	2.76%	4.17%	3.19%	4.38%	4.67%	5.14%	5.07%	4.65%	5.32%	6.01%	5.39%	6.71%	6.71%	6.86%	4.88%	3.98%		
32NHV	0.00%	2.11%	1.19%	0.28%	2.62%	4.42%	5.77%	5.04%	5.52%	3.29%	2.17%	-1.24%	0.25%	0.11%	2.73%	1.88%	5.77%	6.62%	4.93%	5.46%	4.70%	5.38%	4.90%	2.87%	1.44%	0.17%	-0.14%	-1.90%	-0.23%	-2.45%	0.17%	-0.66%	0.23%	-0.99%	-1.83%	
33NHV	0.00%	1.09%	2.15%	-2.15%	-1.12%	-0.84%	-1.66%	-1.49%	-0.56%	-2.18%	0.90%	0.37%	2.92%	3.61%	5.2%	3.24%	3.76%	1.56%	1.18%	0.81%	2.68%	2.12%	2.77%	-0.22%	-1.28%	-2.40%	-3.08%	-2.74%	-5.16%	-2.43%	-4.7%	-1.37%	-0.44%	-1.86%		
34NHV	0.00%	1.21%	0.41%	0.74%	0.95%	1.80%	3.31%	4.89%	6.16%	-0.54%	3.44%	2.88%	3.16%	3.01%	2.70%	3.53%	2.70%	-1.51%	-1.22%	-1.93%	-0.99%	0.22%	-1.04%	0.52%	0.24%	0.45%	-4.82%	-4.7%	-4.82%	-4.7%	-4.82%	-4.7%	-4.82%	-4.7%		
35DKR	0.00%	0.00%	0.00%	1.07%	1.07%	1.49%	1.07%	1.49%	3.57%	4.44%	7.86%	7.86%	4.29%	5.00%	3.21%	3.57%	5.00%	5.00%	8.57%	8.57%	10.00%	10.00%	9.29%	8.89%	8.89%	11.43%	12.88%	15.15%	17.44%	14.49%	10.71%	11.43%	12.88%	14.49%		
36DKR	0.00%	1.21%	-0.91%	-1.81%	-3.32%	-3.01%	-3.32%	-3.32%	-3.01%	0.00%	1.21%	2.11%	2.42%	0.00%	-1.21%	-1.51%	-1.51%	-1.51%	-1.51%	-1.51%	-1.51%	-1.51%	-1.51%	-1.51%	-1.51%	-1.51%	-1.51%	-1.51%	-1.51%	-1.51%	-1.51%	-1.51%	-1.51%	-1.51%	-1.51%	
37DKR	0.00%	0.00%	1.94%	1.94%	2.59%	2.59%	2.59%																													

Normal returns:

Instrument	Ex dividend close	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	
DNB	0.00	0.93	1.46	1.97	1.94	2.00	2.16	1.74	1.94	2.69	2.72	3.38	3.98	3.25	2.93	2.86	2.16	2.61	2.04	1.81	2.23	2.09	2.89	2.47	2.04	2.07	2.38	2.52	2.68	2.71	2.67	3.03	2.99	2.68	2.17	
DNB	0.00	0.46	0.50	-0.09	0.06	0.58	0.62	0.35	1.06	1.23	0.14	0.48	0.13	1.18	2.38	2.43	2.26	2.81	2.67	2.12	1.84	1.85	1.94	2.20	2.17	2.00	2.11	1.47	0.47	1.24	0.38	-0.05	-0.14	0.18	0.09	
DNB	0.00	0.13	0.12	0.08	0.08	0.10	0.11	0.08	0.07	0.08	0.05	0.06	0.05	0.06	0.09	0.09	0.10	0.10	0.12	0.15	0.16	0.16	0.17	0.21	0.22	0.21	0.24	0.23	0.21	0.21	0.21	0.25	0.22	0.22	0.23	
DNB	0.00	-0.04	0.57	1.34	1.08	0.02	-1.95	-1.14	-1.28	-0.62	-0.53	-0.80	-0.28	0.38	0.35	0.44	0.95	1.09	1.23	1.48	1.73	1.51	1.75	2.33	2.83	2.70	2.67	3.01	2.53	2.65	3.06	3.77	4.77	4.65	4.14	
DNB	0.00	0.43	-0.36	-2.01	-2.74	-2.54	-2.16	-1.89	-2.00	-0.68	-0.23	-0.52	-0.44	-0.45	-1.30	-0.58	0.21	0.19	0.01	0.28	0.23	0.97	1.06	1.33	0.91	1.71	2.03	1.88	1.89	2.28	2.94	2.91	3.72	3.60	4.27	
DNB	0.00	-1.67	-1.98	-0.98	-0.55	0.34	0.63	0.05	0.74	1.01	1.25	0.39	3.85	3.90	-7.42	-7.61	-10.45	-6.53	-8.09	-5.81	-4.48	-6.14	-6.00	-5.62	-4.50	-6.28	-6.66	9.92	8.75	-10.29	-12.37	-12.16	-9.17	-9.97	-9.81	
DNB	0.00	0.45	0.28	0.24	1.43	1.51	2.51	2.86	0.31	0.42	0.22	-0.88	-0.53	0.56	0.74	2.38	3.50	3.80	4.73	4.42	3.30	2.75	2.45	4.30	5.42	5.05	4.68	2.79	1.94	1.43	2.40	1.24	1.53	1.44	6.16	
DNB	0.00	-0.93	-1.40	2.66	4.30	2.01	1.55	3.94	6.91	8.91	10.84	8.16	10.22	13.20	10.90	6.78	3.65	4.01	3.23	5.43	5.39	6.38	2.72	2.01	3.92	2.65	0.95	0.48	1.46	2.49	4.37	5.88	3.80	3.30	-0.07	
DNB	0.00	1.19	0.31	0.86	-1.71	-3.29	-5.28	-7.71	-2.47	-3.11	-1.49	-4.52	-4.04	-6.75	-10.08	-8.84	-11.77	-8.12	-6.50	-7.48	-8.83	-8.81	-8.25	-6.40	-7.84	-8.80	-9.95	-7.90	-6.78	-6.33	-4.44	-3.87	-4.74	-4.80	-4.58	
DNB	0.00	0.80	0.58	-0.85	-2.92	-2.79	-1.98	-2.04	-1.46	-1.55	-2.53	-1.98	-1.62	-1.76	-1.19	-1.79	-3.35	-2.86	-2.50	-2.89	-1.83	-1.51	-0.61	-1.34	-2.41	-2.60	-2.93	-4.41	-3.71	-4.98	-4.19	-6.18	-7.20	-7.01	-7.65	
DNB	0.00	0.14	1.18	1.62	3.09	4.16	3.87	4.02	4.24	5.35	5.42	6.82	6.71	7.19	6.71	6.31	6.49	5.92	6.65	7.46	8.05	7.83	8.50	8.81	8.77	9.94	10.20	9.60	11.83	12.05	12.21	11.64	12.42	12.50	12.03	
DNB	0.00	0.11	0.22	-0.93	-2.98	-1.82	-0.44	-0.77	-0.76	-1.56	-0.42	0.59	0.10	1.17	0.48	0.39	0.06	0.06	0.37	0.29	-1.19	-0.68	-0.84	-0.80	-0.89	-0.01	0.76	0.22	0.10	0.17	-1.15	-1.12	-0.75	-2.27	-3.75	
DNB	0.00	2.45	3.49	2.44	1.36	0.61	0.06	0.13	-0.99	-0.26	0.82	1.14	0.44	2.24	4.15	2.17	2.24	3.45	5.42	6.01	5.24	6.15	4.91	3.64	3.57	3.11	4.43	5.91	6.11	3.84	2.00	1.10	0.10	1.79	-1.16	-4.49
DNB	0.00	0.04	0.01	-0.21	1.27	1.93	3.40	2.20	2.21	2.89	4.22	4.15	3.94	4.55	5.26	6.00	2.83	4.87	5.08	4.62	5.52	4.96	3.95	3.98	2.36	2.94	2.71	2.16	2.51	1.27	1.64	2.89	3.51	4.39	4.09	
DNB	0.00	1.45	2.24	2.83	3.37	3.34	3.08	3.57	3.12	3.33	4.15	4.18	4.90	5.55	4.76	4.41	4.33	3.57	4.06	3.44	3.20	3.64	3.50	4.36	3.91	3.44	3.47	3.81	3.97	4.14	4.17	4.33	4.52	4.31	4.14	
DNB	0.00	0.24	0.87	0.93	0.80	1.66	1.66	3.04	0.76	0.33	1.60	2.07	3.13	2.92	3.59	3.42	3.75	2.41	2.43	2.53	2.88	2.81	2.61	2.74	1.95	0.74	1.68	0.69	0.11	0.00	0.40	0.29	0.25	0.00	0.00	
DNB	0.00	0.73	1.47	1.41	1.13	0.70	2.39	1.81	2.61	1.87	2.89	3.08	4.11	4.09	-1.37	-2.28	-4.89	-5.56	-5.46	-6.07	-6.08	-6.66	-6.86	-11.38	-10.68	-8.05	-9.08	-9.99	-9.62	-9.55	-10.03	-13.54	-14.74	-16.55	-16.96	
DNB	0.00	1.20	1.22	1.40	2.36	3.04	3.24	2.96	2.99	0.87	2.19	2.44	1.77	0.78	3.34	3.70	5.96	6.61	8.89	8.01	10.17	9.32	10.21	9.29	8.19	8.67	9.86	9.67	11.87	11.14	11.41	10.27	10.38	10.78	11.87	
DNB	0.00	1.40	1.80	1.61	2.55	1.93	3.23	3.23	3.62	5.13	5.43	5.09	6.15	6.06	6.35	7.83	8.62	8.58	9.31	8.36	8.54	9.43	10.57	13.14	12.44	11.77	12.09	12.08	15.14	14.44	14.81	14.28	15.10	16.24	14.76	
DNB	0.00	2.69	3.59	3.03	3.17	3.16	1.46	2.91	3.64	4.43	4.03	4.61	4.51	5.97	6.15	6.68	5.86	7.44	8.07	7.78	7.80	8.57	9.87	9.81	11.41	11.19	12.52	12.19	12.98	13.78	13.46	13.64	13.33	15.02	16.36	
DNB	0.00	0.37	0.53	-0.45	-0.55	-0.00	-0.39	-0.41	-0.12	-1.92	-1.60	-1.16	-0.28	-1.48	-1.18	-1.13	-1.58	-1.63	-2.30	-2.02	-2.08	-2.48	-2.04	-2.70	-2.40	-2.06	-2.27	-2.12	-2.07	-1.95	-1.93	-1.95	-1.78	-1.64		
DNB	0.00	-0.03	-1.28	-0.88	0.35	0.56	2.40	3.69	4.03	5.10	4.74	3.47	2.84	2.50	4.61	5.87	5.45	5.08	2.89	1.92	1.85	2.45	1.13	1.46	4.42	6.72	6.99	7.65	7.89	7.48	7.09	6.63	6.19	5.76	6.45	
DNB	0.00	1.25	0.35	0.67	1.00	3.07	4.74	5.38	3.94	5.38	7.46	5.86	2.88	0.79	1.04	0.50	2.04	2.01	2.70	0.14	-0.35	0.88	0.10	-1.09	-2.09	-0.74	0.02	1.30	2.55	0.90	0.55	-1.81	-2.61	-3.72	-3.53	
DNB	0.00	-0.78	-6.39	-1.36	0.65	2.85	-1.65	-0.48	-6.24	-8.90	-8.06	-12.41	-6.99	-4.98	-6.04	-8.05	8.02	-7.18	-4.44	-6.38	-8.00	-9.71	-6.66	-5.00	-4.34	-1.08	-0.88	1.91	2.07	1.73	0.70	-1.26	-3.01	-3.76	-8.41	
DNB	0.00	-0.04	0.90	0.75	-0.88	0.05	0.84	0.41	1.33	0.86	-2.15	-1.52	-0.79	-1.42	0.30	0.82	2.26	1.09	0.64	-0.95	-1.47	-3.86	-2.73	-4.78	-3.50	-4.72	-6.37	8.05	9.08	5.31	-6.53	-10.04	-10.82	-10.89	-9.63	
DNB	0.00	1.32	1.40	0.75	-0.23	-0.75	-4.07	-2.36	-0.43	-4.03	-3.20	-3.11	-2.27	-4.07	-5.21	-7.01	-8.59	-7.61	-4.77	-3.83	-4.38	-4.89	-4.41	-6.05	-5.02	-3.23	-6.32	2.07	1.12	-2.99	-4.89	-5.82	-4.16	-3.30	-2.92	
DNB	0.00	0.45	0.34	0.27	0.42	1.39	1.40	-0.19	0.01	0.79	1.74	0.89	0.93	0.88	0.27	-0.10	-0.80	-1.41	-1.21	-1.67	-1.35	-2.50	-2.72	-2.50	-1.72	-1.12	-1.89	3.01	3.93	-5.56	-4.04	-1.12	-1.15	-3.30	-2.92	
DNB	0.00	0.28	1.18	1.11	1.42	1.11	0.65	0.97	0.60	1.07	1.59	1.96	1.83	2.68	2.45	2.43	3.18	3.34	2.96	3.79	4.52	4.63	4.26	4.76	4.81	4.51	3.70	4.99	5.89	5.70	5.04	5.42	4.16	3.94	4.06	
DNB	0.00	0.58	1.61	1.11	2.20	1.50	1.40	1.06	1.07	1.38	1.30	0.21	0.31	0.14	0.19	0.10	0.99	1.78	0.78	0.91	1.18	-0.17	-0.14	0.24	-1.32	-2.83	-2.62	-2.13	-2.62	-2.03	-0.78	-1.12	0.34	-2.59		
DNB	0.00	0.46	0.52	0.08	0.19	1.10	1.36	0.78	2.29	0.28	0.23	0.29	3.31	4.97	5.46	4.82	5.88	4.54	3.47	3.41	3.02	4.12	5.38	5.55	3.64	2.18	0.49	1.10	0.57	3.37	4.04	1.99	1.38	2.58	3.34	
DNB	0.00	2.06	2.87	4.48	4.40	4.15	4.88	5.75	6.64	2.81	5.27	5.53	4.97	6.06	4.30	4.16	4.19	2.23	2.93	2.66	2.00	2.41	0.91	1.34	2.62	2.17	1.74	0.89	0.51	1.96	2.19	0.38	-1.84	-1.94	-1.98	
DRK	0.00	1.19	1.49	2.11	2.90	1.93	1.50	1.41	0.48	1.07	0.82	0.01	0.56	0.38	0.88	1.45	0.89	0.32	0.35	0.76	1.17	1.21	1.68	1.36	1.58	1.17	0.49	0.86	1.19	1.42	1.62	2.02	1.54	2.04	2.46	
DRK	0.00	0.57	0.28	0.60	0.48	0.32	0.73	0.83	0.75	0.77	1.34	1.69	1.65	1.34	1.34	1.70	1.74	1.55	2.04	2.16	1.40	1.64	1.89	2.13	2.97	3.01	2.88	3.27	3.17	2.79	2.59	2.60	2.84	2.82		
DRK	0.00	-0.03	-0.10	-0.19	-0.16	-0.22	-0.28	-0.27	-0.19	0.14	0.20	-0.26	-0.31	-0.20	-0.26	-0.31	-0.40	-0.45	-0.47	-0.56	-0.51	-0.29	-0.32	-0.38	-0.45	0.30	0.44	0.34	0.27	0.14	-0.19	-0.13	-0.10	-0.33	-0.35	
DRK	0.00	1.12	1.86	5.70	4.83	5.48	5.07	5.13	5.27	6.45	7.65	6.90	8.77	8.23	8.73	11.39	11.49	11.53	12.89	13.82	14.28	13.09	14.57	14.59	14.83	15.89	16.89	16.84	16.82	16.36	15.84	15.41	15.25	15.30		
DRK	0.00	-0.48	1.64	2.56	1.91	2.63	3.56	3.48	2.30	2.23	2.15	2.86	1.90	1.77	1.63	1.69	1.19	-0.18	-1.17	-2.19	-2.33	-1.17	-1.33	-2.88	-5.66	-4.56	1.45	-7.35	-3.86	3.73	-4.00	-3.89	-2.52	-2.40		
DRK	0.00	1.72	1.54	1.37	1.01	-0.38	-0.51	-1.44	-0.40	0.41	1.38	1.54	1.87	2.68	2.88	2.15	2.32	2.49	2.11	-0.02	-1.26	-2.29	-2.09	-1.72												

CARs:

Instrument	Ex dividend close	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	
DNB	0.00	0.96	0.44	-0.70	-0.35	0.02	2.62	1.44	1.24	0.17	-0.45	-1.75	-1.43	-2.30	2.65	0.95	1.02	0.26	-0.13	0.10	0.95	-0.82	1.57	1.03	-1.40	1.75	3.36	5.76	7.47	7.16	7.84	7.67	7.20	12.61	13.63	
DNB	0.00	-0.46	-0.75	-0.16	-0.19	-0.88	-0.62	-0.00	0.69	5.52	4.61	5.77	7.12	4.82	2.62	-0.18	-3.26	-4.06	-4.42	-4.62	-5.09	-2.85	-3.44	-2.07	-1.75	-2.36	3.22	4.99	4.99	-2.38	-0.45	-2.36	-2.18	0.16		
DNB	0.00	0.10	1.02	1.29	2.19	2.18	3.08	4.93	6.54	3.85	5.87	5.18	5.19	2.90	2.19	3.78	1.72	-2.15	-4.44	-6.76	-5.88	-5.63	-5.41	-8.41	-7.73	-5.67	-7.30	7.29	6.36	5.68	-5.90	-7.77	6.14	-6.39	6.34	
DNB	0.00	0.86	5.06	8.84	8.14	6.88	7.28	6.83	7.37	9.91	11.23	11.01	11.63	10.67	9.19	9.43	6.52	6.28	7.68	7.99	8.54	8.42	10.63	12.88	13.47	13.34	11.37	10.36	6.98	4.88	4.09	1.99	1.68	3.49	6.34	
DNB	0.00	0.44	1.04	1.19	1.65	0.07	2.18	2.29	1.28	-0.53	-1.07	-1.73	0.05	0.77	-1.50	-2.05	-2.56	-2.47	-3.29	-3.78	-1.50	-1.74	-1.52	-0.49	0.16	0.52	1.01	1.04	0.69	1.25	1.07	3.12	3.51	2.91	2.30	
DNB	0.00	0.77	-1.64	-1.99	-1.26	-1.46	-1.44	0.29	3.00	3.49	4.23	2.92	2.44	3.25	2.50	2.80	0.81	0.41	0.12	0.12	-0.83	-0.78	-1.06	-1.39	-0.91	0.29	1.57	1.32	0.11	1.52	2.68	2.29	1.48	1.20	1.39	
DNB	0.00	1.38	0.80	0.40	-0.02	0.52	0.24	1.40	1.86	2.74	0.77	0.95	0.10	0.72	-2.69	1.54	0.82	0.60	-1.73	-1.99	-2.46	-2.82	-3.54	-3.05	-1.80	-4.12	-2.59	3.08	-1.07	-2.43	-1.21	-0.55	-0.37	0.15	-0.02	
DNB	0.00	2.86	1.47	1.51	0.81	-0.54	-0.56	-1.17	-0.49	-6.03	-5.88	-4.38	-4.01	-2.11	-3.01	-4.59	5.41	-6.55	-7.84	-8.33	-7.71	-7.41	-5.68	-7.05	-6.38	-3.27	8.21	7.21	7.91	-1.77	-7.68	-8.41	-8.58	-9.75	-11.80	
DNB	0.00	0.42	-1.58	-2.29	-2.88	0.56	1.43	-1.24	-1.99	-6.48	-7.86	-5.72	5.14	-10.09	-11.06	-8.28	-6.08	-6.44	-3.51	-6.24	-8.23	-6.54	-5.15	-4.03	-6.67	-5.21	-3.79	2.90	-4.37	-3.38	-5.59	-6.01	-5.55	-5.14	-4.11	
DNB	0.00	3.34	6.11	6.32	5.94	3.80	1.96	1.44	3.68	4.74	4.21	2.63	1.40	3.54	3.34	0.91	7.39	7.82	4.76	4.91	5.36	4.89	7.72	2.93	-4.52	3.51	7.00	8.20	6.02	8.88	6.71	6.08	8.82	9.78	11.22	
DNB	0.00	0.20	-0.35	0.91	1.29	-3.42	-3.08	-1.77	-3.82	-3.78	-3.69	-4.17	-4.94	-3.23	-4.85	-4.16	-1.56	-2.32	-3.00	-2.85	-3.80	-3.36	-2.98	-1.53	-4.68	-3.84	-4.64	2.74	2.81	1.68	1.11	-3.77	-1.79	1.32		
DNB	0.00	-11.40	-12.05	-12.29	-11.47	-12.17	-10.10	-12.82	-10.85	-8.46	-10.19	-11.04	-12.56	-11.88	-13.23	-7.76	-7.40	-13.81	-10.88	-10.41	-13.12	-10.75	-10.57	-8.55	-5.83	-4.74	-6.72	-9.35	-8.38	-7.85	-8.98	-8.37	-7.82	-11.04		
DNB	0.00	2.54	1.54	1.15	2.22	1.13	0.36	-0.50	-0.76	-0.78	-0.11	1.29	0.35	-1.72	-1.28	1.24	-2.11	-1.40	-1.25	-0.95	-2.49	-2.94	-3.08	-3.38	-1.22	-2.57	1.21	1.34	1.95	2.68	0.28	-1.73	-0.09	-4.99		
DNB	0.00	0.34	0.81	0.02	-1.24	-2.31	-1.92	-1.97	-0.14	0.12	1.03	-0.85	0.03	0.36	0.22	0.82	0.04	1.31	0.78	0.93	0.04	1.45	1.46	0.86	0.85	2.27	1.42	3.10	2.88	1.23	0.71	1.16	0.08	-0.68	-0.02	
DNB	0.00	1.64	0.58	0.13	1.08	2.04	-0.58	-1.17	-1.12	1.12	2.00	1.81	0.21	2.34	0.44	1.64	1.53	2.07	1.40	1.76	-0.14	1.77	0.97	0.77	0.58	0.38	0.89	0.42	1.03	0.83	1.12	-0.71	0.25	-1.66	1.12	
DNB	0.00	2.10	-1.41	-1.45	-2.49	0.31	-1.80	-2.31	-1.34	-2.12	-3.89	-4.60	-4.23	-4.36	-4.44	-2.47	-1.85	0.71	0.82	0.72	1.59	0.09	-0.05	1.41	0.89	1.55	1.23	0.66	2.05	2.16	-2.80	-1.58	0.00	-2.85	5.08	
DNB	0.00	0.12	0.90	5.55	4.99	5.74	6.29	5.09	7.12	5.56	6.38	6.67	6.74	6.10	2.50	6.65	6.12	5.45	5.54	4.08	5.64	5.45	3.70	5.84	4.21	3.83	4.76	4.57	6.39	7.41	6.63	5.12	8.14	9.01		
NHY	0.00	1.54	2.78	4.87	4.18	4.68	4.93	4.92	4.74	4.06	4.34	4.31	6.11	8.29	8.14	7.54	6.32	5.86	3.80	4.26	4.51	4.06	4.21	2.24	1.44	0.64	1.56	1.07	2.01	3.72	3.53	6.22	7.12	6.85	4.99	
NHY	0.00	-1.04	-1.27	-1.86	-1.19	-3.46	-0.97	0.74	-0.16	-0.73	-1.40	-2.01	0.74	0.73	1.18	1.54	1.64	1.77	2.77	1.70	1.19	1.59	0.91	0.85	1.65	1.89	2.58	4.70	5.09	6.27	4.52	3.32	6.63	6.20	6.90	6.25
NHY	0.00	-1.16	-0.98	-0.29	-0.42	0.47	-0.51	-0.75	-1.07	-1.63	-1.34	-2.29	1.37	0.87	1.15	1.12	2.50	0.51	0.17	0.78	0.07	-0.22	-0.30	-0.05	0.60	1.54	0.74	0.07	1.52	0.88	0.73	2.70	2.60	4.17	2.38	
NHY	0.00	-1.03	-2.57	-4.12	-4.30	-4.23	-4.17	-4.75	-4.66	-3.61	-3.59	-2.36	-2.78	-2.96	-3.65	-1.18	-2.05	-2.60	-1.89	-2.35	-3.58	3.75	6.15	4.46	4.21	2.03	1.68	1.54	1.65	3.39	7.27	7.45	8.06	9.70		
NHY	0.00	1.33	0.88	-0.39	-2.72	-2.18	-2.15	-0.75	-0.85	-1.41	-2.08	-1.15	0.44	0.10	0.74	0.51	1.74	-1.44	-1.13	-1.13	-1.56	-1.46	-1.37	-1.05	-0.24	-0.78	1.35	0.31	0.94	4.12	-1.26	-3.65	-2.77	-3.29	-4.68	-3.58
NHY	0.00	0.15	0.65	2.34	1.15	-1.99	-0.02	-1.77	-0.77	-1.31	-1.90	-2.61	0.27	0.36	0.40	0.07	0.10	0.32	0.24	-0.17	0.12	-0.26	-0.75	-1.60	0.14	-0.15	0.65	0.38	2.42	1.46	3.64	4.29	1.57	2.11	3.71	
NHY	0.00	2.25	1.95	2.60	1.38	2.03	3.21	5.04	3.82	3.88	4.65	3.91	4.81	3.45	2.40	1.87	3.03	3.04	3.14	3.54	3.92	3.87	4.48	5.00	4.03	4.47	3.39	5.27	5.13	5.74	5.04	5.69	5.57	5.76	3.92	
NHY	0.00	1.27	0.34	-1.92	-1.95	-2.83	-1.50	-2.18	-2.08	-1.97	-2.90	-1.94	-3.23	0.07	-2.65	-2.59	-2.62	-3.92	-5.69	-6.14	-5.73	-6.35	-7.76	-6.66	-7.87	-8.21	8.39	6.89	6.64	9.04	6.68	-15.80	-15.32	-16.48	-16.40	
NHY	0.00	-1.16	0.30	-0.10	-0.77	-1.32	-2.55	-2.38	-2.29	-2.81	-3.36	-4.26	-2.99	-2.11	-3.13	-2.17	-2.75	-3.19	-4.29	-3.95	-3.05	-3.06	-3.56	-3.54	-5.09	-4.37	-3.48	3.24	3.59	4.35	4.10	-3.15	-1.81	-1.61	-1.15	
NHY	0.00	0.64	3.89	3.50	0.20	0.31	0.79	3.76	4.56	6.78	5.95	5.01	4.28	5.25	4.85	4.70	6.54	5.86	6.16	7.52	8.18	7.32	5.85	6.49	6.26	7.66	6.66	8.86	9.40	11.04	11.56	11.08	10.71	4.71	3.20	
NHY	0.00	-1.35	-1.80	-2.58	-1.84	-0.56	-0.20	-0.52	-0.72	-1.28	-1.97	-0.70	-1.60	0.69	1.18	0.03	0.42	1.60	1.66	-0.23	0.04	-1.74	-1.07	-1.33	-1.26	-3.49	-3.89	4.41	5.37	-3.13	-3.68	-5.54	-5.66	-5.65	-5.72	
NHY	0.00	0.59	1.78	2.46	3.00	2.24	0.77	0.66	0.20	-1.16	-0.38	1.17	1.12	1.00	0.04	0.64	-1.08	-0.92	-0.20	0.19	-1.33	-0.25	0.41	0.38	0.26	0.34	0.57	0.30	0.12	0.51	0.25	0.73	0.30	-0.28	-0.88	
NHY	0.00	1.53	0.31	-1.08	0.42	2.92	4.37	3.88	4.45	1.91	0.87	-1.03	-0.05	-0.26	2.54	3.08	4.78	4.84	4.15	4.56	3.55	3.55	5.04	2.64	2.75	2.66	2.48	1.09	2.40	0.42	0.95	0.06	-0.11	-0.82	-1.40	
NHY	0.00	0.63	1.08	-2.22	-1.31	-1.94	-1.22	-2.78	-2.65	-2.46	-1.33	-1.92	-0.38	-1.36	-0.11	-1.89	-2.35	-0.71	-1.91	-2.21	-1.45	-2.26	-2.78	-3.86	-3.46	-2.89	1.99	-2.17	1.80	1.36	1.88	1.28	1.30	1.02	-1.56	
NHY	0.00	-0.84	-2.46	-3.75	-3.65	-2.35	-1.75	-0.88	-0.47	-3.35	-1.83	-2.65	1.81	3.06	1.99	0.64	-1.49	-3.75	4.19	-3.99	-3.99	-2.19	-1.95	-0.82	-3.38	-2.75	-3.57	3.73	3.64	-3.40	-3.44	-1.91	0.91	-0.96	-12.38	
CRK	0.00	-1.19	-1.22	-1.03	-1.83	-0.50	0.43	0.02	3.10	3.57	7.54	7.75	7.82	7.62	7.17	2.68	4.68	4.65	4.24	7.16	7.40	5.90	8.84	7.63	7.35	7.76	9.00	10.30	11.61	12.53	12.65	10.71	9.93	10.46	11.38	
CRK	0.00	0.64	-1.19	-2.42	-3.81	-3.34	-3.70	-4.15	3.77	-0.46	0.43	0.49	0.77	1.24	2.55	-3.22	-3.55	-4.87	-5.37	-6.89	-1.70	-1.64	-1.69	-0.92	-1.76	-3.91	-2.28	1.16	-1.07	3.27	2.85	1.93	1.87	1.94	-1.41	
CRK	0.00	0.83	1.59	2.13	2.75	2.81	2.81	2.55	3.83	3.84	3.85	4.09	4.49	3.42	3.06	2.79	2.59	2.28	0.82	0.12	3.86	3.55	0.78	0.20	-0.33	-1.89	-4.52	4.08	1.05	2.44	0.47	0.84	1.19	0.77	-3.23	
CRK	0.00	-2.21	-8.13	-8.67	-7.76	-7.25	-5.49	-3.46	-1.00	-3.11	-5.34	-5.48	-7.51	-4.88	-5.18	-5.88	-9.48	-9.60	-6.37	-7.89	-8.08	-8.42	-7.17	-8.29	-8.32	-10.05	-9.05	8.14	8.81	-7.28	-6.64	-3.28	-6.14	-5.86		
CRK	0.00	1.69	2.59	0.78	0.51	-2.54	-4.55	-3.56	-2.11	-4.44	-3.86	-4.37	-2.80	0.04	-1.62	-1.65	-0.18	2.92	4.28	3.84	4.77	6.26	5.40	8.78	7.81	10.49	10.30	8.88								

APPENDIX C – Calculation of Normal Return

Beta and alpha calculated according to formula in method chapter. Snapshots of the excel calculations of individual event beta:

Column1	OSEBX	OSEBX Return	DNB	DNB Return	BetaDnB	NHY	NHY Return	BetaNHY	ORK	ORK Return	BetaORK	TEL	TEL Return	BetaTE	YAR	YAR Return	BetaYAR	MHG	MHG Return	Beta M
4261	17.12.15	600,8501	-0.49%																	
4262	18.12.15	590,1446	-1.78%	106.90																
4263	21.12.15	591,1381	0.17%	106.10																
4264	22.12.15	589,8975	-0.21%	106.30																
4265	23.12.15	605,2559	2.60%	109.70																
4266	28.12.15	602,1565	-0.51%	109.30																
4267	29.12.15	609,4765	1.22%	109.90					60.80		0.639586				383.9		0.879961			
4268	30.12.15	610,2589	0.13%	109.80					70.10	0.43%					382.9	-0.26%				
4269	04.01.16	600,6138	-1.58%	107.60					68.60	-2.14%					374.8	-2.12%				
4270	05.01.16	590,2676	-1.72%	104.40					68.85	0.36%					372	-0.75%		115.40		0.481
4271	06.01.16	581,7465	-1.44%	103.50		31.42		1,1900222	68.25	-0.87%					368.7	-0.89%		106.90		1.50%
4272	07.01.16	565,3807	-2.81%	101.00		29.69	-5.51%		66.80	-2.12%					351.5	-4.67%		114.50		-2.05%
4273	08.01.16	563,7501	-0.29%	101.60		28.87	-2.75%		66.55	-0.37%					361.3	2.79%		114.00		-0.44%
4274	11.01.16	554,7739	-1.59%	100.30		28.69	-0.62%		65.60	-1.43%					350.1	-3.10%		116.70		2.37%
4275	12.01.16	554,507	-0.05%	99.55		28.47	-0.77%		66.40	1.22%					354.4	1.23%		117.40		0.60%
4276	13.01.16	556,81	0.42%	98.95		28.69	0.77%		68.25	2.79%					358.3	1.10%		117.80		0.34%
4277	14.01.16	542,1663	-2.63%	98.60		28.45	-0.84%		66.25	-2.93%					347.7	-2.96%		113.20		-3.90%
4278	15.01.16	535,6449	-1.20%	96.40		27.33	-3.94%		66.20	-0.08%					344.4	-0.95%		112.30		-0.80%
4279	18.01.16	528,4695	-1.34%	93.65		26.84	-1.79%		65.75	-0.68%					344.2	-0.06%		110.90		-1.25%
4280	19.01.16	543,6822	2.88%	96.15		27.54	2.61%		67.90	3.27%					352.6	2.44%		114.80		3.52%
4281	20.01.16	518,0507	-4.71%	92.15		26.00	-5.59%		65.40	-3.68%					328.3	-6.89%		111.50		-2.87%
4282	21.01.16	530,636	2.43%	95.10		27.17	4.31%		65.80	0.61%					336	2.35%		111.30		-0.18%
4283	22.01.16	552,6219	4.14%	100.90		27.98	3.17%		67.60	2.74%					345	2.68%		113.60		2.07%
4284	25.01.16	547,0665	-1.01%	97.15		28.01	0.11%		67.80	0.30%					339.2	-1.68%		115.30		1.50%
4285	26.01.16	551,0231	0.72%	99.00		29.05	3.71%		68.65	1.25%					337.1	-0.62%		116.10		0.69%
4286	27.01.16	547,1175	-0.71%	97.65		28.91	-0.48%		68.85	0.29%					336.7	-0.12%		117.00		0.78%
4287	28.01.16	552,3204	0.95%	100.10		29.45	1.87%		68.80	0.07%					333.8	-0.86%		115.90		-0.94%
4288	29.01.16	560,9303	1.56%	104.20		28.68	-2.61%		70.10	1.74%					327	-2.04%		117.90		1.64%
4289	01.02.16	556,6996	-0.75%	101.50		28.24	-1.53%		70.30	0.29%					328.7	0.52%		117.80		0.00%
4290	02.02.16	539,4571	-3.10%	97.50		27.50	-3.94%		69.80	-0.71%					323.8	-1.49%		118.20		0.34%
4291	03.02.16	540,4653	0.19%	97.25		28.03	1.93%		69.65	0.07%					326.4	0.80%		119.40		1.02%
4292	04.02.16	552,2213	2.18%			29.93	6.78%		68.35	-2.15%					333.1	2.05%		117.30		-1.76%

Formulas:

Column1	OSEBX	OSEBX Return	DNB	DNB Return	BetaDnB	NHY
4261	42355	600,8501	=([@OSEBX]/[@4260]-1)	=([@DNB]/[@4260]-1)	=([@4261]-[@0])/([@DNB]/[@4260]-1)	
4262	42356	590,1446	=([@OSEBX]/[@4261]-1)	106.9	=([@4262]-[@0])/([@DNB]/[@4261]-1)	
4263	42359	591,1381	=([@OSEBX]/[@4262]-1)	106.1	=([@4263]-[@0])/([@DNB]/[@4262]-1)	
4264	42360	589,8975	=([@OSEBX]/[@4263]-1)	106.3	=([@4264]-[@0])/([@DNB]/[@4263]-1)	
4265	42361	605,2559	=([@OSEBX]/[@4264]-1)	109.7	=([@4265]-[@0])/([@DNB]/[@4264]-1)	
4266	42366	602,1565	=([@OSEBX]/[@4265]-1)	109.3	=([@4266]-[@0])/([@DNB]/[@4265]-1)	
4267	42367	609,4765	=([@OSEBX]/[@4266]-1)	109.9	=([@4267]-[@0])/([@DNB]/[@4266]-1)	
4268	42368	610,2589	=([@OSEBX]/[@4267]-1)	109.8	=([@4268]-[@0])/([@DNB]/[@4267]-1)	
4269	42373	600,6138	=([@OSEBX]/[@4268]-1)	107.6	=([@4269]-[@0])/([@DNB]/[@4268]-1)	
4270	42374	590,2676	=([@OSEBX]/[@4269]-1)	104.4	=([@4270]-[@0])/([@DNB]/[@4269]-1)	
4271	42375	581,7465	=([@OSEBX]/[@4270]-1)	103.5	=([@4271]-[@0])/([@DNB]/[@4270]-1)	
4272	42376	565,3807	=([@OSEBX]/[@4271]-1)	101	=([@4272]-[@0])/([@DNB]/[@4271]-1)	
4273	42377	563,7501	=([@OSEBX]/[@4272]-1)	101.6	=([@4273]-[@0])/([@DNB]/[@4272]-1)	
4274	42380	554,7739	=([@OSEBX]/[@4273]-1)	100.3	=([@4274]-[@0])/([@DNB]/[@4273]-1)	
4275	42381	554,507	=([@OSEBX]/[@4274]-1)	99.55	=([@4275]-[@0])/([@DNB]/[@4274]-1)	
4276	42382	556,81	=([@OSEBX]/[@4275]-1)	98.95	=([@4276]-[@0])/([@DNB]/[@4275]-1)	
4277	42383	542,1663	=([@OSEBX]/[@4276]-1)	98.6	=([@4277]-[@0])/([@DNB]/[@4276]-1)	
4278	42384	535,6449	=([@OSEBX]/[@4277]-1)	96.4	=([@4278]-[@0])/([@DNB]/[@4277]-1)	
4279	42387	528,4695	=([@OSEBX]/[@4278]-1)	93.65	=([@4279]-[@0])/([@DNB]/[@4278]-1)	
4280	42388	543,6822	=([@OSEBX]/[@4279]-1)	96.15	=([@4280]-[@0])/([@DNB]/[@4279]-1)	
4281	42389	518,0507	=([@OSEBX]/[@4280]-1)	92.15	=([@4281]-[@0])/([@DNB]/[@4280]-1)	
4282	42390	530,636	=([@OSEBX]/[@4281]-1)	95.1	=([@4282]-[@0])/([@DNB]/[@4281]-1)	
4283	42391	552,6219	=([@OSEBX]/[@4282]-1)	100.9	=([@4283]-[@0])/([@DNB]/[@4282]-1)	
4284	42394	547,0665	=([@OSEBX]/[@4283]-1)	97.15	=([@4284]-[@0])/([@DNB]/[@4283]-1)	
4285	42395	551,0231	=([@OSEBX]/[@4284]-1)	99	=([@4285]-[@0])/([@DNB]/[@4284]-1)	
4286	42396	547,1175	=([@OSEBX]/[@4285]-1)	97.65	=([@4286]-[@0])/([@DNB]/[@4285]-1)	
4287	42397	552,3204	=([@OSEBX]/[@4286]-1)	100.1	=([@4287]-[@0])/([@DNB]/[@4286]-1)	
4288	42398	560,9303	=([@OSEBX]/[@4287]-1)	104.2	=([@4288]-[@0])/([@DNB]/[@4287]-1)	
4289	42401	556,6996	=([@OSEBX]/[@4288]-1)	101.5	=([@4289]-[@0])/([@DNB]/[@4288]-1)	
4290	42402	539,4571	=([@OSEBX]/[@4289]-1)	97.5	=([@4290]-[@0])/([@DNB]/[@4289]-1)	
4291	42403	540,4653	=([@OSEBX]/[@4290]-1)	97.25	=([@4291]-[@0])/([@DNB]/[@4290]-1)	
4292	42404	552,2213	=([@OSEBX]/[@4291]-1)		=([@4292]-[@0])/([@DNB]/[@4291]-1)	

Instrument	Beta	OSEBX Return			Stock Return			Event window	Strategy 1	Alpha	Normal Return
		Strategy 1	Est. Per.	Est. Per. Average	Estimation p.	Estimation p. Average	Estimation window				
1 DNB	0.46	-6.16 %	4.66 %	0.17 %	-6.29 %	-0.21 %	30	50	-0.29 %	-3.14 %	
2 DNB	0.10	-4.30 %	0.85 %	0.03 %	-4.06 %	-0.13 %	30	48	-0.14 %	-0.57 %	
3 DNB	0.76	5.46 %	-4.91 %	-0.17 %	5.54 %	0.20 %	30	48	0.33 %	4.48 %	
4 DNB	0.75	12.23 %	-14.60 %	-0.53 %	-23.80 %	-0.91 %	30	37	-0.52 %	8.62 %	
5 DNB	0.88	8.86 %	8.96 %	0.30 %	4.30 %	0.17 %	30	43	0.17 %	-4.35 %	
6 DNB	0.18	-1.49 %	6.94 %	0.23 %	5.53 %	0.19 %	30	38	0.15 %	-0.12 %	
7 DNB	0.50	14.72 %	7.91 %	0.27 %	8.75 %	0.30 %	30	41	0.16 %	7.53 %	
8 DNB	0.70	2.95 %	5.96 %	0.20 %	4.68 %	0.16 %	30	41	0.02 %	2.10 %	
9 DNB	0.76	10.39 %	-11.74 %	-0.40 %	-9.98 %	-0.33 %	30	52	-0.03 %	7.88 %	
10 DNB	1.18	11.67 %	-6.47 %	-0.22 %	-2.03 %	-0.05 %	30	51	0.22 %	13.99 %	
11 DNB	1.03	1.71 %	-0.68 %	-0.02 %	-2.26 %	-0.07 %	30	53	-0.05 %	1.71 %	
12 DNB	1.66	1.05 %	8.08 %	0.27 %	10.13 %	0.35 %	30	52	-0.10 %	1.65 %	
13 DNB	1.12	2.32 %	4.57 %	0.16 %	7.90 %	0.27 %	30	56	0.09 %	2.69 %	
14 DNB	0.92	4.67 %	0.09 %	0.01 %	2.26 %	0.08 %	30	53	0.08 %	4.36 %	
15 DNB	0.89	6.33 %	6.01 %	0.21 %	4.11 %	0.15 %	30	53	-0.03 %	5.57 %	
16 DNB	1.17	7.72 %	-6.58 %	-0.22 %	-9.03 %	-0.29 %	30	56	-0.04 %	8.96 %	
17 DNB	0.99	0.64 %	2.36 %	0.08 %	9.73 %	0.33 %	30	56	0.24 %	0.88 %	
18 NHY	0.72	-5.48 %	2.61 %	0.10 %	-7.11 %	-0.24 %	30	50	-0.31 %	-4.24 %	
19 NHY	0.27	-2.18 %	0.53 %	0.02 %	6.57 %	0.23 %	30	54	0.22 %	-0.37 %	
20 NHY	0.71	8.64 %	-3.62 %	-0.12 %	-1.99 %	-0.06 %	30	55	0.03 %	6.20 %	
21 NHY	0.64	13.95 %	-9.03 %	-0.32 %	-6.62 %	-0.23 %	30	59	-0.03 %	8.87 %	
22 NHY	1.34	-2.42 %	6.61 %	0.22 %	9.47 %	0.32 %	30	59	0.02 %	-3.22 %	
23 NHY	1.33	-3.46 %	9.08 %	0.30 %	7.86 %	0.27 %	30	53	-0.13 %	-4.74 %	
24 NHY	1.23	22.22 %	2.72 %	0.10 %	8.47 %	0.29 %	30	57	0.17 %	27.58 %	
25 NHY	1.14	2.80 %	8.35 %	0.28 %	6.97 %	0.24 %	30	53	-0.08 %	3.11 %	
26 NHY	1.11	12.17 %	-11.44 %	-0.39 %	8.17 %	0.33 %	30	53	0.76 %	14.23 %	
27 NHY	1.65	6.83 %	-7.86 %	-0.27 %	-16.68 %	-0.60 %	30	52	-0.15 %	11.13 %	
28 NHY	1.11	-3.51 %	1.13 %	0.04 %	3.42 %	0.12 %	30	54	0.07 %	-3.82 %	
29 NHY	1.37	-4.55 %	7.22 %	0.24 %	6.07 %	0.22 %	30	55	-0.12 %	-6.33 %	
30 NHY	1.15	3.42 %	3.78 %	0.13 %	-4.23 %	-0.14 %	30	58	-0.29 %	3.64 %	
31 NHY	1.07	6.49 %	0.23 %	0.01 %	5.58 %	0.20 %	30	57	0.19 %	7.13 %	
32 NHY	1.08	7.03 %	4.77 %	0.17 %	4.37 %	0.16 %	30	57	0.16 %	12.12 %	
33 NHY	1.19	8.40 %	-1.87 %	-0.04 %	-8.63 %	-0.26 %	30	51	-0.22 %	9.78 %	
34 NHY	1.32	1.34 %	1.56 %	0.06 %	15.88 %	0.53 %	30	56	0.46 %	2.21 %	
35 ORK	0.95	0.09 %	0.52 %	0.03 %	2.25 %	0.10 %	30	60	0.07 %	0.16 %	
36 ORK	-0.20	-2.13 %	1.92 %	0.07 %	1.67 %	0.06 %	30	52	0.08 %	0.51 %	
37 ORK	-0.39	8.36 %	-4.86 %	-0.17 %	-0.65 %	-0.02 %	30	56	-0.08 %	-3.35 %	
38 ORK	1.45	10.70 %	-1.14 %	-0.03 %	2.34 %	0.11 %	30	27	0.16 %	15.69 %	
39 ORK	0.64	-4.04 %	11.06 %	0.37 %	6.67 %	0.23 %	30	48	-0.01 %	-2.60 %	
40 ORK	0.92	4.69 %	6.02 %	0.20 %	5.75 %	0.20 %	30	44	0.01 %	4.35 %	
41 ORK	0.63	12.33 %	7.95 %	0.27 %	4.67 %	0.16 %	30	46	-0.01 %	7.77 %	
42 ORK	0.94	-1.68 %	9.82 %	0.33 %	16.69 %	0.55 %	30	44	0.24 %	-1.33 %	
43 ORK	1.11	7.00 %	-11.74 %	-0.40 %	-34.11 %	-1.37 %	30	48	-0.93 %	6.87 %	
44 ORK	0.99	6.61 %	-6.00 %	-0.19 %	-3.35 %	-0.08 %	30	43	0.11 %	6.68 %	
45 ORK	1.08	11.52 %	-6.47 %	-0.22 %	-15.87 %	-0.58 %	30	48	-0.34 %	12.12 %	
46 ORK	0.51	0.67 %	-0.68 %	-0.02 %	-7.28 %	-0.25 %	30	46	-0.24 %	0.09 %	
47 ORK	0.90	7.65 %	-4.77 %	-0.14 %	-12.94 %	-0.45 %	30	37	-0.32 %	6.59 %	
48 ORK	0.81	1.06 %	8.08 %	0.27 %	7.82 %	0.27 %	30	48	0.04 %	0.91 %	
49 ORK	0.75	-0.70 %	3.88 %	0.13 %	0.00 %	0.00 %	30	49	-0.10 %	-0.62 %	
50 ORK	0.19	1.03 %	-0.01 %	0.00 %	4.69 %	0.16 %	30	16	0.16 %	0.35 %	
51 ORK	0.88	7.96 %	-0.86 %	-0.03 %	2.80 %	0.10 %	30	13	0.13 %	7.13 %	
52 ORK	0.64	14.35 %	-15.57 %	-0.56 %	-2.94 %	-0.09 %	30	43	0.27 %	9.45 %	
53 ORK	0.09	-1.65 %	1.56 %	0.06 %	2.13 %	0.08 %	30	49	0.07 %	-0.08 %	
54 ORK	0.58	1.71 %	7.42 %	0.25 %	1.18 %	0.04 %	30	18	-0.10 %	0.89 %	
55 TEL	0.85	7.32 %	-4.91 %	-0.17 %	-12.28 %	-0.44 %	30	56	-0.29 %	5.93 %	
56 TEL	1.00	14.57 %	-12.55 %	-0.45 %	-9.26 %	-0.32 %	30	57	0.14 %	14.67 %	
57 TEL	1.23	1.23 %	7.54 %	0.25 %	14.98 %	0.49 %	30	57	0.18 %	1.70 %	
58 TEL	1.06	0.04 %	9.08 %	0.30 %	5.78 %	0.21 %	30	63	-0.17 %	-0.12 %	
59 TEL	0.69	7.09 %	4.76 %	0.17 %	-0.37 %	0.00 %	30	65	0.12 %	4.78 %	
60 TEL	0.83	3.27 %	8.01 %	0.27 %	10.42 %	0.35 %	30	60	0.13 %	2.85 %	
61 TEL	0.61	20.89 %	-16.08 %	-0.57 %	-15.47 %	-0.56 %	30	58	-0.21 %	12.43 %	
62 TEL	0.77	1.42 %	-8.18 %	-0.29 %	-3.88 %	-0.12 %	30	66	0.10 %	1.19 %	
63 TEL	0.58	-0.76 %	0.17 %	0.01 %	-5.97 %	-0.20 %	30	69	-0.21 %	-0.65 %	
64 TEL	0.78	-2.55 %	7.34 %	0.25 %	-2.39 %	-0.07 %	30	67	-0.27 %	-2.24 %	
65 TEL	0.73	3.36 %	3.81 %	0.13 %	5.12 %	0.18 %	30	61	0.08 %	2.53 %	
66 TEL	1.30	9.04 %	0.23 %	0.01 %	-5.39 %	-0.18 %	30	62	-0.19 %	11.59 %	
67 YAR	1.03	0.08 %	6.14 %	0.21 %	16.78 %	0.54 %	30	59	0.33 %	0.42 %	
68 YAR	0.96	19.33 %	5.50 %	0.19 %	-6.39 %	-0.21 %	30	56	-0.39 %	18.21 %	
69 YAR	1.53	1.53 %	6.80 %	0.23 %	15.60 %	0.53 %	30	61	0.17 %	2.51 %	
70 YAR	0.94	19.56 %	-11.74 %	-0.40 %	10.40 %	0.42 %	30	57	0.79 %	19.20 %	
71 YAR	1.35	22.34 %	-5.23 %	-0.16 %	0.62 %	0.11 %	30	54	0.32 %	30.43 %	
72 YAR	1.29	8.33 %	-10.65 %	-0.38 %	-10.91 %	-0.37 %	30	59	0.12 %	10.86 %	
73 YAR	1.16	-1.81 %	0.93 %	0.04 %	0.94 %	0.05 %	30	58	0.01 %	-2.10 %	
74 YAR	1.52	0.02 %	7.54 %	0.25 %	9.43 %	0.33 %	30	64	-0.05 %	-0.02 %	
75 YAR	0.75	3.77 %	3.78 %	0.13 %	8.47 %	0.29 %	30	60	0.19 %	3.01 %	
76 YAR	0.91	6.17 %	0.23 %	0.01 %	2.72 %	0.10 %	30	55	0.09 %	5.71 %	
77 YAR	0.36	8.42 %	4.77 %	0.17 %	16.55 %	0.54 %	30	60	0.49 %	3.50 %	
78 YAR	0.88	15.33 %	-15.57 %	-0.56 %	-16.23 %	-0.58 %	30	60	-0.09 %	13.40 %	
79 YAR	0.90	3.40 %	1.56 %	0.06 %	0.91 %	0.04 %	30	62	-0.01 %	3.04 %	
80 MHG	0.21	0.42 %	-0.48 %	-0.01 %	-18.92 %	-0.70 %	30	11	-0.70 %	-0.61 %	
81 MHG	1.00	-5.31 %	-0.33 %	0.00 %	9.11 %	0.32 %	30	23	0.32 %	-4.97 %	
82 MHG	0.76	1.45 %	-0.54 %	0.00 %	-22.11 %	-0.82 %	30	24	-0.82 %	0.28 %	
83 MHG	1.12	3.92 %	7.21 %	0.24 %	15.14 %	0.50 %	30	25	0.23 %	4.61 %	
84 MHG	1.10	1.34 %	-4.21 %	-0.14 %	1.03 %	0.05 %	30	13	0.20 %	1.67 %	
85 MHG	0.60	4.32 %	-2.33 %	-0.08 %	1.49 %	0.06 %	30	21	0.11 %	2.68 %	
86 MHG	0.34	1.67 %	0.99 %	0.04 %	-5.12 %	-0.17 %	30	19	-0.19 %	0.38 %	
87 MHG	1.24	3.06 %	4.33 %	0.15 %	15.63 %	0.51 %	30	18	0.33 %	4.11 %	
88 MHG	0.15	1.03 %	-0.92 %	-0.03 %	1.38 %	0.05 %	30	10	0.06 %	0.21 %	
89 MHG	0.42	3.15 %	6.67 %	0.23 %	11.67 %	0.40 %	30	16	0.30 %	1.63 %	
90 MHG	1.96	0.41 %	-1.47 %	-0.05 %	-0.35 %	0.01 %	30	7	0.11 %	0.91 %	
91 MHG	1.07	2.46 %	-7.46 %	-0.26 %	3.36 %	0.13 %	30	8	0.40 %	3.02 %	
92 MHG	0.45	0.28 %	11.35 %	0.38 %	5.64 %	0.21 %	30	11	0.04 %	0.17 %	
93 MHG	1.30	-0.24 %	5.46 %	0.19 %	-1.60 %	-0.03 %	30	18	-0.28 %	-0.59 %	
94 MHG	0.75	-4.68 %	-0.79 %	-0.02 %	16.24 %	0.53 %	30	8	0.55 %	-2.96 %	
95 MHG	0.68	2.04 %	4.82 %	0.17 %	13.89 %	0.46 %	30	8	0.35 %	1.73 %	
96 MHG	0.48	4.57 %	-8.53 %	-0.28 %	1.30 %	0.06 %	30	8	0.20 %	2.40 %	
97 MHG	0.02	1.98 %	1.25 %	0.05 %	0.46 %	0.03 %	30	6	0.03 %	0.07 %	
98 MHG	0.64	1.60 %	-0.19 %	0.00 %	-4.46 %	-0.15 %	30	7	-0.15 %	0.88 %	
99 MHG	1.01	1.00 %	4.84 %	0.17 %	11.20 %	0.38 %	30	8	0.21 %	1.22 %	
100 MHG	0.52	-1.11 %	1.29 %	0.05 %	-2.01 %	-0.06 %	30	8	-0.08 %	-0.66 %	
101 MHG	0.71	-0.04 %	3.68 %	0.13 %	8.44 %	0.29 %	30	16	0.20 %	0.17 %	
102 MHG	0.79	1.47 %	0.99 %	0.04 %	11.24 %	0.37 %	30	7	0.35 %	1.51 %	
103 MHG	0.31	0.53 %	5.43 %	0.18 %	3.30 %	0.12 %	30	8	0.06 %	0.22 %	

Strategy 2, ex-dividend strategy

Instrument	Beta	OSEBX Return			Stock Return			Event window	Alpha	Normal Return Strategy 2
		Strategy 2	Est. Per	Est. Per. Average	Estimation p.	Estimation p. Average	Estimation window			
1 DNB	0,40	4,33 %	-3,81 %	-0,29 %	2,19 %	0,09 %	30	9	0,20 %	1,94 %
2 DNB	0,48	2,09 %	3,93 %	-0,04 %	0,46 %	0,04 %	30	9	0,06 %	1,06 %
3 DNB	-0,02	2,68 %	-1,73 %	-0,04 %	3,13 %	0,11 %	30	9	0,11 %	0,07 %
4 DNB	1,02	4,52 %	12,83 %	0,44 %	16,25 %	0,55 %	30	9	0,10 %	4,71 %
5 DNB	0,65	-2,06 %	-3,44 %	-0,05 %	0,44 %	0,02 %	30	9	0,05 %	-1,28 %
6 DNB	0,59	-3,61 %	-2,42 %	-0,12 %	1,98 %	0,07 %	30	9	0,14 %	-2,00 %
7 DNB	0,66	0,93 %	13,49 %	0,46 %	12,96 %	0,43 %	30	9	0,13 %	0,74 %
8 DNB	1,04	0,39 %	7,23 %	0,22 %	3,55 %	0,13 %	30	9	-0,10 %	0,31 %
9 DNB	1,45	5,24 %	19,90 %	0,59 %	4,52 %	0,19 %	30	9	-0,66 %	6,91 %
10 DNB	0,90	-2,60 %	4,34 %	0,16 %	0,00 %	0,01 %	30	9	-0,14 %	-2,47 %
11 DNB	0,92	-2,55 %	6,34 %	0,20 %	7,24 %	0,25 %	30	9	0,07 %	-2,26 %
12 DNB	1,45	-4,79 %	-1,17 %	-0,01 %	2,49 %	0,11 %	30	9	0,12 %	-6,81 %
13 DNB	1,56	2,52 %	-0,54 %	0,00 %	0,43 %	0,04 %	30	9	0,04 %	3,97 %
14 DNB	1,19	4,03 %	3,66 %	0,06 %	-3,33 %	-0,11 %	30	9	-0,17 %	4,61 %
15 DNB	1,05	-1,59 %	7,02 %	0,27 %	10,36 %	0,35 %	30	9	0,07 %	-1,60 %
16 DNB	1,33	-2,00 %	2,85 %	0,06 %	-1,12 %	-0,02 %	30	9	-0,11 %	-2,76 %
17 DNB	1,42	3,01 %	-0,24 %	0,00 %	-1,14 %	-0,03 %	30	9	-0,04 %	4,22 %
18 NHY	0,42	6,60 %	-8,52 %	-0,21 %	6,56 %	0,24 %	30	9	0,33 %	3,12 %
19 NHY	0,58	1,19 %	4,47 %	0,15 %	4,26 %	0,15 %	30	9	0,06 %	0,76 %
20 NHY	1,15	2,14 %	-2,19 %	-0,03 %	3,00 %	0,11 %	30	9	0,15 %	2,61 %
21 NHY	0,87	3,00 %	13,29 %	0,39 %	9,66 %	0,33 %	30	9	-0,01 %	2,59 %
22 NHY	1,38	3,53 %	-5,42 %	-0,14 %	-6,99 %	-0,23 %	30	9	-0,03 %	4,83 %
23 NHY	1,14	3,14 %	-5,74 %	-0,20 %	-4,48 %	-0,15 %	30	9	0,08 %	3,64 %
24 NHY	1,41	-11,29 %	9,35 %	0,34 %	9,58 %	0,33 %	30	9	-0,14 %	-16,12 %
25 NHY	1,18	3,25 %	3,48 %	0,15 %	11,17 %	0,37 %	30	9	0,19 %	4,03 %
26 NHY	1,03	3,72 %	21,95 %	0,61 %	22,40 %	0,73 %	30	9	0,10 %	3,94 %
27 NHY	1,29	-4,99 %	-0,33 %	0,06 %	7,05 %	0,25 %	30	9	0,17 %	-6,24 %
28 NHY	1,44	0,88 %	-1,07 %	-0,05 %	-1,11 %	-0,02 %	30	9	0,06 %	1,33 %
29 NHY	1,08	-0,02 %	-6,11 %	-0,17 %	-16,27 %	-0,59 %	30	9	-0,40 %	-0,43 %
30 NHY	0,93	-0,21 %	3,57 %	0,10 %	8,57 %	0,29 %	30	9	0,20 %	0,01 %
31 NHY	0,80	0,46 %	6,62 %	0,18 %	11,55 %	0,38 %	30	9	0,24 %	0,61 %
32 NHY	1,05	1,57 %	2,99 %	0,13 %	-12,82 %	-0,45 %	30	9	-0,59 %	1,07 %
33 NHY	1,11	2,15 %	0,39 %	0,10 %	-0,38 %	0,00 %	30	9	-0,11 %	2,29 %
34 NHY	1,72	4,05 %	-0,51 %	0,00 %	-9,12 %	-0,31 %	30	9	-0,31 %	6,64 %
35 ORK	0,56	2,69 %	2,22 %	0,04 %	5,32 %	0,20 %	30	9	0,18 %	1,68 %
36 ORK	0,33	1,19 %	9,56 %	0,32 %	10,51 %	0,35 %	30	9	0,25 %	0,64 %
37 ORK	0,09	-1,80 %	-1,31 %	-0,03 %	-2,52 %	-0,08 %	30	9	-0,08 %	-0,24 %
38 ORK	0,98	4,02 %	11,03 %	0,41 %	9,63 %	0,33 %	30	9	-0,07 %	3,86 %
39 ORK	0,91	-2,07 %	-3,65 %	-0,11 %	-13,54 %	-0,44 %	30	9	-0,33 %	-2,21 %
40 ORK	1,00	-4,43 %	-4,47 %	-0,01 %	1,11 %	0,05 %	30	9	0,06 %	-4,37 %
41 ORK	1,21	5,07 %	9,82 %	0,30 %	11,51 %	0,40 %	30	9	0,03 %	6,19 %
42 ORK	0,57	2,44 %	6,38 %	0,27 %	14,09 %	0,46 %	30	9	0,31 %	1,70 %
43 ORK	1,47	8,37 %	15,05 %	0,35 %	3,26 %	0,14 %	30	9	-0,37 %	11,92 %
44 ORK	0,91	12,28 %	15,01 %	0,52 %	5,18 %	0,22 %	30	9	-0,25 %	10,88 %
45 ORK	0,57	-6,10 %	6,43 %	0,17 %	-1,56 %	-0,04 %	30	9	-0,14 %	-3,60 %
46 ORK	0,65	2,00 %	-4,21 %	-0,06 %	2,67 %	0,10 %	30	9	0,14 %	1,44 %
47 ORK	0,62	0,91 %	10,18 %	0,44 %	-2,99 %	-0,07 %	30	9	-0,34 %	0,23 %
48 ORK	0,75	0,19 %	-3,38 %	0,05 %	-6,48 %	-0,22 %	30	9	-0,26 %	-0,11 %
49 ORK	0,23	2,26 %	-2,28 %	-0,08 %	4,06 %	0,14 %	30	9	0,16 %	0,68 %
50 ORK	1,53	4,61 %	-2,38 %	-0,07 %	0,09 %	0,02 %	30	9	0,12 %	7,17 %
51 ORK	1,56	-0,50 %	5,65 %	0,23 %	0,90 %	0,05 %	30	9	-0,32 %	-1,09 %
52 ORK	0,32	3,69 %	1,58 %	0,09 %	-2,92 %	-0,10 %	30	9	-0,12 %	1,06 %
53 ORK	0,30	2,63 %	0,28 %	-0,04 %	-1,13 %	-0,04 %	30	9	-0,02 %	0,76 %
54 ORK	0,98	3,01 %	5,12 %	0,16 %	-1,50 %	-0,04 %	30	9	-0,21 %	2,75 %
55 TEL	1,18	-1,83 %	-0,99 %	-0,06 %	-10,05 %	-0,34 %	30	9	-0,28 %	-2,44 %
56 TEL	1,18	-0,36 %	14,16 %	0,44 %	17,01 %	0,57 %	30	9	0,05 %	-0,38 %
57 TEL	0,98	-0,62 %	-1,97 %	-0,01 %	-1,90 %	-0,05 %	30	9	-0,04 %	-0,65 %
58 TEL	1,20	3,44 %	-3,61 %	-0,08 %	-6,38 %	-0,20 %	30	9	-0,10 %	4,04 %
59 TEL	0,58	2,48 %	-8,51 %	-0,14 %	4,48 %	0,19 %	30	9	0,27 %	1,70 %
60 TEL	1,28	1,64 %	4,03 %	0,13 %	7,57 %	0,27 %	30	9	0,10 %	2,20 %
61 TEL	1,09	7,60 %	18,19 %	0,67 %	15,96 %	0,53 %	30	9	-0,19 %	8,11 %
62 TEL	0,87	2,29 %	-11,91 %	-0,31 %	0,55 %	0,04 %	30	9	0,32 %	2,30 %
63 TEL	0,56	0,51 %	-4,26 %	-0,12 %	4,41 %	0,15 %	30	9	0,22 %	0,51 %
64 TEL	0,56	-1,09 %	-9,83 %	-0,20 %	-0,09 %	0,01 %	30	9	0,12 %	-0,48 %
65 TEL	0,73	0,55 %	2,70 %	0,10 %	3,73 %	0,13 %	30	9	0,06 %	0,46 %
66 TEL	1,32	1,43 %	5,97 %	0,22 %	10,99 %	0,37 %	30	9	0,07 %	1,96 %
67 YAR	1,09	2,55 %	-2,61 %	-0,10 %	-2,11 %	-0,05 %	30	9	0,05 %	2,83 %
68 YAR	0,58	-8,01 %	6,58 %	0,32 %	-9,56 %	-0,33 %	30	9	-0,52 %	-5,14 %
69 YAR	1,16	5,15 %	3,62 %	0,13 %	-1,32 %	-0,03 %	30	9	-0,18 %	5,82 %
70 YAR	0,80	3,96 %	18,19 %	0,67 %	40,92 %	1,25 %	30	9	0,72 %	3,89 %
71 YAR	1,01	2,11 %	24,46 %	0,61 %	28,21 %	0,94 %	30	9	0,33 %	2,45 %
72 YAR	0,78	-5,66 %	0,43 %	-0,03 %	-16,67 %	-0,59 %	30	9	-0,57 %	-5,00 %
73 YAR	1,78	-1,56 %	-1,87 %	-0,06 %	10,91 %	0,38 %	30	9	0,49 %	-2,29 %
74 YAR	0,95	-4,18 %	-4,79 %	-0,20 %	-4,59 %	-0,15 %	30	9	0,05 %	-3,95 %
75 YAR	0,94	1,51 %	3,75 %	0,13 %	3,57 %	0,13 %	30	9	0,01 %	1,43 %
76 YAR	0,59	1,86 %	6,24 %	0,22 %	12,42 %	0,42 %	30	9	0,29 %	1,38 %
77 YAR	0,98	-1,23 %	6,53 %	0,21 %	-2,31 %	-0,07 %	30	9	-0,28 %	-1,47 %
78 YAR	0,80	2,79 %	2,38 %	0,15 %	-0,94 %	-0,02 %	30	9	-0,14 %	2,09 %
79 YAR	1,22	-0,33 %	5,18 %	0,19 %	1,26 %	0,06 %	30	9	-0,17 %	-0,58 %
80 MHG	1,69	-0,25 %	1,48 %	-0,05 %	-37,27 %	-1,46 %	30	9	-1,37 %	-1,80 %
81 MHG	0,90	3,03 %	-9,05 %	-0,39 %	0,91 %	0,07 %	30	9	0,42 %	3,13 %
82 MHG	0,83	6,20 %	-1,94 %	0,00 %	12,43 %	0,45 %	30	9	0,45 %	5,63 %
83 MHG	1,19	1,46 %	4,87 %	0,18 %	6,85 %	0,26 %	30	9	0,04 %	1,78 %
84 MHG	0,72	-2,10 %	-1,97 %	-0,06 %	2,79 %	0,11 %	30	9	0,15 %	-1,35 %
85 MHG	0,49	-0,87 %	4,07 %	0,15 %	10,92 %	0,37 %	30	9	0,30 %	-0,13 %
86 MHG	1,81	0,43 %	2,30 %	0,09 %	2,49 %	0,10 %	30	9	-0,06 %	0,72 %
87 MHG	0,93	-0,20 %	9,32 %	0,26 %	8,89 %	0,30 %	30	9	0,06 %	-0,13 %
88 MHG	-0,08	-2,01 %	-1,10 %	-0,06 %	-7,67 %	-0,26 %	30	9	-0,27 %	-0,11 %
89 MHG	0,18	3,32 %	8,40 %	0,32 %	14,22 %	0,47 %	30	9	0,41 %	1,02 %
90 MHG	2,02	-1,31 %	-0,19 %	-0,04 %	-2,80 %	-0,07 %	30	9	0,02 %	-2,61 %
91 MHG	1,01	0,95 %	-4,93 %	-0,20 %	5,58 %	0,21 %	30	9	0,41 %	1,38 %
92 MHG	0,67	-1,20 %	7,00 %	0,26 %	-6,08 %	-0,19 %	30	9	-0,36 %	-1,17 %
93 MHG	0,84	0,81 %	-1,59 %	-0,07 %	-4,75 %	-0,15 %	30	9	-0,09 %	0,59 %
94 MHG	0,78	-0,59 %	-8,38 %	-0,22 %	6,22 %	0,22 %	30	9	0,38 %	-0,07 %
95 MHG	0,68	0,04 %	9,88 %	0,28 %	9,76 %	0,34 %	30	9	0,14 %	0,17 %
96 MHG	0,55	2,95 %	7,17 %	0,16 %	12,56 %	0,43 %	30	9	0,34 %	1,95 %
97 MHG	-0,05	12,89 %	6,22 %	0,23 %	1,01 %	0,04 %	30	9	0,06 %	-0,62 %
98 MHG	0,42	1,29 %	-0,15 %	-0,03 %	-8,09 %	-0,28 %	30	9	-0,27 %	0,27 %
99 MHG	1,22	2,61 %	2,83 %	0,13 %	0,84 %	0,04 %	30	9	-0,12 %	3,07 %
100 MHG	0,87	0,60 %	-0,61 %	-0,01 %	-0,13 %	0,01 %	30	9	0,02 %	0,54 %
101 MHG	1,54	-2,15 %	4,34 %	0,14 %	10,14 %	0,35 %	30	9	0,14 %	-3,18 %
102 MHG	0,69	1,90 %	3,35 %	0,08 %	7,46 %	0,25 %	30	9	0,20 %	1,52 %
103 MHG	0,67	-0,14 %	2,99 %	0,12 %	-2,10 %	-0,07 %	30	9	-0,15 %	-0,24 %

APPENDIX D – Dividend Size Comparison

	Instrument	Relative size	Abnormal Return		Av. Return
			Strategy 1	Strategy 2	
1	DNB	5,95 %	14,36 %	1,25 %	7,80 %
2	DNB	4,93 %	-4,04 %	0,69 %	-1,67 %
3	DNB	5,56 %	2,24 %	6,54 %	4,39 %
4	DNB	8,86 %	10,20 %	7,37 %	8,79 %
5	DNB	4,95 %	6,60 %	1,28 %	3,94 %
6	DNB	4,05 %	2,10 %	3,20 %	2,65 %
7	DNB	4,29 %	4,74 %	1,86 %	3,30 %
8	DNB	4,54 %	-3,00 %	-4,49 %	-3,75 %
9	DNB	5,84 %	-8,79 %	-2,99 %	-5,89 %
10	DNB	2,79 %	-5,62 %	3,68 %	-0,97 %
11	DNB	4,88 %	6,78 %	-3,01 %	1,88 %
12	DNB	2,88 %	1,95 %	-10,40 %	-4,22 %
13	DNB	2,58 %	13,24 %	-1,87 %	5,68 %
14	DNB	2,49 %	-7,96 %	-0,51 %	-4,24 %
15	DNB	3,24 %	13,34 %	1,97 %	7,65 %
16	DNB	4,46 %	-4,30 %	1,03 %	-1,64 %
17	DNB	4,16 %	0,36 %	5,79 %	3,07 %
18	NHY	7,61 %	4,57 %	4,74 %	4,66 %
19	NHY	7,64 %	2,58 %	-1,16 %	0,71 %
20	NHY	8,25 %	8,66 %	-1,07 %	3,79 %
21	NHY	11,31 %	-1,71 %	-3,61 %	-2,66 %
22	NHY	7,15 %	-11,23 %	-0,86 %	-6,04 %
23	NHY	11,96 %	3,96 %	-1,31 %	1,33 %
24	NHY	8,91 %	0,15 %	3,82 %	1,98 %
25	NHY	7,90 %	7,91 %	-1,91 %	3,00 %
26	NHY	6,71 %	-3,49 %	1,20 %	-1,15 %
27	NHY	1,26 %	1,76 %	-2,08 %	-0,16 %
28	NHY	1,61 %	-4,26 %	-3,29 %	-3,77 %
29	NHY	2,34 %	-12,50 %	6,78 %	-2,86 %
30	NHY	2,80 %	-1,40 %	-0,72 %	-1,06 %
31	NHY	2,53 %	2,16 %	-0,20 %	0,98 %
32	NHY	2,22 %	-23,45 %	4,45 %	-9,50 %
33	NHY	3,10 %	-3,80 %	-2,85 %	-3,32 %
34	NHY	2,64 %	-0,23 %	-0,47 %	-0,35 %
35	ORK	1,84 %	1,31 %	1,89 %	1,60 %
36	ORK	1,69 %	-6,97 %	-3,66 %	-5,32 %
37	ORK	2,15 %	6,65 %	3,80 %	5,23 %
38	ORK	3,09 %	-4,78 %	2,42 %	-1,18 %
39	ORK	15,10 %	6,77 %	1,31 %	4,04 %
40	ORK	4,38 %	7,17 %	1,19 %	4,18 %
41	ORK	2,61 %	9,97 %	-7,70 %	1,14 %
42	ORK	2,31 %	9,30 %	4,33 %	6,82 %
43	ORK	3,43 %	-5,19 %	-4,01 %	-4,60 %
44	ORK	4,91 %	-0,67 %	-5,17 %	-2,92 %
45	ORK	4,65 %	-2,63 %	-4,27 %	-3,45 %
46	ORK	4,81 %	4,43 %	0,99 %	2,71 %
47	ORK	10,82 %	0,12 %	-6,63 %	-3,25 %
48	ORK	5,49 %	-2,75 %	-2,33 %	-2,54 %
49	ORK	5,23 %	6,08 %	1,44 %	3,76 %
50	ORK	5,18 %	4,31 %	-3,63 %	0,34 %
51	ORK	4,18 %	0,49 %	-2,81 %	-1,16 %
52	ORK	3,73 %	-1,24 %	-1,13 %	-1,19 %
53	ORK	3,23 %	-4,27 %	5,03 %	0,38 %
54	ORK	6,08 %	-0,04 %	-1,93 %	-0,99 %
55	TEL	1,06 %	-5,33 %	2,14 %	-1,59 %
56	TEL	1,78 %	-3,20 %	2,14 %	-0,53 %
57	TEL	2,09 %	-4,42 %	1,97 %	-1,22 %
58	TEL	2,59 %	-5,05 %	-10,52 %	-7,79 %
59	TEL	2,93 %	6,21 %	8,71 %	7,46 %

60	TEL	2,09 %	-4,74 %	-0,21 %	-2,47 %
61	TEL	3,33 %	-2,65 %	-6,02 %	-4,34 %
62	TEL	3,33 %	7,92 %	-0,52 %	3,70 %
63	TEL	4,15 %	5,46 %	-1,55 %	1,95 %
64	TEL	5,19 %	11,74 %	-7,12 %	2,31 %
65	TEL	4,90 %	6,37 %	-3,52 %	1,43 %
66	TEL	5,49 %	4,19 %	-2,66 %	0,77 %
67	YAR	2,62 %	7,72 %	4,78 %	6,25 %
68	YAR	2,32 %	-22,41 %	-2,99 %	-12,70 %
69	YAR	1,54 %	1,65 %	3,00 %	2,33 %
70	YAR	1,36 %	16,45 %	0,16 %	8,31 %
71	YAR	2,92 %	-0,56 %	10,56 %	5,00 %
72	YAR	1,99 %	-17,37 %	-1,12 %	-9,25 %
73	YAR	1,69 %	-2,49 %	7,21 %	2,36 %
74	YAR	2,69 %	1,40 %	-4,60 %	-1,60 %
75	YAR	4,40 %	-9,82 %	-0,46 %	-5,14 %
76	YAR	4,00 %	5,81 %	2,85 %	4,33 %
77	YAR	3,16 %	-4,98 %	4,07 %	-0,46 %
78	YAR	4,80 %	-12,76 %	-0,31 %	-6,54 %
79	YAR	3,12 %	-3,17 %	5,38 %	1,11 %
80	MHG	2,24 %	-18,21 %	12,75 %	-2,73 %
81	MHG	6,40 %	6,43 %	-3,32 %	1,55 %
82	MHG	4,20 %	7,01 %	-3,41 %	1,80 %
83	MHG	0,84 %	-2,25 %	-4,15 %	-3,20 %
84	MHG	12,45 %	4,32 %	-11,66 %	-3,67 %
85	MHG	1,68 %	3,02 %	-2,76 %	0,13 %
86	MHG	0,84 %	-0,38 %	7,96 %	3,79 %
87	MHG	1,07 %	-4,68 %	3,26 %	-0,71 %
88	MHG	1,71 %	-1,70 %	-5,36 %	-3,53 %
89	MHG	6,87 %	2,63 %	1,15 %	1,89 %
90	MHG	1,17 %	-1,72 %	2,84 %	0,56 %
91	MHG	1,24 %	3,87 %	3,75 %	3,81 %
92	MHG	1,19 %	-2,05 %	2,36 %	0,15 %
93	MHG	1,37 %	-5,02 %	6,19 %	0,59 %
94	MHG	1,25 %	-0,22 %	1,26 %	0,52 %
95	MHG	1,27 %	4,44 %	1,68 %	3,06 %
96	MHG	1,21 %	7,14 %	-6,91 %	0,11 %
97	MHG	1,30 %	-0,53 %	5,50 %	2,48 %
98	MHG	2,43 %	0,11 %	0,89 %	0,50 %
99	MHG	1,53 %	-5,40 %	2,28 %	-1,56 %
100	MHG	1,84 %	-1,77 %	-5,57 %	-3,67 %
101	MHG	1,96 %	-1,48 %	0,56 %	-0,46 %
102	MHG	2,04 %	-3,36 %	-0,40 %	-1,88 %
103	MHG	2,13 %	-3,55 %	0,24 %	-1,65 %