LUND UNIVERSITY

School of Economics and Management

Investigating Short-Term Trading Returns Around The Ex-Dividend Date: A Test for Market Efficiency

Master Thesis

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Abstract

This study tests the efficiency of the Swedish and the Dutch stock markets by analyzing the performance of two dividend strategies – dividend capturing and dividend timing. To test these strategies and what factors influence them, the researchers collect a sample of 95 different firms, about half from each country and a total of over 8 000 dividend observation. A cross sectional regression is run for serval short term holding periods and repeated for the years 2012-2016.

The results show that market efficiency does not hold on the country level as the return between the strategies differs, but it does seem to be maintained on an international scale. The thesis shows that the dividend yield and the home country's tax system have the greatest impact on a difference between the two strategies. This result is consistent over time. Evidence is also found for increased trading around the ex-dividend date.

This study contributes to the literature, by testing market efficiency in regards to dividends for the Swedish and the Dutch stock markets. It provides further guidance for investors on what to look for when trying to decide between a dividend capturing and a dividend timing strategy as well as it tries to explain what impacts dividend returns.

Keywords used in the literature and data collections for this thesis are:

- Market Efficiency
- Dividend Timing
- Dividend Capturing
- Ex-Dividend Behavior
- Stock Price Recovery
- Abnormal Returns
- Short-Term trading

Acknowledgements

We wish to thank our supervisor, Charlotte Christiansen, for her continuous support and advice throughout the research process.

Furthermore, we want to thank Hossein Asgharian for listening to our ideas and providing feedback during the first stages of the thesis.

Additional thanks go out to our midterm opponents Alexandre Azar and Heying Zhou for their insight and feedback.

We also want to thank our families, without whose never wavering support and belief this project would not have been possible.

Contents

1. Introduction

Over time, dividend capturing is seen as a favored strategy for short-term investors as there is empirical evidence for the stock prices to recover before the next dividend payment (Henry & Koski, 2016). This method is mainly used by tax-advantaged investors such as pension funds. Tax-advantaged investors possess the arbitrage opportunity of gaining the tax amount as an additional return (Kalay, 1982), due to the nature of stocks dropping less than the dividend amount on the ex-dividend date (Chowdhury & Sonaer, 2016). Non-tax-advantaged traders seeking a similar short-term arbitrage opportunity fuels recent developments in literature and discussions amongst traders. The new potential arbitrage method for non-tax-advantaged short-term traders is known as the dividend timing strategy and researching its effectiveness is the goal of this paper.

Dividend timing is an opposing strategy to dividend capturing, where a return is realized by collecting the dividend through purchasing the stock cum-dividend and selling it ex dividend. Dividend timing is not about capturing the dividend as a return but emphasizes on stock recovery. By implementing the dividend timing strategy a short-term trader purchases the stock on the ex-dividend date, after the dividend payment, and waits for the stock to recover in order to capture a similar return without having to pay dividend tax. The recovery period of this strategy could be from one trading day, to capture the empirically proven abnormal returns on the ex-dividend date (Dubofsky, 1992) up to sixty trading days to capture the next quarterly dividend recovery period. This strategy is relatively new, although employed by traders already. One of the authors learnt about it while working at Vattenfall Energy Trading as an analyst on the trade floor. A discussion arose between traders as they disagreed on which short-term method generates the highest returns. Therefore there is practical relevance to investigate if the dividend timing strategy actually outperforms the dividend capturing strategy as a short-term trading strategy.

In essence this thesis investigates market efficiency by measuring the difference between two return strategies – a cum-dividend strategy (dividend capturing) and an ex-dividend strategy (dividend timing). The idea is that market frictions such as taxes and trade volume invalidate the theory of market efficiency and thus give rise to an arbitrage opportunity. The main research question guiding this thesis can therefore be stated as:

Is there a difference in returns between a strategy where the investor buys a stock ex-dividend and a strategy where the investor buys the stock cum-dividend and holds them for the same period and, if so, what causes this difference?

To facilitate analysis, this main question is broken down into sub-questions, the first one aimed at identifying whether or not there is a phenomenon to investigate and thus reason to progress. Due to evidence in the literature (Chowdhury & Sonaer, 2015; Miller & Modigliani, 1961) there is ample reason to assume that a difference will be found, caused by market imperfections, and thus this question is somewhat of a formality to give the thesis an empirical base to stand on:

a. *Is there an observable and statistically significant difference in returns between a cum-dividend and an ex-dividend strategy and if so what is that difference?*

The second stage will look closer to the returns themselves and whether or not they differ over different holding periods. They are expected to differ since the longer the holding period the more external events can occur to impact the price – and thus return – development. It is important to investigate the effect of the holding period on the returns to analyze the impact of dividends on the longer period returns. The second sub-question states:

b. *Is there an observable and statistically significant difference in returns between different holding periods for the cum-dividend and ex-dividend strategy respectively and if so what is that difference?*

The third and final sub-question investigates what causes these differences in returns. This is of interest since, if significant findings are made, these can be used by traders to base investment decisions on. It is also of academic interest as it is another step in explaining what affects stock returns.

c. *What factors can be found to impact the difference in return between the cum-dividend and ex-dividend strategy?*

The purpose of this paper is to test for market efficiency concerning dividend related trading, measured by the difference between the two strategies. According to the market efficiency theorem there are no arbitrage opportunities. Therefore, neither the cum-dividend strategy

nor ex-dividend strategy should outperform one another. In a practical matter, including market frictions, it is taken into account that a significant difference in performance could occur amongst the methods. When measuring a statistically significant difference amongst the two strategies the difference in outcome should be verified by the implemented variables. This thesis can contribute by adding a new layer of evidence for a currently ongoing discussion and new insight to current literature.

An important distinction to make is that this thesis only investigates short term strategies; that is strategies that vary between one trading day and a maximum of sixty trading days. This limit is imposed since a number of companies pay quarterly dividends and including another dividend might obscure the conclusions drawn from the empirical data.

Another identified limitation is that this thesis only focuses on two countries, Sweden and the Netherlands. The findings will be country specific and primarily applicable to those markets and thus only to a limited extent to other European markets or the world market in general.

While taking tax-advantaged investors into account when researching the theory, this thesis does not look at the trading strategies from the point of such an investor. Instead this thesis looks at the returns from the perspective of a private trader.

Furthermore this thesis does only investigate the returns of publicly traded companies, not privately traded ones. This is because private companies' stock returns and dividends are naturally difficult to obtain and they are not open to the average investor.

2. Literature Review

This section will investigate the current state of the literature concerning market efficiency, market frictions and dividend strategies. It provides the theoretical framework on which this thesis is constructed.

2.1 Market Efficiency

Market efficiency and whether it exists is a much-discussed topic in financial literature, its essential message being that no arbitrage opportunity can consistently exist, as it would be instantly traded away. This manifests in various ways. According to the theorem of Miller and Modigliani (1961), on the ex-dividend date the opening price of the stock should equal the previous day's closing price minus the dividend amount, given no market imperfections. The same theorem states that as there are no market frictions a firm's dividend policy is irrelevant as any dividend payment can be replicated through the buying and selling of the stock within a portfolio. Both Elton and Gruber (1970) and Chowdhury and Sonaer (2016) agree on the statement that investors should be indifferent on dividend payments. Miller and Modigliani (1961) reason this indifference is due to the frictionless capital markets mentioned above, while Elton and Gruber (1970) argue that as the drop in share price equals dividend minus taxes there is no difference in capital gain between the cum and ex-dividend date and thus no arbitrage to be made. It has to be considered that according to the perfect capital market theorem, arbitrage opportunities should not even occur at all since all market participants have homogenous expectations, thus everyone would expect the arbitrage opportunity to occur and it would instantly be traded away (Miller & Modigliani, 1961). If market efficiency holds, then this thesis will be unable to detect a significant difference in returns, as such a difference would theoretically present an arbitrage opportunity.

2.2 Market Frictions – Why Efficiency Doesn't Hold

Previous literature challenges market efficiency theory by implementing the concept of market frictions. Market frictions are present in practice and stock prices rarely drop by the exact dividend amount on the ex-dividend date. It is documented by Elton and Gruber (1970) and again by Chowdhury and Sonaer (2016) on recent data that for the majority of stocks the actual price drop on the ex-dividend date is less than the actual dividend payment. Naranjo, Nimalendran, and Ryngaert (2000) find evidence that ex-dividend date returns are lower when the transaction costs and risk associated with the dividend capturing are smaller, evidently suggesting that investor tax heterogeneity affects the time variation of ex-dividend date stock returns. Stock prices, even after financial disasters, tend to recover as shown by Hasler and Marfe (2016). Empirical evidence is observed for the occurrence of abnormal returns on the actual ex-dividend date (Chowdhury & Sonaer, 2016). Combined, these frictions make authors like Henry and Koski (2016) reject the theory of market efficiency.

2.3 Explaining Market Frictions

Numerous theories have tried to explain the occurrence of market frictions, how they prevent market efficiency or how markets overcome them to be efficient after all. Elton and Gruber (1970) propose the tax hypothesis as an explanation to the difference between the price drop ex-dividend and the size of the dividend. They argue that as compensation for the dividend tax rate the decrease in stock price on the ex-dividend date is smaller than the actual dividend. The tax effect is of importance as it could have impact on the trading volume around the ex-dividend date. In practice, in terms of dividend stocks, tax-advantaged investors have an edge over non-tax advantaged investors. If Elton and Gruber's (1970) argument holds, tax advantaged investors have the opportunity of purchasing the cum-dividend stock without paying dividend tax and the opportunity to sell the stock on the ex-dividend date for the less declined price (Kalay, 1982), receiving an arbitrage profit that equals the tax amount. As there is more to gain for tax advantaged traders Naranjo, Nimalendran, and Ryngaert (2000) investigate if these traders trade more frequently than non-tax advantaged traders around the dividend date. According to their findings, tax-based trading is related to the size of the dividend yield and the transaction cost. Naranjo, Nimalendran, and Ryngaert (2000) conclude

that, the higher the dividend yield and tax rate along with the lower the transaction cost, the higher the probability of a tax-advantaged investor to get involved in short term trading around the ex-dividend date. That is as in that case the tax gain is more likely to cover the cost of trading. The impact of dividend day trading, the heterogeneity of the investors, and the related taxes could cause market frictions which in turn could be the source of a significant difference in returns between a cum- and ex-dividend strategy.

A hypothesis bound to the abnormal returns is provided by Dubofsky (1992) giving an explanation for observed abnormal returns on the ex-dividend date and countermeasure of the market for when there is no observed abnormal return on the ex-dividend date. The countermeasure is due to short term traders as they arbitrage the abnormal returns away, making the market adjust the stock price accordingly. The short-term trader has the incentive to act around the cum- and ex-dividend date. Elton and Gruber (1970) state that the abnormal return is caused by so called “marginal investors” who due to the tax burden bound to dividends trade for reasons unrelated to the capturing of dividends. This type of investor prefers to purchase a stock after the dividend payment similar to the dividend timing strategy. In both cases the results of Hasler and Marfe (2016) apply, providing empirical evidence that stock prices tend to recover. The method differs from a dividend timing strategy as a marginal investor prefers to purchase stocks at a discount in order to maintain a long-term buy-and-hold strategy.

2.4 Dividend Policies and Strategies

Dividend policies are set or adjusted by a company to attract the right investors, who are not satisfied with the dividend policies of other companies in their portfolio (Ogden, Jen, & O'Connor, 2003). This behavior around dividend policies has the side effect of attracting the aforementioned short-term opportunity seekers, with the intention of capturing arbitrage. As dividend payments happen either annually, semi-annually, or quarterly it could be said that these payments are a frequent occurrence in an unpredictable environment. In his book, *A Random Walk Down Wallstreet*, Malkiel (1973) first presents the random walk hypothesis, stating that stock prices are a stochastic trend. This view is shared by Evans (1986) and by Malkiel (2005) himself in a thirty year reflection, where the theory still holds. Therefore it can

be questioned is if these short-term methods of capturing arbitrage and abnormal returns are actually paying off. As according to Malkiel (2005) and Evans (1986), both abnormal returns on the ex-dividend date and the duration of the recovery period cannot be determined based on historical returns, which is due to the stochastic nature of the stock prices. Capturing dividends by either a buy-and-hold strategy or through the short-term strategy of purchasing cum-dividend and selling ex-dividend could be seen as a secure method of realizing a return, but at what cost? The dividend payment make the company reduce its equity value, creating a need to acquire new sources to create or recover its equity level. Additionally the sign of the return is at risk, as over time the stock price could fall by more than the actual payment. If the random walk hypothesis holds, both passive and active investors have no certainty of if and when the stock price will recover after the dividend payment. Malkiel (2005) and Evans (1986) provide empirical evidence that to reduce the effect of a random walk portfolios should be diversified, lowering idiosyncratic risk. Going against the random walk hypothesis is the finding of Karpoff and Walkling (1988) with their finding stating that the higher the dividend yield, the higher the trading effect on the actual ex-dividend date. Being consistent with their predicted statement that the net benefit of the short-term trading increases along with the size of the dividend but decreases as the cost of trading increases.

One method of acquiring short-term abnormal returns is to purchase stocks cum dividend, before the dividend amount is set as the level of risk is not determined yet (Michaely & Vila, 1996). Heath and Jarrow (1988) reason and demonstrate that this method cannot be stated as an actual arbitrage opportunity due to its high uncertainty. If over time the cum-divided purchase results in an arbitrage opportunity it will be canceled out or at least reduced due to the involved transactions costs (Michealy & Vila, 1996; Karpoff & Walkling, 1988).

The preferred short-term strategy however is *dividend capturing* where the trader purchases high-dividend yielding stocks cum-dividend and sells them ex-dividend to lock the return. Lakonishok and Vermaelen (1986) provide evidence that active short-term trading is concentrated around the ex-dividend date for high-yielding dividend stocks. Dividend capturing is a preferred method by corporations as they are less risk averse and wealth constrained than other traders and secure their positions by maintaining a diversified portfolio (Naranjo, Nimalendran, and Ryngaert; 2000). For the dividend timing strategy stocks

are purchased on the ex-dividend date to capture abnormal returns or to hold the stock until its complete recovery. The effect of this popular strategy is recently re-examined by Henry and Koski (2016). The strategy is of technical nature, based on dividend yield, taxes, and transaction costs, where the combined findings of Hasler and Marfe (2016) and Elton and Gruber (1970) should realize into abnormal return for the investor. This only happens if there is no market efficiency, as suggested by Henry and Koski (2016).

Both methods are an attempt to outperform the passive strategy of maintaining a buy-and-hold portfolio in which both growth and dividend payments are captured (Evans, 1968). It should be taken into account that for long-term measures of abnormal returns, implementing cumulative abnormal returns leads to biased results as it does not account for compounding (Barber & Lyon, 1997). If investors are willing to carry the additional risk, where they do not lock their return in the form of a dividend payment, non-tax advantaged investors could benefit from a similar return opportunity as the tax advantaged investors. They purchase the stock on the ex-dividend date and allow the stock price to – partially – recover, instead of buying the stock during the cum-dividend period. As in practice within a non-frictionless market, non-tax-advantaged investors suffer from dividend tax and can therefore only partially benefit from dividend related return. To compare the effects of both the dividend capturing and dividend timing method, several return periods will be tested during this research. The aim is to determine, for the data set of this thesis, which strategy and duration period will provide the highest return.

3. Method

This section will begin with discussing the estimation of the different factors – *Model Design and Factor Determination*. It will then move on to *Data Collection,* which will describe and argue for the means used to gather the data. The section *Data Processing* will present and argue for the way in which the raw data is transformed and what calculations are employed so a regression could be run.

3.1 Model Design and Factor Determination

This thesis uses a set of cross sectional regressions in order to test market efficiency by estimating whether there is a difference in returns between a cum-dividend and ex-dividend strategy. The thesis will look at five years, from 2012 to 2016, to see if the conclusions hold up over a period of time. A panel data method is considered but discarded, since the dividend frequency for the companies varied between annual, semi-annual, and quarterly dividends, as well as that several companies lack values for one or more years, thus making the panel data factors harder to estimate and more obscure to interpret. The null and alternative hypothesis for this regression are:

$$H_0: there\ is\ no\ significant\ difference\ in\ return\ strategies.$$

$$H_A: there\ is\ a\ signficant\ difference\ in\ returns, which\ is\ caused$$

$$by\ one\ or\ several\ of\ the\ identified\ variables.$$

To test for a reason for a difference in returns a total of six independent factors and four varieties of the depended factor are created. The dependent factor in every case is the difference in returns between the two strategies. This difference is estimated over four time periods: one trading day, a week (five trading days), a month (twenty trading days), and three months (60 trading days). The difference is estimated over the four periods to try and capture the ideal recovery period of the stocks. All returns are calculated for the same amount of days. However, due to the nature of the strategies there is a slight gap between the periods for the two different approaches. The cum-dividend strategy always starts and ends one day earlier than the ex-dividend strategy to ensure the same amount of trading days. While this is not

expected to have a significant effect for the longer observations periods, this discrepancy is most prominent for the one day return. The one day return is also the only one where the return for the different strategies is not calculated over the same amount of days. The cum-dividend strategy measures the return from the adjusted closing price of the cum-dividend day to the adjusted closing price of the ex-dividend day. The ex-dividend strategy measures the return from the adjusted opening price of the ex-dividend day to the adjusted closing price of the ex-dividend day. This discrepancy is however necessary to achieve the aim of this thesis. Adjusted opening and closing prices are used to eliminate the effect of stock splits obscuring longer period returns. For all other return periods the strategies are calculated in the manner presented in the section *Data Processing*. The final design of the model is presented below:

$$DD_{yh} = \beta_{0yh} + \beta_{1yh}DIV_h + \beta_{2yh}TAXEFF_h + \beta_{3yh}VOL_h \quad (1)$$

$$+\beta_{4yh}TC_h + \beta_{5yh}M/B_h + \beta_{6yh}BETA_h + e_{yh}$$

Where DD is the difference in return, β_{0yh} is an intercept term, DIV is the dividend yield, TAXEFF is the tax effect, VOL is the volume, TC is the transaction cost, M/B is the market to book equity ratio, and BETA is the systematic risk. All variables are elaborated upon and argued for below. The *h* index stands for the holding period being 1, 5, 20, or 60 trading days, while the *y* indexes for the year, being 2012 to 2016.

Moving on to the independent factors, the first and perhaps most intuitive candidate is the dividend yield (DIV). This factor is by definition connected to the difference in returns this thesis tries to test since it is the main determinant of the cum-dividend strategies return. The yield is empirically proven to be useful when analyzing stock returns (Henry & Koski, 2017; Chowdhury & Sonaer, 2016; Dhaliwal & Li, 2006). It is often significant at high levels of probability. As the yield will increase the cum-dividend strategies return, this factor is expected to be positively related to the difference.

The second factor is the transaction costs. The transaction costs incurred when buying and selling the stocks will have a negative effect on the return of the strategies. It is previously proxied by using the inverse of the cum-dividend stock price with repeatedly significant results (Chowdhury & Sonaer, 2016; Dhaliwal & Li, 2006; Karpoff & Walkling, 1988). The price

is inversed to turn the natural negative relationship into a positive one to simplify the factor interpretation.

The third factor is the tax effect. There is ample evidence that a difference in tax rates on dividends and capital gains will have an effect on the ex-dividend price drop of the stock (Henry & Koski, 2017; Asimakopoulos, Tsangarakis, & Tsiritakis, 2015; Al-Yahyaee, 2014; Daunfeldt, Selander, & Wikström, 2009; Walker & Partington, 1999; Dubofsky, 1992; Black & Scholes, 1974). The drop during the ex-dividend day and the following recovery are key elements determining the return of both strategies, so it will be included. This thesis follows the formula by Chowdhury and Sonaer (2016) which calculate a proxy for the tax effect with significant results. The formula for the proxy is presented in the section *Data Processing*. This factor is expected to be positively related to the difference in returns, as a more extreme tax difference ought to cause a greater dissonance in returns.

The fourth factor is the traded volume of shares. The volume of the shares traded will affect the prices positively or negatively depending on if investors are buying or selling and is historically linked to dividend payments and stock returns (Henry & Koski, 2017; Chowdhury & Sonaer, 2016; Dhaliwal & Li, 2006). This thesis follows the examples of the referenced authors when calculating a ratio between the traded volume at the event (ex-dividend day) compared to a non-event period. The formula for the calculation is presented in the section *Data Processing*.

The fifth factor is the market to book ratio for equity. Its inverse is linked to stock returns (Fama, 1997) and is used in previous stock return calculations (Loughran & Ritter, 2000). This factor aims to capture some of the induvial makeup of the company, how it is valued by the market, and what effect that has on a possible difference in returns.

The sixth factor is the CAPM calculated beta of the individual companies. The beta proxies for the market risk that the companies are exposed to – this thesis does not take idiosyncratic risk into account since it can effectively be traded away by a well-diversified portfolio (Malkiel, 2005; Evans, 1986). The companies' returns are regressed on the corresponding market indexes to estimate the beta. Historically the betas have shown to be significant when calculating returns (Henry & Koski, 2017; Chowdhury & Sonaer, 2016; Dhaliwal & Li, 2006;

Michaely & Vila, 1996). The betas are expected to be positively correlated with a difference in returns – a higher beta indicates a higher volatility which could suggest a greater difference in returns as they move more.

3.2 Data Collection and Sampling

This section will outline and discuss the data collection process. To fulfil the objective of this thesis, dividend data is collected for 95 different companies with a total of over 8 000 return observations. A set of criteria is established for their selection, based on the gathered articles. The criteria are created to match the investigated factors.

The first criteria is that any firm has to come from Swedish or Dutch stock exchange. This criteria is chosen since these markets are close in size, culture, and geography, but differ in their taxes – Sweden taxes dividends and capital gains at a flat thirty percent rate (Skatteverket, 2017), while the Netherlands tax them differently at fifteen and thirty percent respectively (Belastingdienst, 2017). By focusing on these two markets it should be possible to isolate the effect that a difference in taxes has on the difference in return through observing the Swedish as the counterfactual of the Dutch. A systematic approach is employed and the largest companies from both markets are chosen, as large established companies, which execute their business in a mature market are more prone to pay dividends regularly as there are less investment opportunities to maintain high growth. The possibility exists that a possible difference in returns is caused by some other local characteristics. This thesis will be able to capture them to some degree via the tax difference variable, which essentially acts as a country dummy (for more see *Data Processing)*.

The data is collected from a variety of sources. Daily stock returns, daily traded volumes, and their dividends are gathered from *Yahoo Finance*. The authors are aware that *Yahoo Finance* might not be the first choice for many academic investigations. However, *Yahoo Finance* has some distinct advantages over more commonly used platforms such as *Bloomberg* or *Thomson Reuters* which will be argued for now. First comes the ease of access. *Yahoo Finance* is not only simple and straightforward to use, but also presented the dividend dates and adjusted prices following stock splits neatly integrated in the historical prices of the company,

which the other platforms did not. This enables the data to be processed quicker and thus frees up more time for the analysis. Second comes the freedom of access. *Yahoo Finance* is a free to use online provider of stock market data. As such, it makes it far simpler for any academic trying to recreate this study to access the information that is used. This grants a level of transparency to this thesis it would otherwise not enjoy, by opening it up to anyone with an interest to go in and cross-examine the results, even if that individual has no access to the resources of a university or other academic institution. Furthermore, the collected values are, where appropriate, cross-examined with observations from *Thomson Reuters Eikon*. Wherever observations from *Yahoo Finance* are incomplete, they are adjusted by the data found in *Eikon* or at *Nasdaq Nordic*. The values for the historical market to book equity ratio are collected from Thomson Reuters Eikon.

3.3 Data Processing

The processing of the data is made up of two steps. Step one is gathering the information collected, ordering it, and conducting the relevant calculations in *Excel*. Step two is exporting the data into *Eviews* and running 25 cross sectional regressions, one per year and per return period i.e. 2016 – 1 day, 2016 – 5 day, 2016 – 20 day etc. The data is gathered and organized in accordance with their companies. The dividend payments are place out at the ex-dividend date. A rolling window is used for the cross-sectional regressions, where the inputs for each year is the arithmetic or geometric average of the five previous years, depending on whether the input is a ratio or not. Practically speaking, the estimates for 2016 were calculated using values from 2012-2016, the estimates for 2015 were calculated using values from 2011-2015 etc.

The first step in the analysis is to compile the summary statistics for the difference in returns. For this, all cum-dividend and ex-dividend returns spanning 2006-2016 are organized in *Excel* and then subjected to a student's T-test. The T-test is considered most appropriate, since the data exhibits non-normality (see *Data Validation*). Returns without a counterpart are removed (i.e. ex-dividend returns are removed when there is no cum-dividend observation) to be able to run the T-test. Several observations with massive returns (100% and more) are

winsorized, as these returns are caused by non-trading of individual companies and obscured the general data.

To compare the difference in return, the returns for the cum-dividend (r_{it}^{c}) and for the ex-dividend strategy (r_{it}^{e}) are calculated according to two different formulas.

$$r_{it}^{c} \equiv \ln\left(p_{i,rec} + (D_{it} * (1 - t_d))\right) - \ln(p_{i,t-1}) \quad (2)$$

$$r_{it}^{e} \equiv \ln(p_{i,rec}) - \ln(p_{i,t}) \quad (3)$$

Where $p_{i,t}$ is the ex-dividend day adjusted opening price, p_{rec} is the adjusted closing price following the recovery period, D_{it} is the dividend paid on stock *i* at time *t* multiplied by the dividend tax t_d to capture the actual return to investors, and p_{t-1} is the cum-dividend adjusted closing price i.e. the price at the end of the day before the dividend is paid. The returns are logged in order to normalize them so that they are comparable across companies and to eliminate first order autocorrelation. All returns are calculated according to Formula 1 and 2, save for the one day ex-dividend return. As mentioned earlier, the one day ex-dividend return is calculated as presented in Formula 3 where $p_{i,t,open}$ and $p_{i,t,close}$ are the adjusted opening and closing price on the ex-dividend day, where *y* stands for the year.

$$r_{iy1}^{e} \equiv \ln(p_{i,t,open}) - \ln(p_{i,t,close}) \quad (4)$$

The differences in returns are then calculated as the ex-dividend return minus the cum-dividend return for the dividend at the same recovery period. Consequently, a positive (negative) difference will indicate that the ex-dividend (cum-dividend) strategy is more profitable at this occasion.

The factor calculation will follow the same order as in the section *Model Design and Factor Determination*. The first one is therefore the yield. The yield for stock *i* at time *t* is calculated as a percentage of the cum-dividend closing price:

$$YIELD_{i,t} \equiv \frac{Div_{i,t}}{P_{i,t-1}} \quad (5)$$

Where $Div_{i,t}$ is the dividend paid on stock *i* at time *t* and $P_{i,t-1}$ is the unadjusted cum-dividend closing price of the stock. The stock price is unadjusted because the dividend data is collected

in nominal values. Calculating the yield on an adjusted price would render a misleading result, especially if the company experienced a stock split sometime during the observation period.

The second factor to calculate is the transaction cost. These are calculated using the formula presented by Dhaliwal and Li (2006) as well as Karpoff and Walkling (1988) which is the inverse of the cum-dividend adjusted stock price.

The third factor is the tax effect, calculated according to the formula used by Chowdbury and Sonaer (2016) which is presented below:

$$TAXEFF_{i,t} \equiv \frac{t_{d,c} - t_{g,c}}{1 - t_{g,c}} * YIELD_{i,t} \qquad (6)$$

Where $t_{d,c}$ is the tax rate levied on dividends in country *c* and $t_{g,c}$ is the tax rate levied on capital gains in country *c*. The structure of the formula captures how the difference between the tax rates impacts that particular difference in return for the dividend paid on stock *i* at time *t*. It is to be noted here that this value takes on the number zero for all Swedish observations, as Sweden has the same tax rate for capital gains and dividends. This makes the numerator equal zero and thus renders the function equal to zero. In effect, the TAXEFF variable therefore becomes a dummy variable, that takes on a specific value for each Dutch company and the value zero for all Swedish companies.

The fourth factor is the volume of traded shares. In order to be able and compare the volume of traded shares across companies they will have to be normalized. This is done by the following formula, used by Chowdbury and Sonaer (2016):

$$VOL_{i,t} \equiv \frac{Average\left(Volume_{i,t-5}:Volume_{i,t+5}\right)}{\frac{Average\left(Volume_{i,t-6}:Volume_{i,t-45}\right)+Average\left(Volume_{i,t+6}:Volume_{i,t+45}\right)}{2}} \qquad (7)$$

This formula captures any excess trading volume during the event period t_{-5} through t_{+5} compared to the average return at the time. This way, the event period is excluded from the average trading volume. In addition, no further dividend payments are included in the volume estimation, as even with quarterly dividend distribution the next dividend would be missed by two trading weeks (50 days as compared to the 60 days contained in one quarter.

The fifth factor is the market to book equity ratio. These ratios are downloaded from *Thomson Reuters Eikon* where they are calculated as the market capitalization of the company divided by the book value of total equity.

The sixth factor is the beta, and this is calculated according to the CAPM method similar to Danthine and Donaldson (2015:232). The individual stock returns are regressed on their corresponding market indexes – OMXS30 for Sweden and the AEX for the Netherlands. In order to calculate the CAPM betas in *Excel* a matched set of data is required i.e. the amount of return observations for the individual stock has to match the return observations for the market index. Since this is not the case, this thesis uses monthly returns instead, as those are available as a matched set, avoiding discrepancy in the results.

The values calculated for the different variables are then compiled in five year averages, using arithmetic means for nominal values and geometric means for ratios. These five-year averages are used as indexes for their latest year i.e. the index for year 2016 uses a five-year average of the years 2012-2016, 2015 uses the five-year average for 2011-2015 etc.

4. Results and Analysis

This chapter will present and compare the results obtained from the data collection and processing. It will begin with summary statistics and then move into the regression analysis. The values for the mean returns are presented both in their direct and annualized form, to allow for meaningful comparison. The values for the standard deviation are also annualized.

4.1 Dutch Returns

Table 1 – Summary Statistics of Dutch Returns

	1D Ex	1D Cum	5D Ex	5D Cum	20D Ex	20D Cum	60D Ex	60D Cum
Mean	-0.46%	1.80%	-0.66%	1.76%	-0.95%	1.51%	-2.45%	-4.24%
Mean (annualized)	-68.4%	8548.6%	-29.1%	147.7%	-10.8%	19.7%	-7.2%	-12.2%
Standard Dev	32%	35%	32%	34%	27%	27%	24%	24%
Observations	606	606	605	605	606	606	597	597
P(T<=t) two-tail	0.00		0.00		0.00		0.00	

As can be seen in Table 1 above the ex-dividend returns for the Dutch stocks are consistently negative, while the cum-dividend returns are positive for the 1, 5, and 20 trading day observation period. It can also be observed that the standard deviation decreases somewhat over time. This could be explained by the fact that longer holding periods have more time to approach a potential long run mean return than shorter periods. The returns produced by the various holding periods follow a constant pattern for the Netherlands, with cum-dividend outperforming ex-dividend. This outperformance is extremely significant as can be seen in the low values of the t-test. It can further be seen that the returns are rather similar in size as well as over the holding periods, which results in excessive differences on an annual basis, especially for the 1 day and 5 day returns. However, it should be kept in mind that the returns from the 1, 5, and 20 day strategy are impossible to collect on an annual basis, since dividends in this case are paid out at a maximum rate of four per annum. Therefore it is of interest to

compare the different holding strategies in annual terms, but it needs to be kept in mind that dividend payments – and thus the causes of these returns – only happen rarely.

Looking at the mean returns for both the ex-dividend and cum-dividend strategy the observations states that on average up to 20 trading days the dividend capturing outperforms the dividend timing strategy. In overall the ex-dividend method is negative whereas the 1, 5 and 20 trading day average returns for cum-dividend are positive. For the Dutch market, dividend capturing is the outperforming method hence several previous literature findings hold true. The empirical finding of Elton and Gruber (1970) and Chowdhury and Sonear (2016) find that the majority of stock prices decrease by a lower amount than the actual dividend. This provides less room for benefitting from Hasler and Marfe (2016) finding that after a dividend payment stock prices tend to recover. Combined with the related size of the transaction cost (Naranjo, Nimalendran, & Ryngaert, 2000) the whole potential gain from the stocks' recovery could be taken away due to market frictions. This goes some way to explain the overall negative returns found for the dividend timing strategy. Due to the stochastic nature of stocks supported by the findings of Malkiel (2005; 1973) and Evans (1986) future returns cannot be ensured by measuring the effect of historical data. Dividend capturing fixes the return to a certain extent, which might explain why on average from 1 up to 20 days provides a positive return whereas the short-term dividend timing strategy returns are negative.

The findings of Dubofsky (1992) state that abnormal returns on the ex-dividend date are highly unlikely to occur as the market adjusts to the concentration of short-term investors and marginal investors. This thesis produces supporting evidence for the dividend timing strategy, but based on the Dutch market sample, cum-dividend or dividend capturing after 1 day trading outperforms the average return of any other of the observed durations. This gives evidence that abnormal returns might occur around the ex-dividend date as evidently stated by the research conducted by Chowdhury and Sonaer (2016). That cum-dividend trading outperforms ex-dividend trading also adds evidence to Lakonish and Vermaelen (1986) that short-term trading is concentrated around the ex-dividend date for high yielding dividend stocks.

Although a stock's return can be fixed by implementing the dividend capturing strategy, both the dividend timing and dividend capturing strategies should not be described as arbitrage opportunities. This is because risk is still involved, even if on average dividend capturing results in a positive return on the short term. Unlike Kalay's (1982) theory of arbitrage for tax advantaged traders, no such opportunity is observed in this thesis for non-tax advantaged traders through either of the methods. The findings do however support that for the Dutch market between the two short-term trading methods, dividend capturing does outperform the dividend timing strategy.

4.2 Swedish Returns

Table 2 – Summary Statistics of Swedish Returns

	1D Ex	***1D Cum***	***5D Ex***	***5D Cum***	***20D Ex***	***20D Cum***	***60D Ex***	***60D Cum***
Mean	-0.41%	-3.04%	-0.29%	-4.58%	0.05%	-2.70%	-2.37%	-5.05%
Mean (annualized)	-64.2%	-100.0%	-14.0%	-91.3%	0.6%	-28.0%	-6.9%	-14.4%
Standard Dev	32%	46%	34%	262%	31%	30%	24%	24%
Observations	476	476	473	473	464	464	443	443
P(T<=t) two-tail	0.00		0.01		0.00		0.00	

Contrary to the returns for the Dutch stocks, the Swedish stock returns, presented in Table 2, are consistently negative for both ex-dividend and cum-dividend returns, save for the ex-dividend return in the twenty day time period. The variance is again decreasing in time, save for the 5 day cum-dividend for which the dataset contained a number of surprisingly large returns resulting in a starkly different standard deviation. This might be caused by the somewhat smaller amount of observation, which are due to differences in dividend policies – most Swedish companies pay annual dividends while many Dutch companies pay semiannual or quarterly. It can also be observed that the difference in returns for the Swedish stocks, like the Dutch, is highly significant at the 99% level. Like with the Dutch returns the Swedish short

term returns exhibit excessive levels. On an annual basis the 1 day cum-dividend strategy in the Swedish market would wipe out an investment. However, following the same reasoning these returns can never be realized on an annual basis since they depend on the dividend payment, and due to the seasonality of dividends, it is practically impossible to collect a dividend on every day of the year.

Looking at the Swedish returns, on first glance they do not seem to contradict the theory of market efficiency, as both the cum-dividend and the ex-dividend returns are on average negative. Taking a second look however reveals that the cum-dividend prices are consistently more negative than the ex-dividend prices and this difference is calculated to be significant in all cases. This suggests that the ex-dividend strategy is superior, however the Swedish market might simply be experiencing a volatile period. As such, it could be concluded that market efficiency as proposed by Miller and Modigliani (1961) does not seem to be present in the Swedish stock market. Therefore, the assumptions by Chowdhury and Sonaer (2016) as well as Elton and Gruber (1970) that investors would be indifferent between collecting the dividend or not can be rejected for the Swedish market. Since there is a significant difference in return strategies, which favour the ex-dividend strategy, informed investors would buy the stock ex-dividend and then wait until recovery.

This difference can be expected not to depend on the tax difference between capital gains and dividend tax used by Chowdhury and Sonaer (2016) since the Swedish system applies the same percentage rate. However, this study does not control for the influences of tax advantaged investors as pointed out by Kalay (1982) such as institutions which might still have an influence on the Swedish returns. Although Hasler and Marfe (2016) point out that stock prices recover rather quickly, in the summery statistics for Sweden it can be observed that even for the 60 day return period the returns remain negative. This is surprising, since it would indicate that the market in general is experiencing a downwards trend. However, some of this data might be obscured by values following the Great Recession of 2008. The implication from this research is thus that for investors in the Swedish market there seems to be a clear incentive to buy the stock ex-dividend. It does not speak in favour of a short term dividend timing strategy as analysed by Henry and Koski (2016) since there does not seem to be any

short term abnormal return to be collected. Since the return over all periods is negative or so close to zero a massive investment would have to be mounted in order to generate a profit.

Supported by the t-statistic, in all cases it can be stated that there is a significant difference in returns between two short-term trading methods. As differences in returns are confirmed, Miller and Modigliani's (1961) theory of market efficiency does not hold. Dividend payments cannot be replicated within a portfolio due to the involved market frictions.

4.3 Combined Returns

Table 3 – Summary Statistics of Swedish and Dutch Returns Combined

	1D Ex	*1D Cum*	*5D Ex*	*5D Cum*	*20D Ex*	*20D Cum*	*60D Ex*	*60D Cum*
Mean	-0.44%	-0.33%	-0.50%	-1.02%	-0.52%	-0.32%	-2.41%	-4.58%
Mean (annualized)	-66.8%	-56.2%	-22.9%	-41.3%	-6.1%	-3.8%	-7.1%	-13.1%
Standard Dev	32%	55%	33%	177%	29%	29%	24%	24%
Observations	1082	1082	1078	1078	1070	1070	1040	1040
P(T<=t) two-tail	0.31		0.48		0.10		0.00	

The data is combined and the summery statistics calculated anew, the results are presented in Table 3 above. It can be observed that all the returns now are negative, independent of the strategy employed. Furthermore it can be seen that the standard deviation behaves as before, decreasing in time. There are no significant fluctuations to be observed in the standard deviation of the combined statistics compared to the country specific ones. It needs to be noted that for the combined statistics the difference in return between the strategies is statistically insignificant for the one and five day period. During the twenty day period the difference gains a low significance at the 90%, and during the sixty day period the difference is again highly significant.

In all the tables containing the summery statistics, it can be seen that the number of observations differs over the various periods. This is due to that during some periods certain values have to be dropped since the dates needed for the return calculations turned out to be non-trading days. An explanation for the insignificance of the difference in the combined statistics might be that the values for the Swedish and Dutch returns cancel each other out. As noted, the Dutch companies have negative and positive returns for the ex-dividend and cum-dividend strategy respectively, while the Swedish returns are negative for both during the shorter periods. This could cause the insignificance in differences in the combined statistics. This also goes to show that the excessive return seen in the country-specific one and five day period do not hold up on an international level. The numbers are clearer lower than for each of the individual country, suggesting that market efficiency holds on a more global scale. The combined summery statistics seem to be further in line with the market efficiency argument as no significant difference can be detected during the 1 and 5 day holding periods. This does fall in line with the theory because Sweden and the Netherlands are both small markets in a highly-internationalized world. Therefore, on a local level market efficiency could not hold, while on the global market on average it would.

However, it can be observed that the difference in returns grows significant again for the 20 day and the 60 day period. This is in contradiction to the market efficiency theory since there should be no difference in returns. However, since the difference is only prominent in the longer period observations it is reasonable to assume that this difference is in fact not cause by the dividend payment but by other external factors that do not manage to materialize during the shorter holding periods. An implication from this observation is that any dividend strategy, dividend capturing (Naranjo, Nimalendran, and Ryngaert, 2000) or dividend timing, would probably fail to produce significant short term return on an international level. It has to be considered though that, as seen in Table 3, all returns are negative, so any portfolio of stocks would, on average, incur losses. While the difference is insignificant in the short run, in the long run it cannot with certainty be concluded whether a cum- or ex-dividend strategy would give higher returns – or smaller losses as would be the case in this investigation – as the ex-dividend strategy outperforms the cum-dividend strategy in the 60 day period and vice versa in the 20 day period. This inconsistency makes recommending any particular strategy risky.

Another note on the summary statistics is that when looking at the annualized returns they rapidly decline as the holding period is increased. This is logical, since, as more days are added to the holding period, it comes closer to the actually yearly behaviour of the stocks. Furthermore, the excessive behaviour of returns during the 1 day and 5 day holding periods can be explained by the erratic nature of the returns and the high risk of these short periods. However, the annualized volatility (standard deviation) has to be taken into account. It can be seen to generally decline as the period grows longer, with exceptions for a peak in the 5 day cum-dividend strategy in the Swedish return. They do not differ as much as the annualized returns, although the 1 day volatility is about 50% higher than the 60 day period in general, supporting the idea that the one day returns is rather more risky than the sixty day.

4.4 Cross Sectional Regression

Table 4 – Results for the Cross-Sectional Regression of Returns 2016

Independent Variables (2016)	1 Day Return	5 Day Return	20 Day Return	60 Day Return
Intercept	-0.017***	-0.009*	-0.005	0.008
	(0.005)	(0.006)	(0.006)	(0.005)
Dividends (DIV_)	1.008***	0.898***	1.052***	0.917***
	(0.077)	(0.095)	(0.096)	(0.092)
Transaction Cost (TC)	-0.014	0.017	-0.003	-0.040**
	(0.017)	(0.021)	(0.022)	(0.020)
Tax Effect (TAXEFF)	8.234***	8.943***	9.078***	0.762**
	(0.347)	(0.429)	(0.434)	(0.416)
Volume (VOL)	0.009***	0.007**	0.005*	-0.001
	(0.002)	(0.003)	(0.003)	(0,003)
Market-to-Book Equity (M/B)	0.000	0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Systematic Risk (BETA)	0.001	0.002	-0.006*	-0.008**
	(0.003)	(0.003)	(0.003)	(0.003)
Adjusted R^2	0.684	0.721	0.724	0.386

*The stars correspond to the varying degrees of significance with *=90%; **=95%; and ***=99%. The standard errors are presented in parenthesis. The regression is based on 95 observations for 1, 5, and 20 day return, and on 92 for 60 day return. Robust Least Squares are used to combat possible heteroscedasticity.*

Table 4 above presents the results from the robust least squares cross-sectional regression for 2016. As can be observed a number of independent variables influence the difference in returns to a varying extent. The tax effect has the strongest impact and is highly significant over time. It should be noted that the tax effect experiences a large drop in impact on the dependent variable, as the holding period is extended from 20 to 60 trading days. The intercept and the volume enjoy a high level of significance at first, although having a low

impact on the dependent variable compared to the dividends or the tax effect, but lose significance as the holding period is extended. This is expected since, as mentioned before, the longer period allows for more external factors to influence the data. However, the values for transaction cost behave contradictory to this expectation as their significance and impact increases with the period. For the systematic risk this increase is expected though, it can be interpreted as containing a measure of the external factors – the longer the holding period the more the difference in returns is exposed to systematic risk. The market to book equity ratio however remains nominally and statistically insignificant to the study. The adjusted R^2 obtained from the regression shows a high fit between the model and the collected data. This his however most likely caused by the strong impact of the tax effect variable. A clear drop in goodness of fit can be observed when moving from the 20 to the 60 trading day period, which coincides with the drop in the tax effect. This effect can be observed even in the older periods 2012 to 2015 (see *Appendix*). However, even when the tax effect loses a stark amount of impact, the goodness of fit is still high, with the R^2 reaching almost 0,4.

Across all periods and all years it is found that the only variable that consistently is significant – and that at the 99% level – remains the dividend. Throughout the years (2012-2016) it ranges from 1,05 (20 day return 2016) as a maximum to 0,69 (60 day return 2015) as a minimum. The trend that the goodness of fit for the R^2 is high during the short periods and drops about fifty percent between the 20 day and the 60 day period is prominent in all the years. The tax effect, although still showing an extremely high coefficient and a mostly strong significance is consistently insignificant during the 60 day periods for the previous years. The systematic risk, the intercept, the transaction cost, and the volume on occasion become significant but only for one period or two. The market to book equity ratio is consistently insignificant during all observation periods and all years. As the regression moves back in time, it can be observed that variables like the volume and the systematic risk start to lose their significance. These results of the previous years' regression can be seen in *Appendix I-IV*.

Highly significant evidence is found that the dividend yield impacts the difference in returns both in the short and in the long run. This stands in strong contrast to the market efficiency theorem as the dividends clearly seem to have an impact on the returns. On a market basis investors might be able to trade away these differences, however it would be unreasonable

to assume that the suggestions of investor indifference towards dividends made by Chowdhury and Sonaer (2016) and Elton and Gruber (1970) hold true for the Swedish and Dutch markets, as the dividend seems to have a significant impact on the difference between the holding strategies. As mentioned, the dividend variable is the only one that consistently remains highly significant during all years of analysis (see *Appendix*). It can be seen to vary between about 0,7 and 1, signalling the strongest influence on the difference in returns save for the tax effects while being more consistent. Given that market is subject to inefficiency, this is expected since, again, the dividend is a major factor in determining the return of the cum-dividend strategy.

Another highly significant variable is the tax effect. This is expected to be influential since it is pointed out in the literature as one of the main market frictions (Naranjo, Nimalendran, & Ryngaert, 2000). Furthermore, there are major differences between the Swedish and the Dutch tax code. A stark difference in return behaviour between the Swedish and the Dutch returns – see Table 1 and 2 – together with the tax code variable being zero for all Swedish companies and non-zero for the Dutch companies, is a strong indicator that taxes (and the country, since it is a country dummy) have a major effect on the difference in return. However, as noted earlier there is a radical cut off point for the tax effect variable following the 20 day period, where it loses a lot of its impact. This could be seen as an indication that another variable connected to the tax-effect is impacting the difference in return in the short to medium run but which fades away in the long run. The same pattern can be observed in the regressions of previous years and thus seems to be consistent over time (see *Appendix*). This connected variable could well be country specific, as the tax effect essentially doubles as a country dummy, since all observations for Sweden are zero due to the equal rate of dividend and capital gains tax. As such, the tax effect variable could be capturing qualities that are internal to either Sweden or the Netherlands. These qualities could be a possible explanation for why the return pattern for the cum-dividend and ex-dividend strategy in Sweden is opposite that of the Netherlands.

The volume variable seems to be in concurrence with the theory that the trade volume has an impact on the returns (Henry & Koski, 2017; Chowdhury & Sonaer, 2016; Dhaliwal & Li, 2006, Naranjo, Nimalendran, & Ryngaert, 2000). The volume variable is highly significant in

the difference of returns in the 1 day trading period and then slowly loses significance over time until becoming insignificant for the-60 day holding period. This could be an indication that trade volume behaves differently during the immediate period surrounding the dividend date thus affecting the returns. This effect ebbs out as more time passes. However, since it is significant on the difference of the returns, it could also be interpreted as that the trade volume differs significantly before and after the dividend date, giving support to the theory presented by Naranjo, Nimalendran, and Ryngaert (2000) about the marginal investor. It also supports the existence of dividend timing and capturing as any of these strategies would see a rise in trade volume around the dividend dates. However, it does not indicate whether the trade is higher before or after the dividend date, therefore no conclusions can be drawn about which of those two strategies is preferred. Over time, the volume variable can be seen quickly fading out of significance. It is still highly significant for the 1 day return of 2015 but no longer for the other holding periods and it remains insignificant for the years 2012-2014. The fact that it can be observed to be significant in 2015 lends some credibility to the claim that the effect of the volume variable has some durability over time. The fact that it fades out during the earlier years will be addressed further on.

As mentioned the transaction costs is only significant in the 60 day period, while the market to book equity ratio is not significant at any point. It is thus reasonable to assume that neither the transaction costs, nor the market to book equity ratio have any influence on the difference in returns. This is surprising for the market to book equity ratio as it has previously successfully linked to the returns (Loughan & Ritter, 2000; Fama, 1997). It is unreasonable to assume that this insignificance occurred because this thesis uses the inverse of the variable, as the inverse would merely make a positive relationship negative. It is reasonable to assume though, that while the market to book equity ratio might have an effect on the returns, it might not be sizeable enough or it might not be connected at all with the different cum- and ex-dividend strategies. This would be logical as a company would rarely change its market to book equity ratio between dividend dates. The insignificance of the transaction costs are another surprise as previous research found clear indication for their significance in stock returns (Chowdhury & Sonaer, 2016; Dhaliwal & Li, 2006; Karpoff & Walkling, 1988). However, one key insight is that the transaction costs will be incurred independent on when the investor buys the stock. It is therefore reasonable to assume – and now supported by the empirical results presented

in Table 4 – that the transaction cost will not have any effect on the difference in returns. The fact that the transaction costs are significant in the 60 day return is of interest however, since this seems to be a reoccurring phenomenon for the years, save for year 2014. It could thus be theorized that this variable captures some variable that impacts the difference in the long run, although only very mildly as the transaction costs impact is only about a fraction compared to the dividend yield. Alternatively, it could be argued that the transaction cost first start playing a role during longer holding periods. This is however unlikely, as shorter holding periods would be characterized by nominally smaller returns and thus relatively larger transaction costs. The lack of impact by the transaction costs can also be explained by their often nominal nature. A nominal transaction fee would have a large impact on a small investment (i.e. for a private investor) while only a small if not dismissible impact on an institution (such as a pension fund). For all these reasons, the transaction cost can be assumed to be insignificant in defining the difference in returns.

Another thought should be spared to the systematic risk. As explained earlier the way the systematic risk behaves – becoming significant over time – can be expected since systematic risk is measured by the beta, which measures the impact of the market index's return on the individual stocks. The market index itself is commonly used as a proxy for the entire economy's performance and therefore intended to capture external events i.e. foreign policy developments. These events usually need time to develop and the markets need time to assess the impact on the stock. Therefore, unless some major disturbance occurs, the systematic risk can be expected to be insignificant in the short run. Similar behaviors can be observed throughout the different years, where the systematic risk is rarely significant and never significant for the 1 day period – in the years 2015 it is significant for the 20 day period and in 2012 and 2013 it is significant for the 5 day period. This inconsistent pattern can be explained by the difficulty of truly capturing the market's behavior. This thesis uses a CAPM beta for this purpose, which is not the most refined tool available, and thus might not be able to detect some subtleties in the market. Another theory about the low impact of the systematic risk is that both strategies hold the stock over almost the same time period (save for the overlap, which will be discussed in the next paragraph). Therefore, any systematic risk would impact both strategies rather similarly and thus not have any impact on the difference in returns.

A concern that needs to be raised is the overlapping nature of the holding day periods. As outlined in the *Method* chapter the returns for the cum- and ex-dividend strategy are not measured over the exact same time period. This is caused by the aim and design of this study, which makes a direct comparison difficult since it is this very difference in return caused by this slight lag in time that is of interest. The authors are aware that, especially for the very short term periods, this discrepancy can seriously impact the data and thus the conclusions drawn from it. This is also the main motivation behind the variation in holding periods.

It should further be remembered that as the regressions move back in time the datasets become more incomplete. As such, while 2016 and 2015 enjoy extensive dividend observations for almost all companies, 2014, 2013, and 2012 suffer from a lack of observation, the further back they go. It is assumed that the main cause of this is the financial crisis of 2008, which caused many companies to suspend and/or change their dividend policies for a period of time. As such, more weight should be attached to evidence produced by the later regressions.

4.5 Data Validation

To ensure that the inferences made from the regressions are accurate as well as to identify any potential error sources, the data will be subjected to several tests. This section will shortly outline these test, their importance, and should they find problems in the data, state which steps are taken to amend this. The tests and remedies are taken from Brooks (2014) book on financial econometrics and conducted using *Eviews*. The main objective with the tests is to ensure that an OLS regression is appropriate, i.e. that it has an expected residual of zero, constant residual variance, zero autocorrelation, the explanatory variables are independent of the residuals, and that it has normally distributed errors. If these criteria are fulfilled then reasonably accurate conclusions can be drawn from the regressions.

Starting off with two short issues that have to be addressed – the expected values of the residuals and residual autocorrelation. As the regressions all include a constant term the expected value of the residuals will be zero by design. Furthermore, since this thesis deals with cross sectional data, there is no need to test for autocorrelation, as autocorrelation is a

time series property, when the errors of today's period are connected to the errors of a previous period.

Searching for heteroscedasticity, all regressions are subjected to a White's test. The White test in the majority of cases concludes that heteroscedasticity is present in the data sets for the one, five, and twenty day return periods, throughout years 2012-2015. There is no evidence of heteroscedasticity in year 2016 or in the sixty day return periods. It is theorized that this pattern is caused by a quickly declining number of observations, as the regressions move backwards in time – the further back the data goes the more unregularly are the observations, especially around the financial crisis. To combat the heteroscedasticity robust standard errors are used. The robust standard errors are applied to all periods to allow meaningful comparison.

The data is also tested for normality in residuals using the Jarque-Bera test. It is found that none of the residuals exhibit normality. An attempt is made to log the independent variables but with no significant improvement. This only constitutes a minor problem, as this non-normality issue can be traced to the number of observation. The Central Limit Theorem assumes that if the sample size would be increased the sample distribution will trend towards normality (Brooks, 2014:60). As such, the returns are expected to be normally distributed in the actual population. Nonetheless, to ensure accuracy this thesis uses student's T-test to test for significance.

Another test conducted concerned multicollinearity i.e. that one of the independent variables is correlated with another independent variable. A covariance matrix of the independent variable parameters is created and manually interpreted, where 0,4 is judged the lower limit for existing multicollinearity and 0,8 is judged the lower limit for excess multicollinearity that would have to be treated, based on Brooks (2014). No evidence of multicollinearity could be found in any of the data sets. As such, it can be assumed that the independent variables are not correlated with each other.

5. Conclusion

This last written section will now conclude this thesis. It will shortly summarize the findings while answering the research questions posed at the beginning of the paper. Then it will present some implications of this research. In the end, it will provide suggestions for future research.

Starting off come the answers to the sub questions, which need to be answered, before addressing the main research question. Sub question *a* asked if there is an observable and statistically significant difference in the returns between an cum-dividend and ex-dividend strategy. This thesis finds that there is a significant difference on a country level, while not on an international level. This difference also seems to be connected to the tax effect, depending on whether or not there is a tax effect, either the cum-dividend or the ex-dividend strategy is significantly better.

The second sub question asked if there is an observable and statistically significant difference between the holding periods. This thesis shows that, on a country level, the returns are significant no matter the holding period. It can further be observed that depending on the holding period there are massive differences in the size of the annual returns.

The third sub questions asked what factors can be found to determine the difference in returns. This thesis finds that the factors that's most strongly impact the difference in returns are the dividend yield and the tax effect. The volume and the systematic risk also seem to have an impact but rather small in size. The market to book equity ratio and the transaction costs seem to have no impact at all.

Given these conclusions the main research question can be answered. It asks whether there is a difference between return strategies and what causes this difference. Drawing from the previous arguments, this thesis concludes that yes, there is a difference and it is different for Sweden and the Netherlands. While Swedish investors would benefit from an ex-dividend strategy it seems that Dutch investors would benefit from an cum-dividend strategy. This difference in returns is mainly caused by the actual dividend yield and the tax effect, and somewhat impacted by the volume and the systematic risk.

An implication of this thesis is its practical relevance to traders. As dividend yield and the tax effect variable have been strongly linked to a difference in returns, these two factors should be given special attention when deciding between a cum-dividend or ex-dividend strategy. This thesis provides evidence that a difference in tax rates has a significant impact on returns. It can be seen in the Dutch sample that a comparatively lower dividend to capital gains tax rate could lead to a more profitable cum-dividend strategy. What is interesting to note though is that having the same tax rate on dividends and capital gains does not seem to create the same amount of returns as can be seen in the Swedish sample. This lends credibility to the theory that abnormal returns might exists around the ex-dividend day, which could be collected by active traders. It would thus be of interest to see more research in this field.

Abnormal returns would indicate market inefficiency, which this thesis sets out to test for the financial markets of Sweden and the Netherlands. It finds that evidence of market inefficiency exists on a country level but that this inefficiency dissipates in an international level. However, this thesis merely looks at two countries and it therefore limited in its scope. It would be of interest for future researchers to investigate if this inefficiency is present in other countries as well and if this dissipation continues when including more countries.

Finally, it would be of great interest to investigate the tax effect variable. As this thesis presents it has a strong effect on the difference in returns, but its behaviour suggests that it catches another variable. Finding out what this variable might be and separating its effect from the tax effect might grant new understanding on the impact of dividends on stock returns. Additional research could also be done to compare the outperformance in returns between both short-term trading strategies and a long-term buy-and-hold strategy. As a long-term buy-and-hold strategy in overall requires less effort and has overall lower transaction costs and taxes, as only the realized return will be taxed. It is for this reason that if it outperforms the other that the preference should be to maintain a long-term strategy due to its nature of needing less effort to realize outperforming returns. However if (a combination of) the short-term dividend strategies are outperforming the long-term strategy it can be seen as being worth taking the additional effort to realized outperforming returns.

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7. Appendix

I – Cross Section 2015

*Results for the Cross-Sectional Regression of Returns 2015. The stars correspond to the varying degrees of significance with *=90%; **=95%; and ***=99%. The standard errors are presented in parenthesis. The regression is based on 95 observations for 1, 5, and 20 day return, and on 92 for 60 day return. Robust Least Squares are used to combat possible heteroscedasticity. It should be noted that the systematic risk of the 60 Day Return Period barely missed to be significant at the 90% level.*

Independent Variables (2015)	1 Day Return	5 Day Return	20 Day Return	60 Day Return
Intercept	-0.010**	-0.002	-0.005	0.01*
	(0.004)	(0.006)	(0.006)	(0.006)
Dividends (DIV_)	0.927***	0.944***	0.994***	0.688***
	(0.067)	(0.080)	(0.083)	(0.083)
Transaction Cost (TC)	-0.001	0.009	-0.01	-0.037*
	(0.017)	(0.02)	(0.02)	(0.02)
Tax Effect (TAXEFF)	8.37***	8.964***	9.039***	-0.049
	(0.286)	(0.343)	(0.355)	(0.35)
Volume (VOL)	0.006***	0.003	0.006*	-0.001
	(0.002)	(0.003)	(0.003)	(0.003)
Market-to-Book Equity (ME_BE)	0.000007	0.000	-0.000049	0.000
	(0.000048)	(0.000)	(0.000059)	(0.000)
Systematic Risk (BETA)	-0.000	-0.004	-0.006*	-0.005
	(0.003)	(0.003)	(0.003)	(0.003)
Adjusted R^2	0.697	0.747	0.683	0.345

II – Cross Section 2014

*Results for the Cross-Sectional Regression of Returns 2014. The stars correspond to the varying degrees of significance with *=90%; **=95%; and ***=99%. The standard errors are presented in parenthesis. The regression is based on 95 observations for 1, 5, and 20 day return, and on 92 for 60 day return. Robust Least Squares are used to combat possible heteroscedasticity. It should be noted that the transaction cost of the 1 Day Return Period barely missed to be significant at the 90% level*

Independent Variables (2014)	1 Day Return	5 Day Return	20 Day Return	60 Day Return
Intercept	-0.004	0.000	0.0015	0.009*
	(0.004)	(0.006)	(0.006)	(0.005)
Dividends (DIV_)	0.996***	0.913***	0.894***	0.759***
	(0.062)	(0.094)	(0.096)	(0.084)
Transaction Cost (TC)	0.026	0.037	-0.014	-0.032
	(0.016)	(0.024)	(0.024)	(0.021)
Tax Effect (TAXEFF)	8.939***	8.902***	9.417***	0.363
	(0.259)	(0.395)	(0.402)	(0.353)
Volume (VOL)	-0.001	-0.000	0.003	-0.002
	(0.002)	(0.003)	(0.003)	(0.003)
Market-to-Book Equity (ME_BE)	0.000	0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Systematic Risk (BETA)	0.001	-0.005	-0.003	-0.004
	(0.002)	(0.003)	(0.003)	(0.003)
Adjusted R^2	0.612	0.736	0.724	0.365

III – Cross Section 2013

*Results for the Cross-Sectional Regression of Returns 2013. The stars correspond to the varying degrees of significance with *=90%; **=95%; and ***=99%. The standard errors are presented in parenthesis. The regression is based on 95 observations for 1, 5, and 20 day return, and on 92 for 60 day return. Robust Least Squares are used to combat possible heteroscedasticity. It should be noted that the transaction cost of the 1 Day Return Period barely missed to be significant at the 90% level*

Independent Variables (2013)	1 Day Return	5 Day Return	20 Day Return	60 Day Return
Intercept	0.001	-0.004	0.006	0.0122**
	(0.005)	(0.006)	(0.006)	(0.005)
Dividends (DIV_)	0.876***	0.907***	0.814***	0.756***
	(0.091)	(0.107)	(0.105)	(0.096592)
Transaction Cost (TC)	0.014	0.035	-0.010	-0.040*
	(0.022)	(0.026)	(0.026)	(0.024)
Tax Effect (TAXEFF)	8.481***	8.255***	9.235***	0.143
	(0.3278)	(0.384)	(0.380)	(0.348)
Volume (VOL)	-0.002	-0.001	-0.001	-0.003
	(0.002)	(0.002734)	(0.003)	(0.002)
Market-to-Book Equity (ME_BE)	0.000	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Systematic Risk (BETA)	-0.000	0.001	-0.003	-0.004
	(0.002)	(0.003)	(0.003)	(0.003)
Adjusted R^2	0.626	0.675	0.716	0.377

IV – Cross Section 2012

*Results for the Cross-Sectional Regression of Returns 2012. The stars correspond to the varying degrees of significance with *=90%; **=95%; and ***=99%. The standard errors are presented in parenthesis. The regression is based on 95 observations for 1, 5, and 20 day return, and on 92 for 60 day return. Robust Least Squares are used to combat possible heteroscedasticity. It should be noted that the transaction cost of the 1 Day Return Period barely missed to be significant at the 90% level*

Independent Variables (2012)	1 Day Return	5 Day Return	20 Day Return	60 Day Return
Intercept	0.001	-0.024***	0.000	0.014**
	(0.007)	(0.006)	(0.008)	(0.006)
Dividends (DIV_)	0.769***	1.051***	0.755***	0.716***
	(0.110)	(0.098)	(0.128)	(0.103)
Transaction Cost (TC)	0.005*	0.046*	-0.004	-0.042
	(0.031)	(0.028)	(0.035)	(0.028)
Tax Effect (TAXEFF)	7.838*** (0. 405)	7.840***	8.878***	-0.224
		(0.359)	(0.449)	(0.363)
Volume (VOL)	-0.001	0.006**	0.004	-0.004
	(0.003)	(0.003)	(0.003)	(0.003)
Market-to-Book Equity (M/B)	-0.000	0.000	-0.000	-0.000
	(0.001)	(0.000)	(0.001)	(0.000)
Systematic Risk (BETA)	0.002	0.005*	0.001	-0.004
	(0.003)	(0.003)	(0.004)	(0.003)
Adjusted R^2	0.659	0.605	0.681.	0.230