

NHH



Norwegian School of Economics  
Bergen, Fall 2019

# Tax-Motivated Trading in the Scandinavian Countries

*An empirical study on cum-cum transactions and potential tax  
loss in Norway, Sweden and Denmark*

**Ole Andreas Dalsbø and Hallvard Solli**

**Supervisor: Evelina Gavrilova-Zoutman**

Master thesis in Economics and Business Administration

Major in Financial Economics and Business Analytics

**NORWEGIAN SCHOOL OF ECONOMICS**

This thesis was written as a part of the Master of Science in Economics and Business Administration at NHH. Please note that neither the institution nor the examiners are responsible – through the approval of this thesis – for the theories and methods used, or results and conclusions drawn in this work.

## Abstract

In recent years, foreign investors have taken advantage of loopholes in European taxation systems in order to avoid paying taxes on dividends and to steal from the public treasury for their own benefit. This has happened through extensive stock lending/trading around ex-dividend dates in many European countries for the last decade and our theory is that it is still happening. In this thesis we are primarily looking at tax-motivated trading such as cum-cum/cum-ex trading in Scandinavia.

The tax-motivated trading schemes involves extensive stock lending and transfer of shares before the ex-dividend date from investors with a high marginal tax rate, to investors with a lower marginal tax rate. The saved tax is usually split among the participants in the scheme. This scheme is not necessarily strictly illegal, however, if investors can lend out their stocks with the purpose of avoiding taxes, it could be a sign that the taxation laws are not working as supposed.

In this thesis we investigate how the short ratio behaves for the largest publicly traded stocks in Norway, Sweden and Denmark. We are interested in changes around the ex-dividend date and how the short ratio has changed in the said countries after Denmark changed their regulation in 2016. Next, we look to see if dividend yield can explain the differences in the short ratio. Finally, we give an estimate on the tax loss in 2018 for the largest stocks in Sweden and Norway.

We find that short ratio increases significantly in a seven-day window around the ex-dividend date in said countries. Additionally, we find that short-selling in Denmark is significantly reduced in the period after the regulation was introduced. Whether this is due to the regulation itself or other factors is hard to determine, but the effect is isolated to Denmark. We find that short-selling is higher for stocks in the highest dividend yield group, but we cannot say that the increased short ratio is directly linked to the increase in dividend yield for all dividend yield groups. Whether the increased short-selling is due to tax-motivated trading or other factors, such as dividend capture trading, is hard to conclude on but we argue that a substantial part of the short-selling is likely tax-motivated.

Finally, we argue that Norway and Sweden could be prone to revenue tax losses up to NOK 675 million and SEK 754 million, respectively for the year 2018.

## **Acknowledgements**

We would like to express our appreciation to Evelina Gavrilova-Zoutman who was our supervisor during the work with our thesis. She contributed with valuable insight and guidance during the process. We would also like to thank Sparebank 1 Markets for providing us with data, which would have been considerably hard to get our hands on otherwise. Additionally, we want to thank the Norwegian Tax Administration and the Norwegian Centre for Taxation at NHH for rewarding our work with a grant.

# Contents

<b>ABSTRACT .....</b>	<b>2</b>
<b>ACKNOWLEDGEMENTS.....</b>	<b>3</b>
<b>1. INTRODUCTION.....</b>	<b>6</b>
1.1 BACKGROUND.....	6
1.2 PURPOSE OF THE RESEARCH .....	6
<b>2. THEORETICAL FRAMEWORK .....</b>	<b>10</b>
2.1 WITHHOLDING TAX .....	10
2.2 CUM-CUM TRADING.....	12
2.2.1 <i>Cum-cum in practice</i> .....	13
2.3 CUM-EX TRADING.....	14
2.4 DIVIDEND CAPTURE TRADING.....	15
2.5 LITERATURE REVIEW: TRADING ACTIVITY AROUND EX-DIVIDEND DATE .....	15
2.6 BENEFICIAL OWNERSHIP AND BACKGROUND FOR EVENT STUDY ON DENMARK.....	17
<b>3. DATA.....</b>	<b>19</b>
3.1 DATA COLLECTION.....	19
3.2 DESCRIPTIVE STATISTICS.....	20
3.3 CASE STUDY: EQUINOR .....	22
<b>4. METHODOLOGY.....</b>	<b>24</b>
4.1 RESEARCH QUESTIONS .....	24
4.2 RESEARCH APPROACH .....	25
4.3 ECONOMETRIC FRAMEWORK .....	25
4.3.1 <i>Standardized short ratio</i> .....	25
4.3.2 <i>Panel data analysis – Fixed effects and pooled OLS</i> .....	26
4.3.3 <i>The abnormal short-selling model</i> .....	27
4.3.4 <i>Event study on Denmark – Extension of the model from 4.3.3</i> .....	28
4.3.5 <i>Dividend yield model</i> .....	29
4.3.6 <i>Tax loss model</i> .....	30
4.4 HYPOTHESES .....	32
<b>5. EMPIRICAL ANALYSIS .....</b>	<b>33</b>

---

5.1	GRAPHICAL EVIDENCE – USING SHORT DATA AS A PROXY.....	33
5.2	SHORT VOLUME AROUND EX-DIVIDEND DATE BEFORE AND AFTER EVENT DATE.....	35
5.3	DIVIDEND YIELD MODEL.....	38
5.4	COUNTRY-SPECIFIC ANALYSIS AND TAX LOSS ESTIMATION .....	40
5.4.1	<i>Short-selling in Denmark</i> .....	40
5.4.2	<i>Short-selling in Norway and Sweden</i> .....	41
5.4.3	<i>Tax loss estimation</i> .....	44
5.5	LIMITATIONS .....	46
<b>6.</b>	<b>CONCLUSION AND RECOMMENDATIONS .....</b>	<b>47</b>
<b>7.</b>	<b>BIBLIOGRAPHY .....</b>	<b>49</b>
<b>8.</b>	<b>APPENDIX .....</b>	<b>52</b>
8.1	STOCKS REMOVED FROM THE DATASET .....	52
8.2	TAX-LOSS FOR EACH STOCK IN NORWAY.....	53
8.3	TAX-LOSS FOR EACH STOCK IN SWEDEN.....	54

# 1. Introduction

## 1.1 Background

Tax fraud and tax avoidance in Europe has sparked attention over the last few years due to revelations by several sources, most notably CumEx-files, that have shed light on how European taxpayers have been swindled for billions of euros through cum-ex and cum-cum trading schemes (CumEx-files, 2018). The Danish newspaper DR has calculated the amount of tax losses due to tax-motivated trading schemes to 12,7 billion DKK between the years of 2012 to 2015 in Denmark (DR, 2018a). Equivalent numbers for Norway and Sweden have not been identified and will be attempted in this thesis. The CumEx-files exposed tax schemes involving taxes on dividend payments and was a collaboration between almost 19 European media outlets. It revealed the biggest tax swindle in Europe in its history and totaled up to an amount of 55,2 billion euros. The players in this tax scheme involved, among others, American pension funds and European banks. The most notable tax schemes involved stealing from European countries (cum-ex) and avoiding dividend tax (cum-cum) (CumEx-files, 2018).

## 1.2 Purpose of the research

The CumEx-files showed that cum-ex and cum-cum activities in Denmark were considerably large and Denmark has since done changes to their systems to counter tax-motivated trading schemes. Countries such as Sweden and Norway were also mentioned in the CumEx-files but did not get the same attention and estimations for potential tax loss as Denmark. Our thesis will, by using short data<sup>1</sup> as a proxy, try to identify tax-motivated trading in these countries.

Most of the literature on tax-motivated trading, especially cum-cum and cum-ex, is centered around Germany. We extend the literature on a country-level by focusing on the Scandinavian countries. The motivation for this is to see how tax-motivated trading affects markets in the Scandinavian countries. Further, a positive correlation between trust and levels of tax can be found for the Scandinavian countries and levels of trust are the highest in the world in this region (Kleven, 2014). It is therefore interesting to look at the impact of tax-motivated trading

---

<sup>1</sup> Short interest as a percentage of free float. Note that we also use the term 'short ratio' which denotes the same.

for the Scandinavian countries. Trust does not automatically indicate naivety, but if the Scandinavian countries are under the expectation that tax-motivated trading does not happen in their countries, their regulations would probably not be set to prevent this type of trading either.

In general, there is limited literature on cum-ex and cum-cum trading and we will seek to contribute by clarifying the differences between the trading schemes. Most of the cum-ex trading exposed in the CumEx-files was centered around loopholes and by creating arbitrary transactions and apply for multiple refunds for the same dividend. While CumEx-files and the attention it brought may have reduced the cum-ex trading, we speculate that cum-cum transactions is still apparent. Cum-ex transactions exploits the settlement period for share transactions, that stock trades are not settled immediately, to create an illusion that there are multiple owners of a stock. Cum-cum transactions, on the other hand, can be centered around a wider window since the basic requirement is that the owner of the shares have switched hands before the ex-dividend date. In this thesis the primary focus will revolve around cum-cum trading.

The main purpose of our thesis was to identify if there are patterns in the short-selling activity that can indicate tax-motivated trading and how much that can be attributed to cum-cum. We use short-selling as a proxy for tax-motivated trading since it has been identified as the dominant method to execute different tax-avoidance schemes (Spengel, 2016). In previous research, trading volume has been used as a proxy, but we expect short-selling to come to better use, as this is the dominant way cum-cum has been executed. Tax schemes, such as cum-cum and cum-ex, are reliant on a change in the beneficial owner before the ex-dividend date, which can be done through short-selling or securities lending. By studying how short-selling fluctuates around ex-dividend dates, we can try to identify and estimate the amount of tax-motivated trading. This method extends the literature on tax-motivated trading by using other types of data, such as short-selling data, to identify abnormal patterns around the ex-dividend dates.

Since short-selling is typically done as a bet on a stock's price fall, we expect that the cum-cum effect will be on top of regular short-selling. In a market where there are no taxes on dividends and marginal taxes for different investors are similar, there would be no reason to trade in a tax-motivated manner but there would still be regular short-selling.

The tax-motivated cum-cum trading will increase the total amount of shares that are short-sold or on loan. Possible confounders for increased short-selling around ex-dividend dates are described by Lakonishok and Vermaelen (1986). One of the factors they describe as reason for increased short-selling volume around ex-dividend dates is dividend capture trading. They explain that stocks are traded above their fundamental value before ex-dividend dates and this provides an opportunity for short-sellers to gain on (Lakonishok and Vermaelen, 1986). If a stock reverts to its fundamental value after the dividend has been paid, the stock is overvalued at the ex-dividend date and we expect to see the stock price fall back to the fundamental value after the dividend payment. This provides an attractive trade for short-sellers as they gain when the stock price falls.

To further corner the effect we are looking for, we can use the following method; for similar stocks in different countries whereas one of the countries “allow” for cum-cum we expect to see a higher short-selling in the country that “allows” for cum-cum. By comparing, we can potentially identify the cum-cum effect. As Denmark has tightened regulation, they can be a good indicator to see if cum-cum is present in Norway and Sweden. This will contribute to the limited literature of cum-cum by providing insight into short-selling and tax-motivated trading in Scandinavia.

Our thesis also provides insight into which stocks that are more prone to be traded in a tax-motivated manner. For cum-cum trading to be worthwhile, the transactional cost has to be lower than the gain from the scheme. Our theory is therefore that stocks with larger dividend yields will be more shorted around ex-dividend date than stocks with lower yields. Our thesis gives insight if this pattern stems to be true or not. Based on this, we have formulated two research questions that we will elaborate on later:

- 1) *Does the short data for the Scandinavian countries, from 2013 till today, show any abnormal trading patterns that could indicate tax-motivated trading?*
- 2) *Does the short data indicate that stocks with a higher dividend yield have more tax-motivated trading, than stocks with a lower dividend yield?*

Our findings suggest that short-selling increases significantly around the ex-dividend date for the Scandinavian countries. We find that the short-selling in Denmark has decreased after their regulatory changes and the discovery of the cum-ex and cum-cum trades there. The same



decrease cannot be found for Norway and Sweden. Further, we find that short-selling is most prominent for stocks with highest dividend yield. For lower and medium yielding stocks, the results are mixed and not conclusive. Finally, we estimate the tax revenue loss for Norway and Sweden to be up to NOK 675 million and SEK 754 million, respectively for the year 2018.

We contribute to the literature by showing the increased short-selling around the ex-dividend date, exposing reduced short-selling in Denmark after 2016 and that high yielding stocks have the highest short-selling among the different yield categories. At last, our tax loss analysis contributes to the literature by trying to estimate the presence and amount of tax-motivated trading (cum-cum) in Norway and Sweden.

## 2. Theoretical framework

### 2.1 Withholding tax

When a dividend from a Scandinavian stock is distributed to a foreign shareholder, a tax is normally deducted from the amount that the shareholder receives. This tax is normally called a withholding tax. There is withholding tax on dividends for all the Scandinavian countries. For dividends paid to domestic investors in the Nordic countries, the distributed amount is subject to income tax.

The laws on withholding tax in the Scandinavian countries are similar, but there are some important differences between the legislations. Common for Scandinavian countries is that companies that pay a dividend to its foreign shareholders need to deduct withholding tax on a set rate. The withholding tax can in turn be reduced due to an applicable tax treaty or due to tax-exemption rules (PWC, 2019). The exceptions are different for each country and will be addressed in short. Further there are different rules when it comes to natural persons or legal persons. In this paper the focus is primarily on corporate investors and will therefore be addressed in the largest content. Corporate investors will be referred to as ‘investors’ in the thesis and should not be mixed with individual investors as the legislation is different. Throughout the thesis we will use Norway as an example and will therefore start by presenting the legislation in this section.

In Norway there are exemption rules to dividend taxation. The exemption method in Norway gives foreign corporate investors the possibility to refund the withholding tax. The company has to be established and have real economic activity in an EEA country. Further, the shareholder needs to be the beneficial dividend recipient. Entities that can claim a refund after the exemption method are listed under the Taxation Act section 2-38, subsection 1, letters a-h. For a foreign shareholder to claim the refund, it needs to equal one of the Norwegian taxable entities listed under the act (Skatteetaten, n.d.a).

For Sweden and Denmark, the laws are different. Swedish domestic companies do not pay dividend tax, but they do pay income tax on dividends. In Denmark, the dividend tax is reduced to 15% for domestic investment companies (Skat.dk, 2019). Similar for all Scandinavian countries is that they have tax-exemptions if the company owns more than 10 percent of the

share capital in the stock. In Sweden, the company needs to hold more than 10 percent of the voting shares for “business reasons” for listed shares and needs to be held for at least 1 year. Non-listed stocks are always considered to be held for “business reasons” and can therefore be tax-exempt (PWC, 2019).

In Denmark, dividends are usually tax-exempt if the non-resident owns more than 10 percent of the share capital of the payer and the receiver is the beneficial owner of the stocks. This holds for most of the countries that Denmark has tax agreements with. If the shareholder is not tax-exempt, the general tax rate is 27 percent but can be reduced due to a tax agreement with the respective country of the shareholder. The difference between the withholding tax rate and the reduced rate needs to be applied for by the shareholder in order to be refunded (Skat.dk, 2019).

The key takeaway for the reader is that there are many tax-exemptions and tax-reduction possibilities in the legislations for all the three countries. The fact that the marginal tax rate can differ based on the residency of the company holding the stocks and what type of company they are, makes it possible for investors to adapt in front of the dividend payment.

In **Table 1**, the general withholding taxes for the different Scandinavian countries are presented. The general rates are different for the countries, but they all have reduced withholding tax for many similar countries (exemplified with the US). We highlight the tax rate for US investors as American pension funds have been involved in a large number of tax-motivated schemes such as cum-cum and cum-ex trading (New York Times, 2018).

**Table 1: Tax rate by country**

Country	Withholding tax
Norway	25%
Sweden	30%
Denmark	27%
Reduction for US investor due to tax agreement	15%*

Notes: \*All Scandinavian countries have tax reduction agreement with the US. The tax rate presented is the general withholding tax if the company holding the stocks is based outside of the respective countries.

Apart from the US, the Scandinavian countries have different tax agreements with foreign countries. This means that the marginal tax rate for different investors varies. This creates an

incentive where the lowest-taxed investor should own the stocks before the ex-dividend date to reduce tax. Equities are therefore typically “parked” in the legislation with the lowest marginal tax before the ex-dividend date.

## 2.2 Cum-cum trading

Cum-cum trading and cum-ex trading are often portrayed and mixed up when talking about the issue of dividend tax fraud and avoidance. Cum-ex trading, in the form of receiving multiple tax credit reimbursements, exploits flaws in the tax system. Cum-cum trading, on the other hand, is in a grey zone in terms of legality. As the purpose of cum-cum trading is to avoid paying tax on dividends, it could therefore be deemed illegitimate, while it per definition is legal (Spengel, 2016).

Cum-cum trading exploits the differences in withholding tax for investors in different countries. As we have exemplified by Norway earlier, companies within EU/EEA that hold Norwegian stocks are typically tax-exempt withholding taxes on dividends while non-EU/EEA investors have to pay withholding tax. Applicable tax treaties between countries can reduce the general withholding tax rate. Typically, corporate investors from outside the EEA have to pay a higher withholding tax on dividends from Norwegian companies, while corporate investors within EEA can apply for a tax credit for the withholding tax on their dividends. Common for all forms of cum-cum trading involves transferring ownership of the shares, for a period of time, from an investor that pays withholding tax to an investor that can apply for a tax refund. An example of a cum-cum trade is described in the next section.

To exemplify the impact of foreign investors and why tax-motivated trading can be a problem, we observe the amount of foreign capital on Oslo Stock Exchange. Garsjø & Seglem (2016) showed in their master thesis that investors from four countries own approximately 28 percent of the values on the Oslo Stock Exchange<sup>2</sup>. Further, above 12 percent of the ownership on Oslo Stock Exchange is owned by investors from American and non-European countries. These countries do not have any tax exemption (some of them have tax reduction agreements) in Norway, and could possibly have a larger gain on tax-motivated activities as cum-cum

---

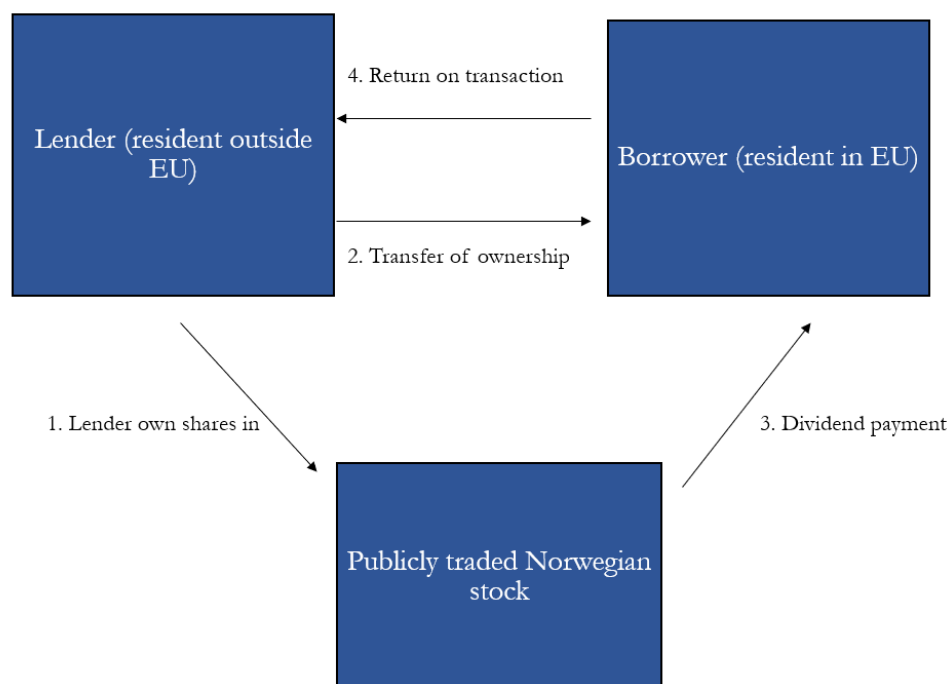
<sup>2</sup> These countries are the US, the UK, Luxembourg and Belgium. The total foreign ownership in 2019 is approximately 40 percent (DN, 2019)

and/or cum-ex. From the CumEx-files it was addressed that a large amount of American pension funds was involved in the cum-ex scheme.

### 2.2.1 Cum-cum in practice

Cum-cum trading to avoid taxes can be arranged in multiple variations. The simplest form is a spot market transaction while other cum-cum trades can be facilitated as repurchase agreements/TRS agreements<sup>3</sup>, securities lending or a combination of the mentioned. As we have gathered short data in the Scandinavian countries, we will focus on this type of arrangement. This type of arrangement is also the most dominant form of cum-cum trading (Spengel, 2016). The cum-cum trade involves two or more parties, often a European bank. The bank commonly has a supporting role in facilitating the scheme (European Parliament, 2018). An example of how the cum-cum trade scheme would work in practice is exemplified in **Figure 1**<sup>4</sup>:

**Figure 1: Example of a cum-cum transaction**



<sup>3</sup> Total return swap. For definition, see The European Commission (2013)

<sup>4</sup> All figures and illustrations throughout the thesis are own contributions.

A lender that is resident in a country with an unfavorable tax agreement with the country that the investor owns shares in, wants to reduce their marginal tax. In this example we can use an American investor and a European bank as an example. In all Scandinavian countries an American investor that owns shares (not above the 10% level mentioned earlier) in a publicly traded company pays 15% withholding tax on their dividend. If the publicly traded stock is a Norwegian company, a European company does not pay withholding tax to Norway (the exemption method mentioned earlier).

Before the ex-dividend date, the lender transfers the ownership of the shares in the Norwegian company from itself to a borrower (company within the EU). When the Norwegian company pays out their dividend, the registered owner of the shares is the European company. The withholding tax will still typically be withdrawn from the dividend, but the European company can fully refund the withholding tax.

At last, the shares are transferred back to the original owner. The dividend payment that the borrower received is usually transferred back to the lender after subtracting a fee. The rate that the borrower has to pay to lend the shares can also be set to match the dividend payment, to disguise that the transfer of shares is solely to avoid paying withholding tax.

## 2.3 Cum-ex trading

As our thesis is primarily centered around the cum-cum topic, we will only include a brief description of the mechanics behind cum-ex transactions. The motivation for cum-ex schemes is to receive several dividend tax refunds rather than avoiding tax like described under cum-cum transactions (Spengel, 2016). Firstly, it should be noted that information about this topic has been limited for the public eye until after the German cum-ex scandal in 2016, and most of the information available is based on this event.

Buettner et al. (2018) explores the exploitation of the withholding tax system in Germany, suggesting that these schemes were purposely made to circumvent the tax system and receive multiple tax refunds. Investors that exploited this scheme performed a set of complex transactions during a short time span, close to the ex-dividend date. In short, these trades deliberately aim to 'blur' which investor that has the right to claim a tax refund. This results in both/several investors receiving a tax certificate. It is likely to believe that similar schemes

have been used in other countries as well for the same purpose of receiving multiple tax refunds. Similar schemes have for instance been revealed in Denmark and is expected to have had an impact on the rest of the Scandinavian countries as well. Norway did for instance stop a reimbursement of 500 000 NOK based on a tip from Denmark in 2018 (DR, 2018a).

## 2.4 Dividend capture trading

While the tax schemes described above can be a potential explanation for the increased trading activity around the ex-dividend date, there are trading strategies that solely focus on dividend payments. Dividend capture trading is based on a strategy where an investor buys a stock just before the ex-dividend date (cum-dividend) and sell it right after the dividend is paid out in order to capture the dividend (Blau et al., 2011). This is in notion with results from Lakonishok and Vermaelen (1986) that showed abnormal positive returns on stocks before the ex-dividend date with negative abnormal returns after dividend payment. Dividend capture traders are primarily looking for the dividend payment and will create excess demand for stocks before the ex-dividend date.

This pattern provides an opportunity for short sellers to short stocks just before and after the ex-dividend date to create a profit, since stocks have abnormal negative returns after the ex-dividend date. We expect this pattern to be larger for stocks that pay a higher dividend compared to stocks with lower dividend yields. Stocks with higher dividend yield will presumably have a higher amount of dividend capture trading, creating larger excess demand and consequently pushing the price over the fundamental value. The result is larger negative abnormal return after the ex-dividend date that short-sellers can profit from.

## 2.5 Litterature review: Trading activity around ex-dividend date

While cum-cum and cum-ex trading has gained attention in the media over the last few years there is not a lot of research on the topic. Most of the coverage on short-selling and trading volumes around ex-dividend dates are centered around dividend capture trading or stock price changes and not directly related to cum-cum or cum-ex. The research is still relevant for our

thesis as it seeks to explain why volume increases (both short-selling and trading volumes) around ex-dividend dates.

Lakonishok and Vermaelen (1986) investigated the trading volume around the ex-date from 1970 until 1980 for 2300 NYSE and AMEX<sup>5</sup> companies. They found that there was a difference in trading volume when it comes to taxable and non-taxable distributions. They found significantly increased trading volume around ex-dividend day for taxable distributions such as cash dividends. For non-taxable distributions, such as stock splits or stock dividends, the trading volume was abnormally negative around dividend days. This shows that many investors behave in tax-motivated manner around ex-dividend dates. Following, the trading volume increased for stocks with higher dividend yields. This can be attributed to transaction costs. If transaction costs are the same, a higher dividend yield will be relatively more impactful for investors to trade around. This insight gives us an indication that there should be higher trading activity around ex-dividend dates for taxable distributions, as well as for stocks with higher dividend yield. If the trading activity is increased for these distributions, we can expect short-selling to increase as well, as discussed in section 2.4. Our thesis will therefore contribute to the larger thematic of trading activity around ex-dividend date by looking at short-selling.

Blau et al. (2011) looked to investigate whether there was abnormal short selling around the ex-dividend date. They found that there was abnormal short-selling on and after ex-dividend date. The short-selling was primarily driven by stocks with higher dividend yield. They indicate that this could be due to dividend capture investors that drive up excess demand for the stock. Short-sellers might recognize this excess demand and position themselves accordingly for a fall in the stock after the ex-dividend date. The research gives us an interesting insight. As our thesis investigates whether short-selling can be an indication of cum-cum/cum-ex trades, it is important to be aware that abnormal short-selling can be due to dividend capture trading. We will further contribute to the existing literature by trying to isolate the cum-cum effect and use it to calculate potential tax-loss for the Scandinavian countries.

---

<sup>5</sup> New York Stock Exchange, formerly known as American Stock Exchange



## 2.6 Beneficial ownership and background for event study on Denmark

Securities lending to transfer the ownership for a limited period of time is one of the ways to utilize the tax schemes mentioned in the previous section. Not yet mentioned, is that securities lending as a way to change the tax duty should not be as effective in theory. Issues identifying the real beneficial owner of the stocks complicate the tax reimbursement process where the question is whether the lender or borrower is the beneficial owner at the time of the ex-dividend date. This is important because it determines what the marginal tax on the dividend should be. We will not elaborate in detail about this, but instead give a brief overview on the topic and explain the problems it causes. As the borrower has full rights over the shares at the time of the dividend, one can assume that the borrower is the beneficial owner as well, but this is not straight forward. Short-selling is a time limited transaction and the real owner of the shares can therefore be argued to be the lender and should consequently be regarded as the beneficial owner. The implication is that the withholding tax will be set to the rate of the lender instead of the borrower, which contradicts the intention of the tax-motivated trader.

While the it can be very clear in some circumstances, the distinction can become blurred for the government agencies that receive the application for refund of withholding tax. Under the current system it is hard for tax authorities to identify the real beneficial owner. Data from Norway shows that foreign investors own more than 40 percent of the stocks on Oslo Stock Exchange and that many of these investors own their shares through nominee accounts that disguise the identity of the owners (DN, 2019). The beneficial owner issue also becomes complex when there are multiple chains of transactions. This can include stocks that are short-sold multiple times or stocks that are on loan with one borrower in addition to a repurchase agreement with another.

A final factor is the timespan of the transaction. If a stock is on loan for a long time, it can be argued that the borrower is the beneficial owner at the time of the dividend. A shorter loan timespan can count in favor of the lender being the real beneficial owner. If a stock is on loan for a very short period around the ex-dividend date, the reason for the loan is possibly tax-motivated, as the borrower is not exposed to price-risk to the same extent as in a longer loan period. In 2016, Germany introduced a draft that required the owner of shares to hold the shares for minimum 45 days before and after the dividend, to apply for a tax credit. In addition,

the shareholder must bear a risk of change in value of 30% during the period (EY, 2016). The intention of the draft was to shut down cum-cum transactions.

The ministry of trade, industry and fisheries in Norway has now proposed that all publicly traded companies and limited liability companies (AS) must inform who their owners are, including owners through nominee accounts. Denmark has, as a preventive action to reduce tax avoidance, introduced additional documentation requirements regarding beneficial ownership since 2016 (Skat.dk, 2019). In August 2015, Denmark stopped paying out refunds on withholding tax in light of the scandal that was revealed in Germany, however, they resumed reimbursement on dividend tax 17 March 2016 (Skat.dk, 2019). Our thesis identifies if this has led to any significant change in the short-selling pattern around ex-dividend date, and we will investigate this further in the analysis section by conducting an event study. We distinguish between post and pre period using an event date<sup>6</sup>. To get a better view of how the tax authorities work when trying to prevent the occurrence of tax evasion, we conducted an interview with the Danish researcher Emma Blicher. The goal was to get a better view of the situation from someone who has done a lot of research on the topic as well as worked closely with Christoph Spengel, often considered one of the most knowledgeable persons on the topic.

Blicher stated that the Danish tax authorities does not have the capacity to follow up and identify the beneficial owner of the stocks. According to Blicher there is also, to some degree, lack of incentives from the Danish tax authorities. It can be stated that they do not want to implement regulations that would eradicate cum-cum transactions completely, as that would lead to reduced foreign investment which is also not optimal for the Danish economy. The impact these regulations have had on the short sale will be further investigated in the analysis section.

---

<sup>6</sup> The event date is the date when Danish tax authorities they resumed reimbursement on dividend tax, 17.03.2016. For simplicity purposes, we will hereafter refer to this day as the 'event date'.

## 3. Data

### 3.1 Data collection

The short data used throughout the thesis was given to us by Sparebank 1 Markets and is for the time period 09.04.2013 to 15.11.2019. The data included the short interest as a percentage of free float<sup>7</sup> for stocks in the Scandinavian countries (Norway, Sweden and Denmark). The stocks that we have data on is based on different indices in the different countries. The data is based on indices that represent the most liquid stocks on the different exchanges; OBX in Norway, OMX Stockholm 30 in Sweden and OMX Copenhagen 25. We obtain data on trading volume from *Yahoo Finance*<sup>8</sup> for the same stocks and for the same period as for the short data (Yahoo Finance, 2019). We gathered trading volume data to compare trends in the different datasets.

We start the data management by removing stocks that were deemed not suitable for the analysis. A full list over stocks removed as well as reason for removal is found in Appendix **8.1**. Stocks that did not pay a dividend in the time period were kept but omitted from the analysis. The stocks could have served as a control group, but since we had very few stocks that did not pay a dividend, we chose to use a different methodology without the stocks. To perform several regressions as a part of our analysis, we needed an integrated dataset including the relevant variables. As there is no place to retrieve an integrated dataset including both the short percentage over time as well as ex-dividend dates for each stock, this has to be created in R to get the desired dataset<sup>9</sup>. This included creating panel data that gathered the 31-day event window based on ex-dividend dates for all the stocks in our dataset.

---

<sup>7</sup> Free float is the number of shares available in the market. Shares owned by governments, insiders and promoters are excluded.

<sup>8</sup>Extracted from Yahoo Finance, Historical Prices from 09.04.2013-15.11.2019.

<sup>9</sup> RStudio is used throughout the thesis for preprocessing of data as well as statistical analysis.

## 3.2 Descriptive statistics

In the dataset containing short interest ratios, we have a total of 453 dividend distributions from 62 companies split by the three countries. **Table 2** gives a summary of the number of dividend distributions for different countries, as well as the number of stocks per country.

**Table 2: Number of stocks and dividend distributions**

Country	No. of stocks	No. of distributions
Norway	21	175
Sweden	27	188
Denmark	14	90
<b>Total</b>	<b>62</b>	<b>453</b>

The total number of distributions in Denmark is the lowest of the three countries and the most likely reason is that we have fewer Danish stocks in the dataset. We note that the Norwegian stocks inhibit close to the same amount of distributions as Sweden even though the amount of stocks are different. In our dataset, many of the Swedish stocks pay out only once a year, while many Norwegian stocks pay out their dividend two or four times a year. **Table 3** shows the month that each ex-dividend date occurs in, for all of our stocks.

**Table 3: Dividend distribution by month**

Month	Count	Percent	Cumulative
January	0	0.00	0.00
February	37	8.17	8.17
March	83	18.32	26.49
April	106	23.40	49.89
May	124	27.37	77.26
June	9	1.99	79.25
July	3	0.66	79.91
August	33	7.28	87.20
September	5	1.10	88.30
October	14	3.09	91.39
November	31	6.84	98.23
December	7	1.77	100
<b>Total</b>	<b>453</b>	<b>100</b>	<b>100</b>

We have included the dividend distributions for years 2013 and 2019 where the full year is not present. This can give a slightly different annual estimate than what would be normal. However, we can conclude that most of the dividends are paid in the period from February to May. The two months of April and May alone counts for just above 50 percent of the dividend distributions in our dataset. When looking at short-selling around ex-dividend date, we use 15 days before and after the ex-dividend date. It should therefore be noted that the underlying dates in the distributions not necessarily are the same. This can potentially create some problems in our dataset where the state of the stock market can influence specific stocks. In specific market conditions, some stocks might be shorted more/less than others. Since we have data for over six years, and the fact that most distributions are in the same months, we still utilize the approach of choosing the time period of 15 days before and after each stock ex-dividend date. As we later want to study the relation between short ratio and a stock's dividend yield, we have included some dividend features in **Table 4**.

**Table 4: Dividend features**

<b>Dividend yield</b>	<b>Value</b>
Mean (%)	3.50
Standard deviation	1.47
Min (%)	0.55
Max (%)	6.39
<b>Dividend yield groups</b>	<b>Count</b>
Low (0-2%)	10
Medium (2-4%)	31
High (>4%)	21
<b>Total</b>	<b>62</b>

Approximately a third of the stocks in the dataset pay a dividend of 4 percent or more. Half of the stocks pay a yield between 2-4 percent, and the remaining pay a dividend yield below 2 percent.

### 3.3 Case study: Equinor

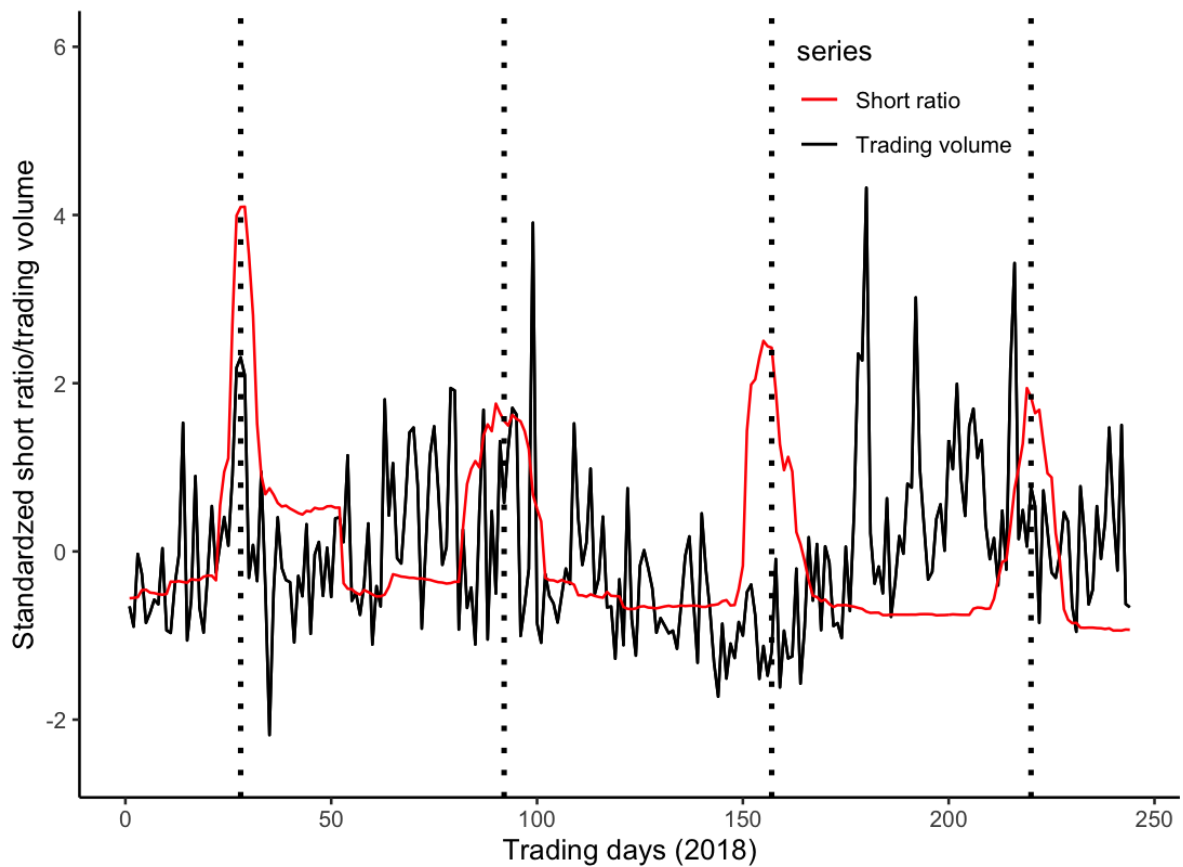
We have chosen to include a case study on Equinor to highlight some of the differences in using different datasets as a predictor for short-selling. Equinor is the biggest company in Scandinavia in terms of revenue, and typically pays out dividends four times a year (E24, 2018a). It is interesting to look at Equinor as they have, in the past, paid regular and relatively large dividends. Equinor is a state-owned energy company and therefore has the added security of being owned by the state. Even though a significant number of their shares is owned by the Norwegian state (67%), the float represents a relatively large amount. If we were to calculate the free float market capitalization, it would still be among the top 5 stocks in Norway in terms of market capitalization<sup>10</sup> in 2018.

As mentioned earlier in section 2.5, previous papers has covered similar topics where the trading volume has been used as a proxy to identify the effects of tax-motivated trading. For example, an article from DN (2018) calculated the estimated tax loss on Equinor (at the time named Statoil) to be around 80 million NOK for 2018. The authors claim that this amount can be the potential amount that the Norwegian state loses in tax revenue by this type of tax-motivated trading in only one year.

To get a better indication on how the short interest activity behaves in comparison to the trading volume, we have conducted a case study to visually examine similarities and differences for the Equinor in 2018. If the increase in trading volume was a good indicator for tax-motivated trading, we would expect to see some increase in the trading volume around the ex-dividend date. Again, we expect to see this due to the tax-motivated trading where an investor with a large marginal tax on dividends sell their shares to an investor with a lower marginal tax rate on dividends. If we were to observe clear spikes in the trading volume around these dates, this could be a good proxy for tax-motivated trading. In **Figure 2** below, the standardized short ratio and the standardized trading volume is plotted for the year 2018.

---

<sup>10</sup> Float of 1,06 billion shares multiplied with the share price on 31.12.2018 of 183,75 NOK, gives a free float market capitalization of approximately 194 billion.

**Figure 2: Trading volume and short ratio for Equinor**

The dotted vertical lines represent the four dividends that were paid from Equinor during 2018. We see that the trading volume is much more volatile compared to the short percentage. This is probably due to many stock-specific events, but it looks like the short ratio is very limited to the ex-dividend dates in the timeseries. Further, the peaks around ex-dividend date is far more evident for the short data timeseries, making this to appear as a better proxy to analyze and detect the presence of tax-motivated trading. This will be addressed in a more comprehensive matter in the empirical analysis under section 5.

## 4. Methodology

In this section we will elaborate points from the theoretical framework into the methods we want to use in the analysis. First, we present the research questions. Next, we walk the reader through the approach we have used, as well as the various aspects of the econometric framework that is relevant for our analysis. Lastly, we present our hypotheses related to the research questions. With regards to the structure of our analysis, our analysis will be split in two parts defined by the research questions below.

### 4.1 Research questions

For the first research question, we want to see if we can isolate the short-selling effect on the ex-dividend date. The first research question is therefore worded as follows:

- 1) *Does the short data for the Scandinavian countries, from 2013 till today, show any abnormal trading patterns that could indicate tax-motivated trading?*

Next we want to take a deeper look at how dividend yield could be linked to the short ratio. The second research question is therefore as follows:

- 2) *Does the short data indicate that stocks with a higher dividend yield have more tax-motivated trading, than stocks with a lower dividend yield?*

By answering these research questions, we aim to contribute to existing literature on the topic, with emphasis on the Scandinavian countries. We want to shed light on the Scandinavian countries subject to tax fraud, and not only Denmark, which primarily have been the Scandinavian country gaining most attention with regards to tax fraud. This will be done through a tax loss analysis where we study Norway and Sweden in the year 2018.



## 4.2 Research approach

To answer our research questions, we have used a method where we look at the short ratio around the ex-dividend date. This method is based on Blau et. al (2011) where they look at short-selling around dividend announcements and ex-dividend dates. They used a 21-day window around the events. Our method includes standardization of the short ratio, which also is done by Blau et al. and is similar to other research done by Lakonishok and Vermaelen (1986), Koski and Scruggs (1998), and Sias (2004). We will elaborate more on why standardized short ratio is beneficial in section 4.3.1.

Further, we have defined regression models to be used in the analysis. In the following section we present these models as well as important variables that we later make use of. As an attempt to isolate the cum-cum effect, we have conducted an event study that will be described more in detail in the following section, as well as looking at how a stock's dividend yield affects the short ratio. Lastly, we conduct a tax loss analysis for Norway and Sweden using the actual short ratios (not standardized) to calculate tax revenue lost. This will be further addressed in section 4.3.6.

## 4.3 Econometric framework

As mentioned in the former section we have used a methodology similar to Blau et. al (2011) where we look at a window of days around each ex-dividend date. We have chosen a 15 day window before and after the ex-dividend date as our data is more limited than that of Blau et. al (2011). The most important effect that we want to look at is the short-selling pattern around ex-dividend dates. In order to isolate the cum-cum effect in our data, we will conduct an event study on Denmark, where we study the short ratio before and after Denmark resumed reimbursement of dividend tax.

### 4.3.1 Standardized short ratio

To answer both research questions, and to develop relevant regression models, we have used the short ratio as a percentage of free float ( $SR_{i,t}$ ) to define our dependent variable. It is shown below in equation (I).

$$SSR_{i,t} = \frac{SR_{i,t} - \overline{SR}_i}{\sigma(SR_i)} \quad (I)$$

The standardized short ratio ( $SSR_{i,t}$ ) is measured for each stock distribution  $i$  on day  $t$ . The index for days ( $t$ ) covers a time frame of 31 days; the ex-dividend date, as well as 15 days before and after. The average short ratio and the standard deviation ( $\sigma(SR_i)$ ) for each distribution are computed based on the 31-day sample time period for each distribution ( $i$ ).

The standardization method we have used is similar to the research mentioned in section 4.2 and is utilized for an important reason. To aggregate all the stocks within a country, we cannot simply use the average of all short ratios across the different stocks. This is due to the fact that stocks have different variances in short ratio. That means a higher short ratio for distribution  $i$  can be relatively significant for stock  $s$ , while the same short ratio can be insignificant for another stock. This difference in variance can also occur for two different distributions for the same stock.

### 4.3.2 Panel data analysis – Fixed effects and pooled OLS

Based on the nature of the data, there are several approaches that can be used when analyzing panel data. In the following paragraphs we argue why including fixed effects is not necessary for our model and hence a pooled OLS is suitable for the analysis. Next we describe how we make use of cluster-robust standard errors to account for heteroskedasticity across observations in our models.

A potential problem in panel based models is the omitted variable bias. To reduce the problem with omitted variable bias, researchers often include fixed effects. This could be to account for entity, time or both (Peterson, 2009). In panel data analysis the error term ( $\mathcal{E}_{i,t}$ ) is very important, as it determines whether the data contains fixed effects, random effects or both. Omitted variable bias occurs when one or more predictor variables that have an impact on the model are left out, resulting in biased estimators that again can affect the model's outcome.

When including entity fixed effects in the model, it is usually to control for variables that are time invariant, resulting in individual heterogeneity. When standardizing the short ratio this is already adjusted for, as we subtract the mean from all observations. Hence, we also remove time-invariant heterogeneity from the distributions and argue that entity fixed effects are not necessary to include in our model.

Time fixed effects is included to adjust for effects that changes with time but is invariant on entity-level. Since the observations within each dividend distribution are collected around each stocks' respective ex-dividend dates, it will be incorrect to include time fixed effects based on the date of the observations. This is because the dividend date varies among the stocks, and for instance  $t = 10$  could represent different underlying dates for different distributions. Based on the aforementioned discussion, we therefore argue that including time fixed effects are not necessary for our defined models, and hence using a pooled OLS is most appropriate for the analysis.

Even though we use standardized short ratio, it is likely that there is some correlation between grouped observations (e.g. between two different stocks), and hence it can be necessary to look at clustering of standard errors. For our dataset it is therefore a question of what level to cluster on; distribution-level, stock-level or country-level. Not adjusting for correlated residuals could for example distort the inference of the model by underestimating the standard error or yielding too small p-values (Cameron & Miller, 2013). Since clustering at lower aggregate levels proposes the potential issue of underestimated standard errors, we disregard the option to cluster at distribution-level. As we only have three countries in our dataset, which can be considered relatively few, we disregard this option as well. To avoid problems with correlated residuals, we therefore cluster the errors on stock-level in our regressions (Wooldridge, 2016).

### 4.3.3 The abnormal short-selling model

As tax motivated trading typically involves stock lending around ex-dividend dates, we are interested to see if we can observe any significant increase in short-selling volume within a 7-day window around the ex-dividend date. To observe the effect the 7-day window has on short-selling, we created a dummy variable to indicate whether or not the observation is within 3 days before or after ex-dividend date. Our model is defined by equation (II):

$$SSR_{i,t} = \beta_0 + \beta_1 E_{i,t} + \varepsilon_{i,t} \quad (\text{II})$$

The dependent variable  $SSR_{i,t}$  is the standardized short ratio for dividend distribution  $i$  in the 31-day window. In our equation we have one dummy variable ( $E_{i,t}$ ) that capture the effect on the seven days in the 31-day window that we are looking at. The binary indicator ( $E_{i,t}$ ) takes

value 1 when  $t \in [-3, 3]$  and 0 otherwise. The ex-dividend date is represented as  $t = 0$ . This dummy variable therefore observe the standardized short ratio increase for the days around ex-dividend date. The argument for including days prior to the ex-dividend date, is that the beneficial owner of a stock needs to change before ex-dividend date in order to utilize the cum-cum tax scheme as mentioned earlier. We expect this to increase the short-selling before the ex-dividend date.

#### 4.3.4 Event study on Denmark – Extension of the model from 4.3.3

Since we have data before and after the event where the Danish tax authorities stopped and resumed refunds on dividend tax, we want to use this to see if there is any change in the short ratio. We have chosen to use March 2016 as the event date, even though the dividend payments were first put on hold in August 2015. If the documentation requirements were introduced in August 2015, it would have made sense to use this date instead. Because the additional documentation requirements were not introduced before March 2016, we use this date. This means that you would still be able to apply for a refund under the old regulation until March 2016. Rightful refunds for the period between August 2015 and March 2016 were still refunded, but at a later point in time. Because of this, we expect to see the same trading activity between August 2015 to March 2016 as before August 2015. Therefore, we have not used this period as a dummy variable in our event study. Before the documentation requirements came into place in March, the changes were not known and there would be no reason to stop investing in a tax-motivated manner. Another contributing factor for not using this time period as a counterfactual, is that there are very few observations in this small period of time. We include the following extension of our model in equation (III):

$$SSR_{i,t} = \beta_0 + \beta_1 E_{i,t} + \beta_3 P_i E_{i,t} + \varepsilon_{i,t} \quad (\text{III})$$

The variable  $P_i$  is a binary indicator to express whether or not the observation is before or after the event date. This variable takes the value 1 if the observed value is post event date, and 0 if the observed value is before the event date. Hence the binary indicator will contribute to our understanding of the change in short-selling after the event date.  $P_i$  is multiplied with the ex-dividend date dummy, giving us the interaction  $E_{i,t} * P_i$ . This interaction term captures the difference before and after the regulatory change in Denmark, and we run this for all countries together as well as each country separately.

### 4.3.5 Dividend yield model

The intention of this model is to see if the dividend yield is related to changes in the short ratio. By dividing the stocks into different groups based on the dividend yield, this can be used in the regression model to see the difference between the yield groups on short sale. For the dividend yield, we have used the definition by Blume (1980) to calculate the annualized dividend yield. It can be seen in equation (IV) below:

$$D_{s,y} = \frac{DPS_{s,y}}{Share\ prices_{s,y}} \quad (IV)$$

The dividend yield is the dividend per share for each stock  $s$  paid in year  $y$  ( $DPS_{s,y}$ ) divided by the closing price on the last trading day in year  $y$ . We have chosen to use the five-year average dividend yield to make use of all observations in the dataset. This is simply an arithmetic average of the annualized dividend yield, as shown in equation (IV), for the five last years. In our case, that would imply using the average dividend yield in the years 2013 to 2018. Many companies have variable dividend payments over time, but many large stocks typically pay relatively the same amount each year. We do recognize that using the five-year average dividend yield can potentially create some bias in our estimates as many things can influence the dividend yield in the short run. If a stock has a significant drop in the share price in one year, this will increase the dividend yield, all other things constant. Additionally, using the last trading day in each year to calculate the dividend yield can create bias if there is an event that only affects a certain stock or sector. However, there are mechanisms in the stock market that will stabilize the dividend yield in the long run. If a company grows their revenue, they will in many cases increase their dividend. In this case, one would also expect their share price to increase due to positive growth which in turn will keep the dividend yield more constant.

To look at the dividend yield and its influence on short-selling we have chosen to divide the companies into three different groups. All companies with a higher dividend yield than 4 percent are in the *high* dividend yield group, companies with dividend yield between 2-4 percent are in the *medium* group and companies below 2 percent are in the *low* group. The number of stocks in each category can be found in **Table 4**. To answer if there are any differences between the groups, we run the following model as presented in equation (V):

$$SSR_{i,t} = \beta_0 + \beta_1 E_{i,t} + \beta_2 D_{i,j} E_{i,t} + \varepsilon_{i,t} \quad (\text{V})$$

The dependent variable is our standardized short ratio which is the percentage change in short-selling volume for each day within the 31-day time window. We have included the interaction term  $D_{i,j} * E_{i,t}$  to capture the effect the dividend yield has on the short ratio. The variable will capture the different groups of dividend yield and their impact on short-selling around the ex-dividend date, where  $j=1$  is the dummy indicator for stocks with a low dividend yield and  $j=3$  is the dummy indicator for stocks with a high dividend yield.

### 4.3.6 Tax loss model

In the final part of the analysis, we will look at the potential tax revenue loss for Norway and Sweden due to short-selling around ex-dividend dates. The intention is to get a rough estimate on the potential tax revenue lost due to tax-motivated trading. The tax-loss for Denmark is not calculated as we expect the regulatory changes in 2016 to have reduced the tax-motivated trading and therefore we want to focus on Norway and Sweden. In addition, estimates for cum-cum and cum-ex in Denmark has been calculated by other sources mentioned in the introduction of this thesis. We have used the year of 2018 to calculate the tax revenue loss for both countries. The method used is straightforward and has been illustrated for Equinor on “dark pools” in DN (2018) and in ProPublica (2016) on German companies in the DAX 30.

Both articles use average trading or short-selling volumes prior to the ex-dividend date and subtracts this volume from the volume on ex-dividend date. The excess volume is multiplied by the dividend paid, and then reduced to 15 percent of the amount. The 15 percent is the tax-rate that would normally be taxed if investors do not find ways to save tax using trading schemes, such as cum-cum trading. The formula used is shown in equation (VI) below:

$$TaxLoss_{s,2018} = Div_{s,2018} * ESR_{s,2018} * 15\% \quad (\text{VI})$$

The variable  $Div_{s,2018}$  represents the dividend payment for each stock in 2018. Variable  $ESR_{s,2018}$  represents the excess number of shares that are short-sold on the ex-dividend date for each stock. The excess number of shares that are short-sold is calculated by taking the short ratio percentage as float on the ex-dividend date, subtracted by the average short ratio

percentage float for each stock  $s$  for the year of 2018 and multiplied by the share free float to get the excess number of shares that are short-sold on the ex-dividend date. Lastly, this amount is multiplied with 15 percent to obtain the saved tax.

As different investors have different marginal tax rates, we will illustrate the loss of tax revenue for different marginal tax rates; 5 percent, 10 percent and 15 percent. Tax agreements that the Scandinavian countries have with foreign states typically reduce the withholding tax to 15 percent and not the general withholding tax rate (some countries have other percentages as well). This means that different investors can potentially exploit these differences through different tax schemes. We have therefore chosen to look at the tax revenue lost if all investors on average reduce their withholding tax by 5, 10 and 15 percent.

## 4.4 Hypotheses

Before we present our analysis, we formulate two hypotheses related to our research questions. For our first research question we have used a regression model to indicate whether the short ratio increases around ex-dividend date. Our first hypothesis is therefore as following:

**H1:** *The short ratio should increase significantly within the 7-day window [-3,3] around the ex-dividend date*

As mentioned earlier, it can be several reasons for tax-motivated trading, in which cum-cum could be a part of it. It could also be generated by other events such as dividend capture trading, as described by Lakonishok and Vermaelen (1986). Therefore, we include the event study on Denmark, and see if that can be used to better isolate the cum-cum effect.

For our second research question we have used a regression model to indicate whether short-selling percentage is higher for stock distributions with higher dividend yields. We have formulated the second hypothesis as follows:

**H2:** *The short ratio is higher for stocks with higher dividend yields and short selling increases with the dividend yield*

Again, the increased short-selling can also be due to dividend capture trading, and we will address this in a more extensive matter in our analysis.

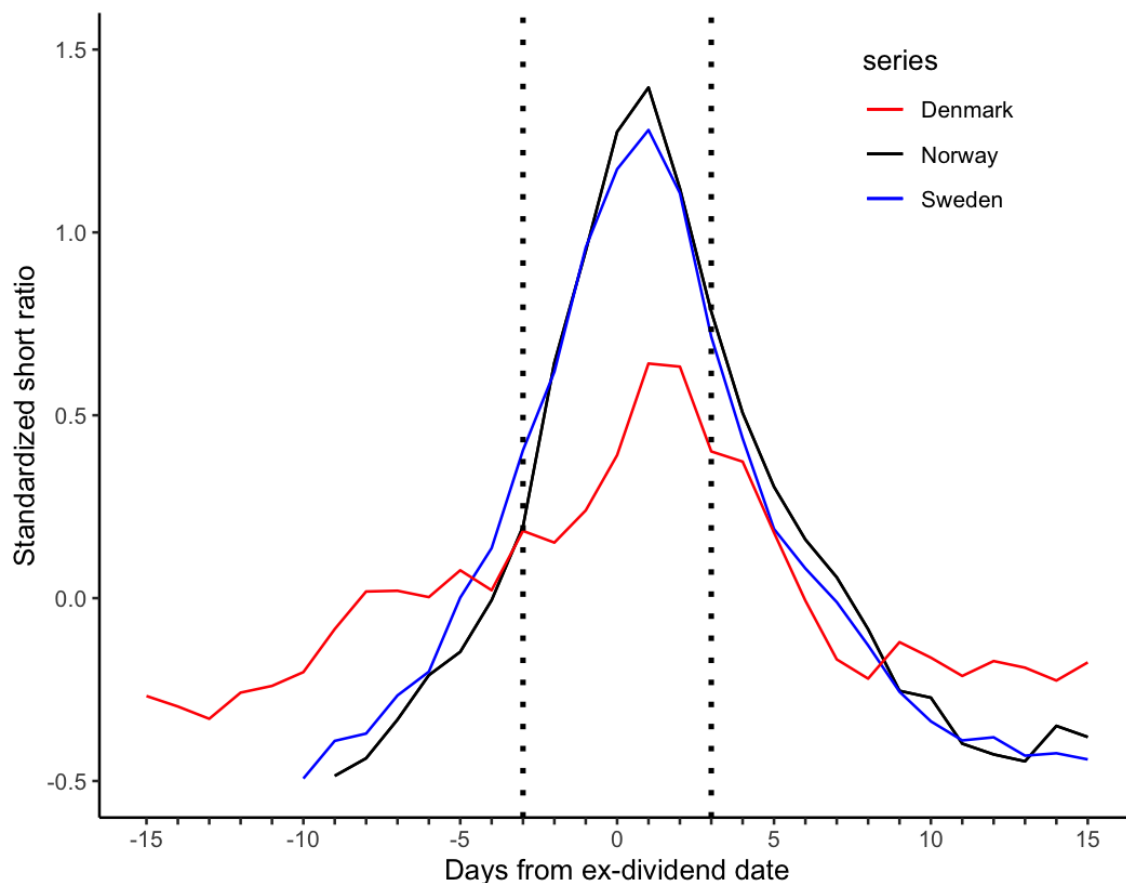


## 5. Empirical analysis

In this part we present the findings from the models described above. As a brief introduction to the analysis, we visualize the differences in trading activity on a country basis. **Figure 3** illustrates the increased short sale around ex-dividend date and is based on the time period after Denmark introduced new documentation requirements for refunds on withholding tax in March 2016 (post event date).

### 5.1 Graphical evidence – Using short data as a proxy

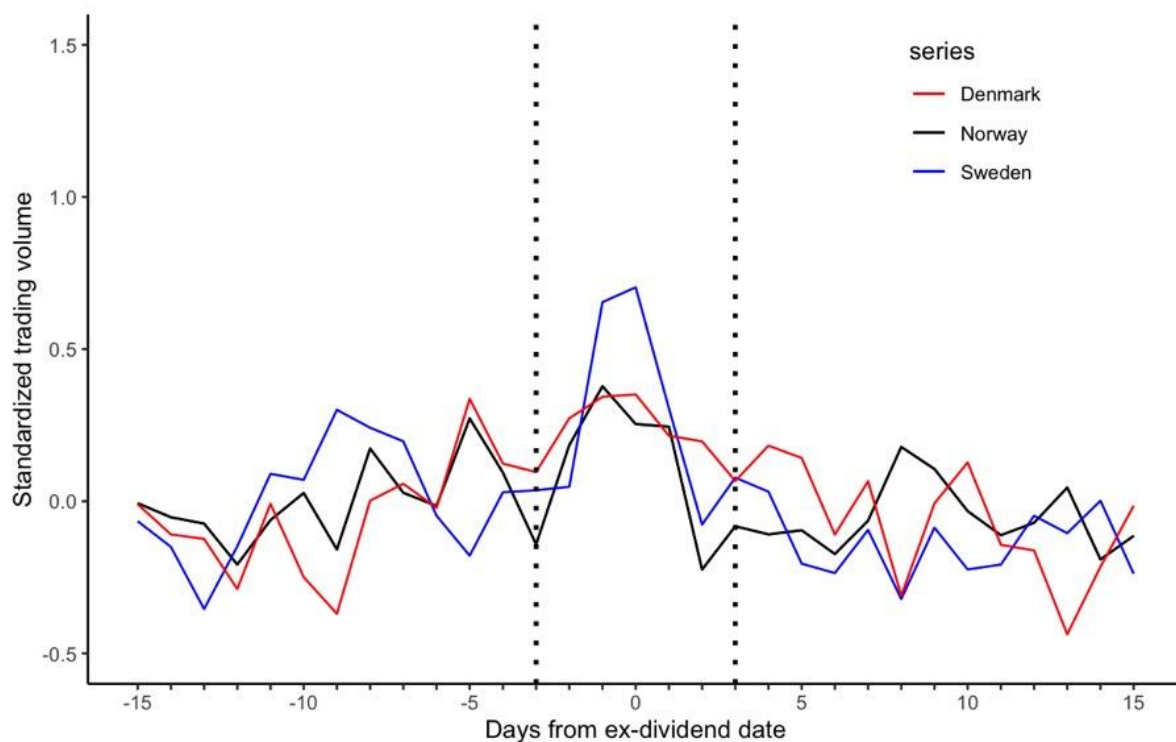
**Figure 3: Standardized short ratio for the Scandinavian countries from 2016-2019**



The stapled lines in **Figure 3** show the dividend window that we have used in further analysis and symbolizes the 3-day window around the dividend date. We note that all the three

countries have a notable increase in the standardized short ratio around ex-dividend date. A remark is that Denmark appears to have the lowest increase, which is interesting considering that Denmark was exposed to a large amount of cum-ex fraud compared to the other Scandinavian countries. In the period of study, Denmark implemented regulatory changes to reduce tax-motivated trading, such as regulations on beneficial ownership that was introduced in 2016. In the same time period Norway and Sweden have not changed their regulation on withholding tax<sup>11</sup>. Knowing that Denmark is the only country that has done changes to their regulations, it is interesting to note that the increased short-sale in Norway and Sweden is twice that of Denmark, respectively.

**Figure 4: Standardized trading volume for the Scandinavian countries from 2016-2019**



In **Figure 4** we have provided a similar illustration using standardized trading volume instead of short data. We obtain the standardized trading volume by following the same method as for the short data. We note that the abnormal trading pattern is a lot less evident in **Figure 4** and that the trading volume data is much more volatile compared to the short data. It is possible to

<sup>11</sup> Norway has introduced documentation requirements for reduced withholding tax on 01.01.2019 (Skatteetaten, n.d.b). Since we do not have data for all of 2019, we have not gone in depth to analyze the effect of these documentation requirements, however, it could be interesting to look at for future research on the topic.

see from both plots that there is increased trading activity around ex-dividend date, however, the pattern is more visible in the short data. Another interesting trend we find in both plots, is the fact that Sweden has one of the higher peaks in both, while Denmark's increased trading activity is a lot less evident. It is, however, difficult to say what the exact reason for this is, and how much that is related to tax-motivated trading. Lastly, the reader should notice that the magnitude of the "spikes" is different in the two plots with larger increased activity in the short-selling data.

## 5.2 Short volume around ex-dividend date before and after event date

For the first research question we wanted to see if there were significant increase in the short ratio around ex-dividend date for the Scandinavian countries. The following regression aims to answer two questions: first, whether or not the short data shows increased trading activity around ex-dividend date, and next, if the implemented regulation in Denmark has had any effect on the short ratio. The regression analysis in **Table 5** makes use of the two dummies  $E_{i,t}$  and  $P_i$  which are described in the methodology section earlier and the notes below **Table 5**.

**Table 5: Abnormal short-selling around ex-dividend date [-3, 3]**

	All (1)	Norway (2)	Sweden (3)	Denmark (4)
$E_{i,t}$	1.322*** (0.028)	1.166*** (0.046)	1.314*** (0.042)	1.641*** (0.067)
$P_i * E_{i,t}$	-0.192*** (0.036)	0.024 (0.058)	0.071 (0.052)	-1.153*** (0.083)
Estimation method	OLS	OLS	OLS	OLS
Observations	14,063	5,445	5,828	2,790
Distributions	453	175	188	90
Adjusted R <sup>2</sup>	0.261	0.252	0.334	0.200

Notes: The dependent variable is the standardized short ratio on day  $t$  around dividend distribution  $i$ . Where  $t$  is limited to the 31-day period around the ex-date ( $t \in [-15;15]$ ). For regression (2), (3) and (4) a subset of the dataset is used.  $E_{i,t}$  is a binary indicator that is equal to one if the observation is within the cum-cum window, that is, if  $t = [-3, 3]$ .  $P_i$  is a binary indicator that is equal to zero for distributions observed before the tax regulation (March 2016), and one if the observed distribution is after that date. Cluster-robust standard errors are presented in the parentheses, and (\*\*\*) (\*\*), (\*) denote significance at 1%, 5% and 10%, respectively. All standard errors are clustered at stock-level to account for heteroskedasticity across observations.

**Table 5** shows that the variable  $E_{i,t}$  is positive and significant at the 1 percent level suggesting that the average short ratio around ex-dividend date is considerably higher than the rest of the 31-day period in all countries altogether, as well as for each country respectively. This confirms our suspicion that there has been increased short-selling around ex-dividend dates for the stocks in our model. The largest constant can be found in Denmark while the lowest constant is in Norway. This is an interesting finding due to the fact that we know that there has been extensive tax-motivated trading and tax fraud in Denmark. Although the variable is significant, the model only has an adjusted R<sup>2</sup> between 20 and 33 percent<sup>2</sup>. This gives us an indication that there are other factors that can influence the short percentage.

The variable  $P_i$  that indicate whether or not we are before or after the event date, is multiplied with the ex-dividend date dummy, giving us the interaction term  $E_{i,t} * P_i$ . This interaction term captures the difference before and after the regulatory change in Denmark, and we run this for all countries together as well as each country separately. Although Norway and Sweden have not made any changes to their regulations in the time period, there could have been other

---

factors that influenced the short-selling for all the countries combined. One explanation could be that short-selling in all the Scandinavian countries decreased after cum-ex and cum-cum trading was exposed in Denmark. **Table 5** further shows that interaction term  $E_{i,t} * P_i$  is negative and significant at the 1 percent level in the regression with all the countries and for the regression with Denmark. We cannot find that the interaction term  $E_{i,t} * P_i$  for Norway and Sweden is significant, but we can see that the constant is positive. This is another interesting finding. We can see that short-selling in the post-period in Denmark seems to have been reduced drastically as the interaction term is negative and significant, while short-selling in Norway and Sweden has not changed significantly. This is in line with our expectations that the regulatory changes in Denmark has affected the short-selling volumes.

As written in the article by Lakonishok and Vermaelen (1986), the increased short-selling before ex-dividend date could be due to short-sellers positioning for dividend capture traders that drive prices above their fundamental value. However, it is strange that the short interest should increase by a large amount *before* the ex-dividend date, if the argument is that prices go up as investors want to capture the dividend. If that was the main motivation, it would be reasonable to think that short sale would only increase just prior to the ex-dividend date, which our graphs prove not to be the case. On the other hand, if investors are trying to position themselves with large short positions before ex-dividend date, they might have to do this earlier to obtain the short-position at a reasonable price. This is, however, only speculation, but if the motive is to benefit from negative stock price returns after the ex-dividend date, the investor should not short a stock long prior to the ex-dividend date for optimal returns (as stock prices increase due to excess demand by dividend capture traders). This creates room to believe that there are other factors that are driving the short ratio up before the ex-dividend date, such as tax-motivated trading.

The ideal scenario for an investor that is short-selling a stock based on other investors that are dividend capture trading, would be to short the stock right before the ex-dividend date. If enough investors do the same, the price for shorting will be higher and it would therefore be logical to think that investors might try to position themselves into the short trade earlier and earlier. An equilibrium will be formed where the cost of shorting will equal the gain from shorting, assuming that stock has the same price formations before ex-dividend dates. As this assumption is not true, the days that investors have to start selling stocks short will fluctuate from distribution to distribution and from stock to stock.

### 5.3 Dividend yield model

As we have indications from the abnormal short-selling model that there are other factors influencing the short ratio, we wanted to check if dividend yield influences the short-selling. As mentioned earlier, our hypothesis is that a higher dividend yield will result in higher short-selling around the ex-dividend date. This is because a higher dividend yield gives a higher benefit relative to the transaction costs. We assume here that transaction costs do not increase with dividend yield.

To make use of most of the data, and due to the fact that Denmark has made changes to refunds of withholding tax, we have performed two regressions; one with all three countries and one without Denmark. The output from the regressions for the dividend yield model are shown below in **Table 6**. The regressions are based on short data from 2013 to 2019.

**Table 6: Short-selling significance in different yield groups (2013-2019)**

	All (5)	Without Denmark (6)
$D_{i,1} * E_{i,t}$ (Low yield)	1.064 <sup>***</sup> (0.145)	1.180 <sup>***</sup> (0.247)
$D_{i,2} * E_{i,t}$ (Medium yield)	1.092 <sup>***</sup> (0.066)	1.173 <sup>***</sup> (0.072)
$D_{i,3} * E_{i,t}$ (High yield)	1.392 <sup>***</sup> (0.066)	1.400 <sup>***</sup> (0.067)
Estimation method	OLS	OLS
Observations	14,063	11,273
Distributions	453	363
Adjusted R <sup>2</sup>	0.263	0.295

Notes: The dependent variable is the standardized short ratio on day  $t$  around dividend distribution  $i$ . Where  $t$  is limited to the 31-day period around the ex-date ( $t \in [-15;15]$ ).  $E_{i,t}$  is a binary indicator that is equal to one if the observation is within the cum-cum window, that is, if  $t = [-3, 3]$ .  $D_{i,j}$  is a variable that indicates what yield group a stock is in where  $j = [1, 3]$ . Cluster-robust standard errors are presented in the parentheses, and (\*\*\*) (\*\*\*) and (\*), denote significance at 1%, 5% and 10%, respectively. All standard errors are clustered at stock-level to account for heteroskedasticity across observations.

---

In **Table 6**, the variable  $D_{i,j}$  represents the different dividend yield groups. The index  $j$  can take the values [1, 3], each representing a specific yield group<sup>12</sup>. We observe from the regression that both high yield and the interaction between high yield and the trading window is highly significant. We can see that the same applies to the low yield and medium yield interaction term, they are all significant at the 1 percent level. If we look at the constants of the different interaction terms in the regression with all countries, we can see that the difference between low and medium is much smaller than the difference between medium and high yield. We do observe that the constant increases with yield in the regression with all countries.

For the regression where Denmark is excluded the short-selling around the ex-dividend is significant at the 1 percent level for all yield groups. An interesting notion is that the constant for low yield is 0,007 higher than the medium yield, signaling that the difference in short-selling is smaller in the low and medium dividend yield categories. We note that the highest constant is found in the high dividend yield category. This is true for both regressions.

The results can be said to be mixed. The short ratio increases for all yield categories around the dividend date, which in turn can be said to be as expected. On the other hand, we cannot observe a clear increase in short-selling with dividend yield. The difference between the low and medium yield category is relatively modest and in the regression without Denmark, the low yield category is higher than the medium yield group, contrary to our belief. Finally, we can see that the constant for high yield is the highest among the yield categories in both regressions. This can be said to be as expected since the literature on dividend capture trading explains that there is more reason to do this type of trade when transaction cost relative to dividend amount is as low as possible. In a cum-cum trade scheme the bank that helps facilitate the short-selling scheme will charge a security lending fee for the transaction. If this security lending fee is constant, it will be more profitable to utilize cum-cum trading schemes when dividend yield and the saved tax is high.

---

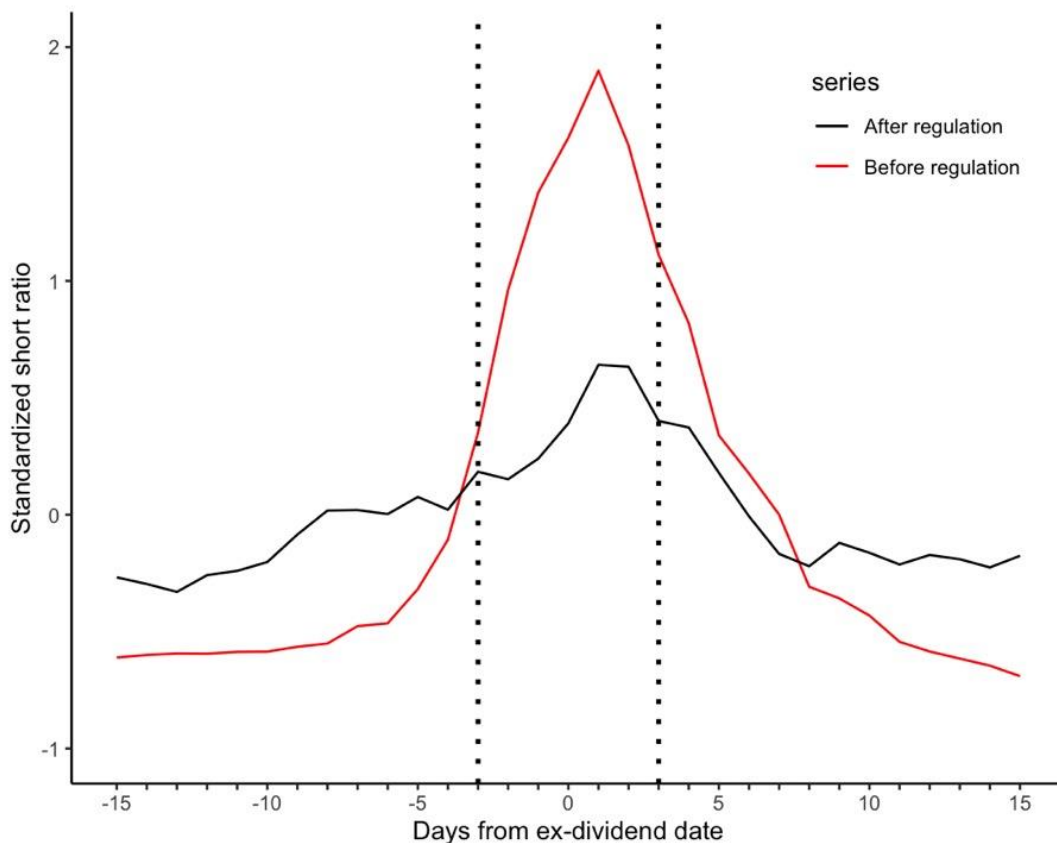
<sup>12</sup> The index  $j$  for the yield group variable  $D_{i,j}$  can take the three values 1, 2 or 3, each number representing the categories low, medium and high, respectively.

## 5.4 Country-specific analysis and tax loss estimation

### 5.4.1 Short-selling in Denmark

As **Table 5** showed that the short-selling volume was significantly lower in the post-period (after 2016), we have showcased Denmark in more detail. As explained in section 4.3.4, Denmark put all payments of refunding of withholding tax from August 2015 to March 2016 on hold, in which they later returned to paying refunds. Since additional requirements for refunds were not introduced before March 2016, this is our event date. Refunds between August 2015 and March 2016 were processed at a later stage, after first being put on hold. In **Figure 5** we can see the changes in short-selling around the ex-dividend date before and after March 2016. From 2013-2016 the short-selling on the ex-dividend date was close to 2 percent on average and from 2016-2019 the same number is closer to 0,6 percent.

**Figure 5: Short-selling in Denmark before and after regulation (March 2016)**





As Denmark has different laws on dividend withholding tax than other Scandinavian countries, we cannot compare them directly but we know that the cum-ex scheme was utilized in Denmark together with cum-cum similar schemes with foreign funds, by transferring the shares before the ex-dividend date to save tax (DR, 2018b).

Even though we cannot with certainty say that the reduction in the short ratio is solely due to tax-motivated trading, multiple indications point in that direction. An interview conducted with the Danish researcher at Copenhagen Business School, Emma Blicher gave us insight into how the Danish tax authority work and could tell us that they had little to no extra capacity to process requests for tax refund where the beneficial owner needed to be identified. An article by the New York Times (2018) notes the same information, that the tiny department at the Danish tax office responsible for refunding withholding tax, was run by one man that approved thousands of applications without having the tools to check if the refunds were correct. After 2016, more attention has been given to the tax authorities and it is apparent to believe that this has reduced the tax-motivated trading.

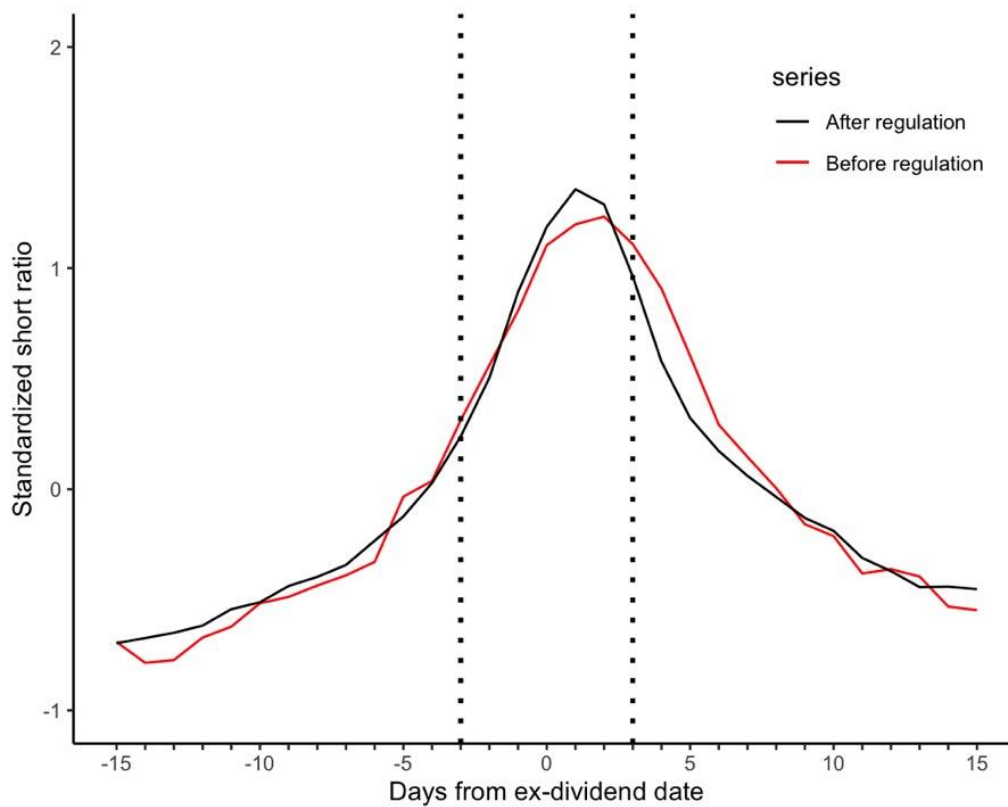
There could also be other reasons for the decrease in the short ratio. Stricter documentation requirements for short-selling (specifically refund of withholding tax) could have made it less attractive for foreign investors to invest in Danish stocks. Lawful investors could have decreased their trading activities in Denmark when refunds were halted and stayed out of the markets. This could have created less liquidity in the markets and created less room for short-selling. A plausible explanation of the sharp drop in the short ratio could also be a combination of the explanations. That some of the fall is due to tax-motivated trading and that the rest of the decrease can be attributed Denmark as a less attractive country to invest for foreign investors.

#### **5.4.2 Short-selling in Norway and Sweden**

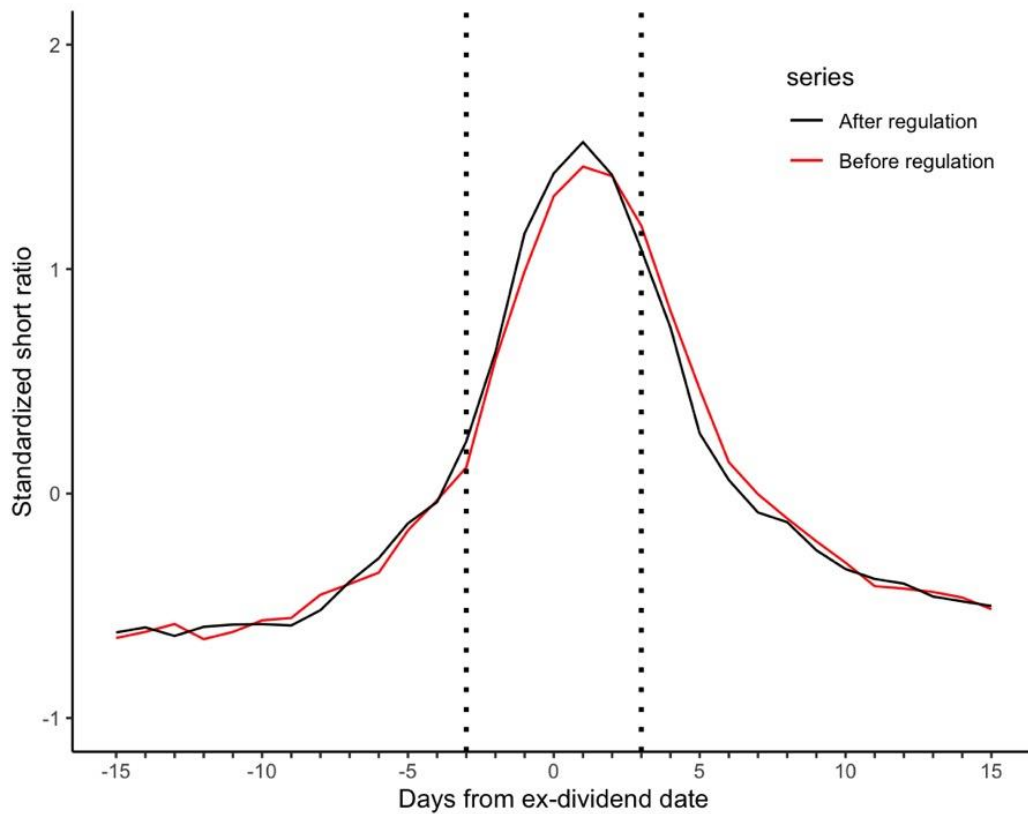
Similar to **Figure 5**, the short-selling plots for Norway and Sweden can be found in **Figure 6** and **Figure 7**. The plots contain the average short ratio around the ex-dividend date for said countries. These countries have not implemented similar tax regulation as Denmark during the period of study, however, the plots are included for comparison reasons. Even though we did not expect to see changes in short-selling in Norway and Sweden due to the regulatory changes in Denmark, there could have been other factors that have influenced the short-selling in the same time period. One explanation could be that tax-motivated trading in the Scandinavian

countries all went down due to the publicity and attention that the reveal of the cum-cum and cum-ex schemes. From plotting Norway and Sweden on the same time period, we can rule out this explanation.

**Figure 6: Short-selling in Norway before and after regulation**



**Figure 7: Short-selling in Sweden before and after regulation**



We can see a clear spike in the short ratio around dividend date for Norway and Sweden as mentioned in the graphical evidence in section 5.1. As expected, neither Norway nor Sweden have had any drastic changes in the short ratio after the event date. This supports our findings presented in **Table 5**, where Denmark was the only country having a strong significant decrease. Even though both Norway and Sweden show a slight increase in short-selling post event date, we cannot say that increase is significant based on the regression results presented in **Table 5**. By the plots of Norway and Sweden it is apparent to believe that there is tax-motivated trading around the ex-dividend date and that these patterns are still fruitful after 2016.

### 5.4.3 Tax loss estimation

In the following paragraphs we present the estimation of the tax loss for Norway and Sweden in 2018. The estimation of the revenue tax loss cannot be regarded as any conclusive number due to the disguised nature of tax-motivated trading but a best estimate is calculating using the method shown in section 4.3.6. The tax revenue loss for Norway and Sweden with 3 different tax rates is shown in **Table 7**.

**Table 7: Tax revenue lost with different marginal tax rates**

Marginal tax rate (%)	5	10	15
Loss Norway (NOK)	225 295 549	450 591 097	675 886 646
Loss Sweden (SEK)	251 430 101	502 860 203	754 290 304

Notes: The marginal tax rate represents different marginal tax rates saved by investors

If all the excess short selling on the ex-dividend date is cum-cum transactions where the investor manages to reduce their tax rate from 15 percent to a tax-free dividend, the tax loss revenue that is lost for Norway would be above NOK 675 million. For the four largest stocks in terms of market capitalization, the amount is almost 478 million NOK in lost tax revenue if all the short-selling is cum-cum transaction where the investor gets their dividends tax-free (and their original marginal tax rate was 15 percent). The full tax revenue lost for each stock can be found in Appendix **8.2**.

For Sweden, the numbers are similar. The annual tax revenue lost if all investors reduce their withholding tax from 15 percent to zero is above SEK 754 million. The four largest stocks account for about SEK 150 million. The numbers are shown in **Table 7** and the full tax revenue lost is in Appendix **8.3**.

As this is a very simplified way of calculating the tax revenue loss by short-selling we need to repeat that a part of the short-selling around ex-dividend dates will probably be due to dividend capture trading or other factors that we have not calculated for in the tax loss analysis. As we saw in section 5.1, Denmark had an average standardized short ratio increase from 2016-2019 on the ex-dividend date of about 0,6 percent. The equivalent number for Norway and Sweden is 1,3 percent and 1,6 percent, respectively. The short-selling increase around ex-dividend date is therefore more than twice the magnitude for Norway and Sweden compared to Denmark. If we were to assume that cum-cum transactions in Denmark have halted and that dividend

capture trading and other factors are equal in all three countries, the short-selling above Denmark's 0,6 percent in Norway and Sweden could be cum-cum transactions. The estimated tax revenue loss would in that case be a bit smaller than our estimation but could potentially be in the hundreds of millions in terms of revenue lost (in NOK/SEK). The closest we can come to confirming to what degree tax-motivated trading happens is by evaluating different sources in addition to our data material. A former leader in SEB describes in an interview that cum-cum trades is the "international standard" and that SEB bank helped their clients with saving tax by transferring their shares from abroad to their bank (SVT, 2018). He further explains that cum-cum transactions in Germany was halted after 2015, but that these types of transactions are happening in many countries up to this date. This way of operating is similar to the approach that we explained earlier in section 2.2.1.

Our dataset does not contain all stocks in Scandinavian countries and only looks at the short-selling that is attributed to the stocks in our dataset, making the potential estimate larger. In addition to this, other forms of tax-motivated trading that does not involve short-selling, can be utilized to change the beneficial ownership status before the ex-dividend date. This can be through TRS-agreements mentioned earlier.

A final remark in this chapter would be to remind the reader about the problem of beneficial ownership that is a benefactor to this problem. If the status of the beneficial owner of shares in lending and TRS agreements were to be fully known, regulators could be more efficient in stopping cum-cum and other purely tax-motivated trades. We have seen more attention being brought to make markets more transparent and stakeholders advocating for the same thing. One example is that the state pension fund of Japan announced that they would stop lending out their shares (Financial Times, 2019). One of their main arguments was that there is lack of transparency, they do not know who the real borrower is and for what purpose borrowers engage in these types of trades.

One of the challenges that arise to regulators is keeping their country attractive to investors, but at the same time, optimizing the tax revenue from investing activities. Investors that want to remain unknown for whatever reason, can change their investments to a different country (with different regulations) if regulators create an unattractive investment opportunity in their home country. It is therefore reason to believe that the changes in regulations that is needed to stop cum-cum schemes should happen through international cooperation between legislations.

## 5.5 Limitations

As mentioned continuously throughout the thesis, the biggest limitation to the analysis is the level of accuracy when isolating the cum-cum effect. There are several other venues in which cum-cum transaction can take place which we have not covered in the thesis. Many of these are less transparent and make it difficult to obtain a precise estimate on the amount of the total short percentage that actually is due to cum-cum. Throughout the thesis we have mentioned some of them, which are: private repurchase agreements and TRS agreements. It should be noted that despite being a weakness in terms of obtaining a precise estimate, it strengthens our analysis in the sense that our results could be deemed modest.

When calculating the five-year average dividend yield, we argue that using the five-year average dividend yield is suitable based on the stocks we have in our dataset. However, it is still possible that the variable contains some bias as it is possible that the dividend yield changes from one year to another. Another weakness of our analysis is the fact that we have some imbalanced data. For example, do we have relatively few observations for Denmark compared to the other countries, at the same time as Denmark could be seen as the most crucial part of our analysis. The same imbalance applies for the number of distributions before and after the event date, where we have considerably less distributions before the event date.

---

## 6. Conclusion and recommendations

The main goal of the thesis was to identify whether tax-motivated is prominent in the Scandinavian countries. We therefore defined regression models to analyze our research questions and hypothesis. Earlier in the thesis we formulated the two following hypotheses:

**H1:** *The short ratio should increase significantly within the 7-day window [-3,3] around the ex-dividend date*

**H2:** *The short ratio is higher for stocks with higher dividend yields and short selling increases with the dividend yield*

For the first hypothesis, we have proven that there is a significant increase in the short sale around ex-dividend date, but we cannot with certainty say that this is solely due to cum-cum trading. When visualizing the Scandinavian countries, Denmark seems to have a less prominent peak around ex-dividend date, which fits well with the assumption that the new tax legislation introduced made this kind of trading activity harder after the event date (March 2016).

For the second hypothesis, we showed that stocks within the highest dividend yield group seems to have the highest increase in short-selling among the three groups. This is interesting findings suggesting that an increase in the tax-motivated trading around ex-dividend date is largest for stocks within the highest dividend yield group. However, we cannot conclude that dividend yield increases with short-selling, only that short-selling is highest for the high dividend yield group. It should, however, be stated that this does not be solely due to cum-cum/cum-ex trading but could also be due to other kinds of trading strategies such as dividend capturing.

Lastly, we conducted a tax-loss analysis to provide an estimate on how much money that has been lost due to tax-motivated trading in the Scandinavian countries. Here we estimate a potential tax loss of up to 675 million NOK for Norway and 754 million SEK for the year of 2018.

Even though cum-cum trading is not directly illegal, it is definitely a loophole that circumvent the intention of the dividend tax legislations. It is therefore reasonable to believe that every country wants to reduce the amount of tax lost to these kinds of financial activities and make

legislations accordingly. We have already seen that Denmark has taken preventive actions, which according to our event study seemed to reduce the tax-motivated trading significantly.

Legislators in other countries should make notice of the tax-motivated trading schemes that have been discovered in European countries such as Germany and Denmark. The major issue, as we see it, is the ability for investors to hide under nominee accounts and other forms that disguise their identify. This makes it hard for tax authorities to identify who the real owners of a stock are and what their tax duty is. If transnational cooperation can seek to make these types of transactions more transparent, it would be easier for tax authorities to create fair and precise legislation to combat tax fraud and tax avoidance such as cum-cum and cum-ex transactions.



## 7. Bibliography

- Blau, B., Fuller, K & Ness, R. (2011, June). *Short selling around dividend announcements and ex-dividend days*. *Journal of Financial Economics*, Vol. 17, issue 3, 628-639.
- Blume, Marshall E. (1980). Stock Returns and Dividend Yields: Some More Evidence. *The Review of Economics and Statistics*. MIT Press, vol. 62(4), pages 567-577.
- Buettner, T., Holzmann, C., Kreidl, F. & Scholz, H. (2018, October). Withholding-tax Non-compliance: The Case of Cum-Ex Stock-market Transactions.
- Cameron, C. & Miller, L. (2013, October). A Practitioner's Guide to Cluster-Robust Inference. *Journal of Human Resources*, 50(2). University of California.
- Clogg, C., Petkova, E. & Haritou, A. (1995, March). Statistical Methods for Comparing Regression Coefficients Between Models. *American Journal of Sociology*, Vol. 100, No. 5, pp. 1261-1293. The University of Chicago Press.
- CumEx files. (2018, 11). *How Europe's taxpayers have been swindled of €55 billion*. Retrieved from CumEx files: <https://cumex-files.com/en/>
- DN. (2018, 01 10). *Norge mister milliarder i utbytteskatt*. Retrieved from: <https://www.dn.no/innlegg/finans/aksjer/skatt/norge-mister-milliarder-i-utbytteskatt/2-1-246740>
- DN. (2019, 11 22). *Utenlandske investorer eier verdier til over 1000 milliarder kroner på børsen. Nytt lovforslag vil kreve at alle får vite hvem de er*. Retrieved from: [https://www.dn.no/market/finans/oslo-bors/narings-og-fiskeridepartementet/utenlandske-investorer-eier-verdier-til-over-1000-milliarder-kroner-pa-borsen-nytt-lovforslag-vil-kreve-at-alle-far-vite-hvem-de-er/2-1-711278?fbclid=IwAR34IcK7-nijiszdC6Tc\\_Mdle3Ur9](https://www.dn.no/market/finans/oslo-bors/narings-og-fiskeridepartementet/utenlandske-investorer-eier-verdier-til-over-1000-milliarder-kroner-pa-borsen-nytt-lovforslag-vil-kreve-at-alle-far-vite-hvem-de-er/2-1-711278?fbclid=IwAR34IcK7-nijiszdC6Tc_Mdle3Ur9)
- DR. (2018a, 10 22). *Dansk tip stoppede snyd med udbytteskat i Norge*. Retrieved from: <https://www.dr.dk/nyheder/penge/dansk-tip-stoppede-snyd-med-udbytteskat-i-norge?fbclid=IwAR0QS5tR7tsRNdO6PFWZV0dowTakyysWMLkYa7ynHBSEmNoo3jYOpYHT98>
- DR. (2018b, 10 18). *Forstå begreberne: Udbytteskat for begyndere*. Retrieved from: <https://www.dr.dk/nyheder/penge/forstaa-begreberne-udbytteskat-begyndere>

- E24. (2018a, 05 20). *Equinor er Nordens største selskap målt i omsetning*. Retrieved from: <https://e24.no/boers-og-finans/i/ngoK95/equinor-er-nordens-stoerste-selskap-maalt-i-omsetning>
- E24. (2019b, 12 11). *Gigantfond gjør helomvending: Dropper omdiskuterte aksjeutlån – men Oljefondet fortsetter*. Retrieved from: <https://e24.no/boers-og-finans/i/P9Llbz/gigantfond-gjoer-helomvending-dropper-omdiskuterte-aksjeutlaan-men-oljefondet-fortsetter?fbclid=IwAR3W2mNt75Fuqz7zyk-xhHia-bobH6b2jHCLu5Ux9Vjd29gGQo02Gxs6DsI>
- EY. (2016, 03 01). *German Government introduces bill to end “dividend stripping” transactions*. Retrieved from: <https://www.ey.com/gl/en/services/tax/international-tax/alert--german-government-introduces-bill-to-end--dividend-stripping--transactions>
- European Parliament. (2018, 11 26). *European Parliament*. Retrieved from: <http://www.europarl.europa.eu/cmsdata/158435/2018-11-26%20-%20Information%20paper%20on%20Cum-ex%20-%20Cum-cum.pdf>
- Financial Times. (2019, 12 12). *Short sellers under fire from investment boss of world’s largest pension fund*. Retrieved from: <https://www.ft.com/content/9b228d14-1c34-11ea-97df-cc63de1d73f4>
- Garsjø, M. & Seglem, P. H. (2016). *Skjult eierskap på Oslo Børs: En analyse av omfanget av anonyme investorer* (Master thesis). Norwegian School of Economics.
- Kleven, H. (2014). How Can Scandinavians Tax So Much? *Journal of Economic Perspectives, Volume 28, Number 4*, 77-98.
- Lakonishok, J., & Vermaelen, T. (1986). Tax-induced trading around ex-dividend days. *Journal of Financial Economics*, Vol. 16, issue 3, 287-319.
- New York Times. (2018, 10 05). *Where in the World Is Denmark’s \$2 Billion?* Retrieved from: <https://www.nytimes.com/2018/10/05/business/denmark-skat-tax-scandal.html>
- Peterson, M. A. (2009). Estimating Standard Errors in Finance Panel Data Sets: Comparing Approaches. *The Review of Financial Studies*, Vol. 22, No1 Jan., 2009. DOI: 10.3386/w11280

- ProPublica. (2016, 03 05). *Tax Avoidance Has a Heartbeat*. Retrieved from:  
[https://projects.propublica.org/graphics/dividend?fbclid=IwAR02AAgzDVqy5QDtmqRObdoyhInMblqSTSlsDDBcrjoc4ys\\_zDq\\_ZFLVuEA](https://projects.propublica.org/graphics/dividend?fbclid=IwAR02AAgzDVqy5QDtmqRObdoyhInMblqSTSlsDDBcrjoc4ys_zDq_ZFLVuEA)
- PWC. (2019, 08 12). *Corporate - Income determination*. Retrieved from:  
<http://taxsummaries.pwc.com/ID/Sweden-Corporate-Income-determination>
- Skat.dk. (n.d.). *Refund of Danish dividend tax*. Retrieved from  
[https://skat.dk/skat.aspx?oid=2244412&fbclid=IwAR2fSdggpAmvnmqfi5G4UcMtiqdDxPhL-QISdA\\_7UFRFmpFbIIMFMBOFi2E](https://skat.dk/skat.aspx?oid=2244412&fbclid=IwAR2fSdggpAmvnmqfi5G4UcMtiqdDxPhL-QISdA_7UFRFmpFbIIMFMBOFi2E)
- Skatteetaten. (n.d.a). *Refusjon av kildeskatt på aksjeutbytte*. Retrived 2019.12.02 from Skatteetaten: <https://www.skatteetaten.no/person/skatt/hjelp-til-riktig-skatt/aksjer-og-verdipapirer/om/refusjon-av-kildeskatt-pa-aksjeutbytte/>
- Skatteetaten. (n.d.b). *Dokumentasjonskrav for redusert trekk av kildeskatt på aksjeutbytte*. Retrieved 2019.12.02 from Skatteetaten: <https://www.skatteetaten.no/bedrift-og-organisasjon/starte-og-drive/rutiner-regnskap-og-kassasystem/lonn-lan-og-utbytte/utbytte-fra-norske-selskaper-til-utenlandske-aksjonarer----krav-til-dokumentasjon-for-trekk-av-kildeskatt-med-reduisert-sats/>
- Spengel, C. (2016). *Sachverständigenutachten nach § 28 PUAG für den 4. Untersuchungsausschuss*. Retrieved from Bundestag.de:  
[https://www.bundestag.de/resource/blob/438666/15d27facf097da2d56213e8a09e27008/sv2\\_spengel-data.pdf](https://www.bundestag.de/resource/blob/438666/15d27facf097da2d56213e8a09e27008/sv2_spengel-data.pdf)
- SVT. (2018, 12 11). *Före detta SEB-chef: Vi har utfört skatteupplägg mot Sverige* Retrieved from: <https://www.svt.se/nyheter/inrikes/fore-detta-seb-chef-vi-har-utfort-skatteupplagg-mot-sverige>
- The European Commission. (2013). Commission Delegated Regulation (EU) No 231/2013 of 19 December 2012. *Official Journal of the European Union*.
- Wooldridge, J. (2016). Advanced Panel Data Methods. In *Wooldridge, & Jeffrey, Introductory Econometrics: A Modern Approach*, 6<sup>th</sup> edition, (pp. 446-575). Cengage Learning, Inc: Mason, OH, United States.
- Yahoo! Finance. (2019,12,2) Historical data - historical prices from 09.04.2013-15.11.2019 15. Retrieved from:<https://finance.yahoo.com/quote/AKER.OL/history?p=AKER.OL> (exemplified by Aker, but retrieved for all ticker symbols)

## 8. Appendix

### 8.1 Stocks removed from the dataset

**Table 8: Stocks not used in analysis**

Norway		Sweden		Denmark	
Stock	Action	Stock	Action	Stock	Action
NAS	No dividend	Atcoa B	Class shares	BAVA	No dividend
BWO	No dividend	NDA	Lack of data	GEN	No dividend
NEL	No dividend	AMEA S	Lack of data	NKT	No dividend
				MAERSK A	Class shares
				NETS	Lack of data

Notes: The stocks are symbolized by their ticker symbol. The stocks with no dividend were kept in the dataset but not utilized. For stocks that have multiple share classes, we only kept the most liquid. Some stocks were removed due to no short data or large periods without data.

## 8.2 Tax-loss for each stock in Norway

**Table 9: Tax loss for each stock in Norway**

Stocks in Norway	Total dividend 2018 (NOK)	Excess number of shares on loan (1)	Lost revenue (NOK)
Equinor ASA	7,49	106572154	119 745 005
Telenor ASA	12,50	90604128	169 882 739
DNB ASA	7,10	129964430	138 412 118
Mowi ASA	10,40	32002056	49 923 207
Yara International ASA	6,50	23432868	22 847 046
Norsk Hydro ASA	1,75	160430736	42 113 068
Aker BP ASA	10,02	679750	1 021 297
Orkla ASA	2,60	65044101	25 367 199
Gjensidige Forsikring ASA	7,10	59312255	63 167 551
Schibsted ASA	1,75	2524650	662 721
SalMar ASA	19,00	6300896	17 957 553
Leroy Seafood Group ASA	1,50	10665992	2 399 848
Aker ASA	18,00	66905	180 644
Storebrand ASA	2,50	51363397	19 261 274
Tomra Systems ASA	2,35	0	-
Subsea 7 SA	5,00	0	-
TGS NOPEC Geophysical Company ASA	6,49	2254213	2 194 476
P/F Bakkafrost	13,52	370356	750 899
Elkem ASA	-	0	-
Golden Ocean Group Ltd	3,72	0	-
PGS ASA	-	0	-

Notes: The tax loss analysis is done for the year of 2018. The total dividend is the dividend paid by the company in 2018. The lost revenue is calculated by multiplying the total dividend in 2018 with the excess number of shares on loan and the reduced tax rate of 15%.

(1) The excess number of shares is calculated by the short ratio for stock  $i$  on the ex-dividend subtracted from the average short ratio for the year 2018 for each stock. If the average short ratio for a stock is higher on average than on the ex-dividend date, the excess number of shares on loan is set to 0.

## 8.3 Tax-loss for each stock in Sweden

**Table 10: Tax loss for each stock in Sweden**

Stocks in Sweden	Total dividend 2018 (SEK)	Excess number of shares on loan (1)	Lost revenue (SEK)
AstraZeneca PLC	22,86	747375	2 562 749
Abb Ltd	6,85	0	-
Volvo AB	4,25	143144655	91 254 718
Investor AB	12,00	31464668	56 636 402
Telefonaktiebolaget LM Ericsson	1,00	223258434	33 488 765
Atlas Copco AB	7,00	14362291	15 080 405
Hennes & Mauritz AB	9,75	0	-
Swedbank AB	13,00	77873671	151 853 657
Svenska Handelsbanken AB	5,50	124798070	102 958 407
Skandinaviska Enskilda Banken AB	5,75	78500300	67 706 509
Telia Company AB	2,30	175865080	60 673 452
Assa Abloy AB	3,30	5163953	2 556 157
Sandvik AB	3,50	38630183	20 280 846
Alfa Laval AB	4,25	17021732	10 851 354
Tele2 AB	4,00	22948833	13 769 300
AB Skf	5,50	7003954	5 778 262
Swedish Match AB	9,20	13228615	18 255 89
Kinnevik AB	8,25	10812203	13 380 101
Skanska AB	8,25	23456010	29 026 813
Autoliv Inc	2,46	0	-
Electrolux AB	8,30	17363977	21 618 151
Boliden AB	14,00	10318416	21 668 673
Securitas AB	4,00	6209780	3 725 868
Svenska Cellulosa SCA AB	1,50	46377675	10 434 977
SSAB AB	1,00	4861657	729 249
Getinge AB	1,50	0	-

Notes: The tax loss analysis is done for the year of 2018. The total dividend is the dividend paid by the company in 2018. The lost revenue is calculated by multiplying the total dividend in 2018 with the excess number of shares on loan and the reduced tax rate of 15%.

(1) The excess number of shares is calculated by the short ratio for stock  $i$  on the ex-dividend subtracted from the average short ratio for the year 2018 for each stock. If the average short ratio for a stock is higher on average than on the ex-dividend date, the excess number of shares on loan is set to 0.