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IMPACT OF FINANCIAL CRIME RELATED NEWS ON BANKS' SHARE PRICE PERFORMANCE – AN EVENT STUDY ON NORDIC BANKS

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ABSTRACT

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The goal of this thesis is to study if there is a connection between financial crime -related news and short-term stock price performance of Nordic banks, and if so, has the possible impact changed over time and does it vary between different types of financial crime -related events and Nordic countries. A standard event study methodology is chosen to analyse the event and share price data. Event data is collected from an independent source, and it consists of 89 financial crime -related events on 20 stock listed Nordic banks. A timeframe of this study covers years from 2012 until the end of 2019.

The final results suggest that there is a statistically significant delayed market reaction to financial crime -related news and allegations. Average abnormal returns on an event day do not result in statistically significant negative returns, whereas the cumulative average abnormal returns for event windows from the event day to day five and from day one to day five result in share price performance of -1.01% and -0.72% respectively, both results being statistically significant at 95% confidence level. Additional testing is also conducted within the financial industry itself, and such test shows that there is no statistically significant impact on stock price performance, suggesting that financial crime -related event on one bank may impact the short-term market perception of the whole industry.

Additional subsample testing is conducted to assess possible variations between financial crime -related event categories, namely money laundering, fraud, tax evasion, and bribery and corruption. Money laundering and tax evasion -related events result in statistically significant negative cumulative average abnormal returns and also both categories have immediate statistically significant impact on event day. When comparing the impact between years, 2014 and 2017 stand out as being only ones with immediate event day impact. Additionally, years 2012, 2013, 2014, 2016, 2017, and 2018 result in delayed statistically significant daily reaction within the event window. Among Nordic countries, Danish market reaction is the strongest and statistically significant on event day, while Finnish and Swedish markets react with a delay, resulting in statistically significant negative cumulative average abnormal returns in the longest tested event window from day one until day 10. Norway stands out as the only country with no statistically significant short-term share price impacts.

Overall, the findings suggest that there are large differences in market reactions to financial crime -related news between Nordic countries and these reactions are changing over time while money laundering and tax evasion are seen as the most harmful allegations by investors.

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Tämän tutkimuksen tavoitteena on selvittää, onko talousrikollisuuteen liittyvillä uutisilla vaikutusta pohjoismaisten pankkien lyhyen aikavälin osakearvostukseen. Lisäksi tavoitteena on selventää, eroavatko vaikutukset vuosittain, Pohjoismaittain tai talousrikollisuuden eri kategorioiden välillä. Tutkimuksessa sovelletaan tapahtumatutkimusmenetelmää, jota varten aineisto on kerätty riippumattomasta lähteestä. Aineisto koostuu 89:stä talousrikollisuutta koskevasta uutisesta, jotka liittyvät 20:een pohjoismaiseen pankkiin vuosien 2012-2019 aikana.

Tulosten mukaan talousrikollisuutten liittyvät uutiset ja syytökset aiheuttavat tilastollisesti merkittävän viivästyneen markkinareaktion. Tapahtumapäivän keskimääräinen epänormaali alatuotto ei ole tilastollisesti merkittävä, mutta kumulatiivinen keskimääräinen tuotto on 0-5 päivän aikavälillä -1.01%:a ja 1-5 päivän aikavälillä -0.72%:a, molemmat 95%:n luottamustasolla. Kun tutkimus toistetaan rahoitusalan sisällä, tilastollisesti merkittävää kurssivaikutusta ei havaita. Tämän tuloksen perusteella voidaan olettaa, että yhden pankin yhdistäminen epäilyihin talousrikollisuudesta vaikuttaa koko toimialan lyhyenaikavälin osakearvostukseen.

Kaikki tapahtumat kattavan aineiston lisäksi tutkimuksessa selvitetään mahdolliset erot talousrikollisuuden eri kategorioiden välillä (rahanpesu, petokset, verojen kiertäminen ja lahjonta & korruptio). Sekä rahanpesuun että verojen kiertämiseen liittyvät uutiset aiheuttavat tilastollisesti merkittävän kumulatiivisen alituoton lisäksi tilastollisesti merkittävän vaikutuksen välittömästi tapahtumapäivänä. Eri vuosia vertaillessa vuodet 2014 ja 2017 erottuvat muista vuosista tuottamalla välittömän markkinareaktion tapahtumapäivänä. Lisäksi vuosina 2012, 2013, 2014, 2016, 2017 ja 2018 havaitaan viisästynyt, tilastollisesti merkittävä päivittäinen reaktio tutkimusikkunan aikana. Pohjoismaita vertaillessa Tanskan markkinareaktio on selkein sekä ainoana tilastollisesti merkittävä tapahtumapäivänä. Sen sijaan Suomessa ja Ruotsissa markkinat reagoivat viiveellä ja tilastollisesti merkittävää kumulatiivista alituottoa havaitaan pisimmän, 1-10 päivän aikavälin aikana. Norja on ainoa maa, jossa tilastollisesti merkittävää lyhytaikaista vaikutusta osakekursseihin ei ole havaittavissa.

Kaiken kaikkiaan tulokset osoittavat, että eri Pohjoismaissa talousrikollisuuteen liittyvät uutiset aiheuttavat toisistaan eroavia markkinareaktioita, jotka vaihtelevat myös tapahtumavuosien välillä. Lisäksi tulokset osoittavat rahanpesuun sekä verojen kiertämiseen liittyvien uutisten olevan kaikkein vahingollisimpia syytöksiä sijoittajien näkökulmasta.

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1 INTRODUCTION

This introduction chapter includes basic terminology and rationale for the study. First, the background of the study is explained. Secondly, the purpose of the study is clarified, and research questions and methodology are presented. Finally, the structure of the thesis is introduced.

1.1 Background of the study

We all pay taxes, social security payments and other side costs related to our salaries, and it can be challenging to always pinpoint the precise purpose of those payments. This may lead us to sometimes play with the idea of having full salary paid to our bank account instead of having all those deductions made that seem obscure or irrelevant to our personal wellbeing. Well, there are individuals, groups, companies and others that have taken the step further from just thinking about it, and currently the European grey economy is estimated to amount around two trillion euros annually and to vary between staggering 10-40% of GDP depending on the country (Schneider, 2019). In comparison, in Finland the size of the grey economy has been estimated in different studies to range from 5.5% up to even 17% of GDP totalling to loss of taxes and payments worth at least four billion euros annually (Finnish Tax Authority, 2018). Most of this money still flows through the traditional banking infrastructure and while we may not see it in our everyday life, banks are increasingly investing in preventive measures to stop the flow of grey funds. And it is not just about avoiding taxes or other payments, but money is being channelled towards various questionable and even criminal purposes domestically and internationally.

Banks are important “gatekeepers” in applying measures to prevent money laundering and terrorist financing, and for this reason regulatory bodies have adopted laws, guidelines, and directives to prevent the financial system from becoming misused for criminal purposes. In the European Union, the first anti-money laundering directive was enforced in 1990 requiring financial institutions to perform customer due diligence measures before starting a business relationship, and since then the directive has been revised several times and accompanied with detailed guidelines provided by authorities and several organizations. (EU Commission, 12.9.2020.)

Regulations are relevant for financial institutions as public authorities have decided to use banks as their agents in attempts to prevent money laundering. This is due to anti-money regulations being

built under an assumption that criminals' attempts to conduct financial crime leave a trace, which can be detected with information that banks have on their customers and financial transactions (Alexander, 2000). An implementation of financial crime related regulations entails additional compliance costs for financial institutions as they need to invest in physical assets, software, processes and human capital, and at the same time the requirements for information sharing might reduce confidentiality in eyes of customers (Masciandro & Filotto, 2001). Therefore, a challenge with effective anti-money laundering regulation is to ensure that financial institutions have proper incentives to implement efficient controls to protect the economy while those measures continue requiring costly investments.

Non-compliance with regulations may result in fines or in worst case a loss of licence issued by Financial Supervisory Authorities ("FSAs"). During recent years, Nordic FSAs have become more active in issuing regulatory penalties. As an example, the Swedish FSA has issued for three banks fines in total of 6.6 billion SEK (approx. 650 million euros) during the first half of 2020 due to deficiencies in the banks' financial crime prevention controls (Finansinspektionen, 2020). The likelihood for regulatory sanctions has also grown in Finland after the Financial Action Task Force ("FATF") pointed out in 2019 that the Finnish FSA has never issued penalties, fines or other sanctions for supervised banks that have not complied with the anti-money laundering and terrorism financing requirements (FATF, 2019). As a result, or as a pure coincidence, in December 2019 the Finnish FSA issued the first AML fine for a bank, and at the same time it has increased the staff in financial crime supervision entailing that also the Finnish banks might be supervised in a more detailed and profound manner going forward.

Simultaneously with regulators, media has begun to publish increasing number of news on suspected and alleged financial crime in banks and report on the regulatory consequences both in local markets and in Nordic and international level. The increased media coverage has raised public interest and awareness of banks' role in the fight against financial crime and the grey economy. As the tone of the news is often negative and headlines are addressing misconducts, banks are concerned about the potential impact on their reputation. The core values of banking are trust and reputation, and the regulatory consequences or published allegations of financial crime might decrease customers' and investors' faith on banks and willingness to cooperate with them.

1.2 Purpose of the study and methodology

The main purpose of this thesis is to provide insights on whether news related to alleged financial crime have short-term effect on Nordic banks' stock values. More specifically, this study aims to also identify any differences that various types of financial crime related news may have on banks' stock price. For this, four subcategories are used: i) money laundering, ii) bribery & corruption, iii) tax evasion and iv) fraud.

For the avoidance of doubt, "financial crime" term is used in this study to refer to both sanctioned and alleged wrongdoings related to any financial crime subcategories presented above and as described later in chapter 2.1. This is a common approach used by practitioners in the banking sector, and similarly, used in connection to screening counterparties and in developing preventive measures (see Nordea, 2020b).

The current literature offers a limited information on the effects of financial crime events on banks' value. However, studies have concluded that generally the reputational damage caused by negative events often leads to a decrease in company's value and news addressing illegal activities and sanctions issued by authorities are especially harmful to company's reputation (Brockman, 1995 & Gatzert, 2015 & Williams & Barret, 2000). Furthermore, previous event studies in several countries and industries have shown consistent results of different types of financial crimes leading into negative abnormal returns (Davidson et al., 1994, Tanimura & Okamoto, 2012 & Sampath et al., 2016). On a basis of these conclusions it could be assumed that financial crime related news and weakened reputation, which in most cases are related to illegal or criminal activities or banks being fined by authorities, have an effect on banks' financial performance.

Based on literature review and search, only few event studies have been done to examine the effect of financial crime events on banks' value. During the last two years, two studies have been published in which the impacts of recent money laundering scandals in Denmark and Sweden were analysed (see Berglund & Ekelund, 2019 & Njoku & Zetterström, 2020). Both of these studies concluded that the allegations of money laundering have had a negative impact on banks' stock prices, but the impact has emerged only after the event day. In this study, the scope has been widened to cover all Nordic countries and several financial crime categories, and it will be studied whether an impact differs on a yearly basis or between different financial crime categories. In short, this study is aiming to answer the two key questions below:

1) Is there a connection between negative financial crime related news and short-term share price performance of Nordic banks?
2) Has the possible impact changed over time and does it vary between different types of financial crime related events and Nordic countries?

As there have only been limited amount of studies in this area, this thesis also aspires to contribute to the existing literature and knowledge within the area of financial crime and stock price performance. The second research question is thus divided into smaller and more specific hypotheses. As Berglund & Ekelund (2019) and Njoku & Zetterström (2020) have found, there is a connection between financial crime events, namely money laundering, and bank's stock price performance and this impact is visible in two different Nordic countries. Additionally, Brockman (1995) and Salomonsson & Thormählen (2015) concluded that different types of fraud events result in decrease in banks' stock value. However, there are no comprehensive studies related to banks on all financial crime categories or all Nordic countries or over a longer period of time. As a result, hypotheses are formed for this study:

1) Financial crime events result in statistically significant negative abnormal returns

2a) There is no difference in financial crime categories and their impact on banks' short-term stock price performance
2b) There is no difference in impact between Nordic countries
2c) The impact on banks' short-term stock price performance does not vary depending on the event year

Salomonsson & Thormählen (2015) find in their study that there may also be positive cross-bank reaction to fraud events, opening a possibility for investors to achieve positive excess returns by investing in other banks at times when one bank is hit with fraud event. This will not be the main subject in this study, but the findings by Salomonsson & Thormählen support inclusion of two alternative benchmarks, namely the general market index and financial industry index, in this study as a market portfolio references.

To answer the above hypotheses, a standard event study is conducted. The event study methodology is widely applied in finance to examine an impact of events to a company's share price, and additionally, it can be used to test the efficiency of markets. According to Fama's (1970) efficient market hypothesis, in the semi-strong format of stock markets all publicly available

information is effectively incorporated in share prices. This study uses the market model to capture the changes caused by financial crime events on company's share value by comparing the return of a stock to the return of market portfolio. By this comparison it can be assessed whether an unanticipated financial crime events cause abnormal stock price reactions.

1.3 Structure of the paper

This study consists of four parts including the theoretical background & literature review, description of data and the event study methodology, presentation of empirical results and finally the conclusions.

In the second chapter the focus is on presenting and describing the four categories of financial crime events: money laundering, bribery & corruption, fraud, and tax evasion. This chapter also explains why and how financial institutions are related to the fight against financial crime and why non-compliance could affect the value of banks. After this, relevant theories are introduced, namely the efficient market hypothesis and agency and contracting theories. In addition, the previous literature is described to explain what kind of studies have been conducted on financial crime area and what kind of findings and conclusions have been reached.

The main topic of the third chapter is to explain how this study has been conducted. This chapter elaborates the collection of data and describes the event study methodology and chosen market model.

After building the background and explaining the research methodology, the final two sections concentrate on showing and discussing the main empirical results. The fourth chapter focuses on presenting the results for both the all-inclusive sample and several subsamples along with the robustness checks. The final fifth chapter summarises results and this thesis and provides suggestions for future research.

2 THEORETICAL BACKGROUND

In this chapter the focus is on defining the concepts and building the theoretical framework. The chapter starts off with a description of different forms of financial crime before explaining why banks are obliged by regulation to be on the frontline of financial crime prevention and what this obligation entails for them. Furthermore, relevant theories, namely efficient market hypothesis and agency and contracting theories, are presented and discussed. Lastly in the chapter, literature review summarises findings from previous similar studies.

2.1 Definition of financial crime

Corruption, crime, and terrorism are major global challenges all over the world. Often criminal activities are related to or even supported by different forms of financial crime from tax evasion to concealing illegitimate gains obtained from a criminal activity. Also, the scale of financial crime is wide, as it ranges from fraud committed by an ill-intentioned individual to large-scale operations organized by criminal organizations operating globally. Together, these financial crime related criminal activities expose both countries and societies to major challenges because financial crime reduces the welfare and undermines the trust on governments and other public authorities. (Hardouin, 2009.)

In this study, the concept of financial crime is divided in four subcategories: i) money laundering, ii) bribery & corruption, iii) tax evasion, and iv) fraud. Each of these categories are described next.

2.1.1 Money laundering

The 1973 Watergate scandal was the first time when “money laundering” was used to describe a process of transforming illegal funds into legal, and since then money laundering has become ever increasing challenge for governments and financial institutions throughout the world (Schneider and Windischbauer, 2008). The Financial Action Task Force (“FATF”, 2020a) defines money laundering as an illegal activity where the origin of the proceeds of criminal activities is being hidden while also concealing the true ownership of those funds. The aim of money laundering is to lose the criminal identity of funds and make funds appear legitimate so that criminals can control it without the underlying activities or persons attracting attention. There are countless of ways for money laundering to occur including distinguishing the source of funds, changing the form of funds, or

transferring money to a jurisdiction where it is less probable to attract attention. Despite the multiple ways for laundering money, the most often used instruments are financial institutions, through which an extensive amount of money is laundered (He, 2010). A reason for this is the nature of their business: to offer products and services whose purpose is to manage, control and possess funds owned by others (International Compliance Association, 2020). (FATF, 2020a.)

In practice the money laundering process includes three stages: placement, layering and integration. Of these stages especially the first and second relate to products and services of financial institutions. In the placement stage, funds gained from criminal activity are introduced into the financial system. This can be performed by using different services and products offered by banks e.g. depositing cash to accounts and purchasing checks which enable depositing the funds into another account in another location. In the second stage, layering, the true origin of the funds is tried to be hidden for example by conducting multiple conversions or transfers of funds. This stage might include various banks all over the world. The last stage, integration, can be described as a circumstance where the laundered property is returned to the legitimate economy where the funds can be used again. (FATF, 2020a.)

United Nations Office on Drugs and Crime (2020a) has estimated that globally 2-5% of global GDD, i.e. EUR 715 billion – 1.87 trillion, are laundered each year. The consequences of this amount of money laundered are severe for economic development and the society at large. If money laundering is not controlled, it is possible for criminals to continue criminal activity as it is easier for them to return the illicit funds back to economy. With the laundered money, criminals can increase their control over parts of economy by conducting investments and enforcing their impact on public authorities and governments. Furthermore, one of the biggest threats for society is the possibility of cleaned money being used to terrorism financing and the proliferation of weapons of mass destruction (Weeks-Brown, 2018).

2.1.2 Bribery & corruption

Corruption can generally be described as a misuse of individual power for the purpose of obtaining personal gain. It has occurred since antiquity and nowadays it can be recognized as a widespread problem both in private and public sector. Corruption exists in many forms, such as abuse of functions, bribery, and conflict of interest. In the financial industry, bribery is one of the most commonly addressed forms of corruption. Generally, it is described as "*involving the offer, promise, request, acceptance or transfer of anything of value either directly or indirectly to or by an individual,*

in order to improperly induce, influence, or reward the performance of a function or an activity". The obtained gain is an unlawful benefit. In the European Union, corruption is estimated to cost to the economy 120 billion euros annually and the global estimation of paid bribes rises to hundreds of billions of euros. The fight against corruption is particularly challenging due to these multiple forms in which it may exist and as it may also cover several different dimensions from economic to social and political to cultural. Additionally, these forms often differ from country to another. In Europe, the southern and eastern parts are estimated to be associated with a higher risk for corruption than the Nordic countries, which are positioned in top ten of least corrupted countries globally (Transparency International, 2020). (European Commission, 2019 & Wolfsberg, 2017a.)

In many cases corruption is fundamentally linked to money laundering, as the illegitimate funds obtained from corruption and bribery need to be laundered to enable the further use of the funds (FATF, 2020b). For this reason, financial institutions can be utilized to facilitate corruption by processing transactions which can be payments of bribes, or they might have as customers companies whose ownership structure hides the actual beneficial owners. Banks may also be exposed to corrupted activities through so-called Politically Exposed Persons ("PEPs") i.e. people with a public position in a society or an authority over policies or funds. The risk associated with PEPs is more severe due to higher likelihood of them being subject to corruption and bribery attempts (Wolfsberg Group, 2017b).

The phenomena of corruption is a difficult and severe challenge for economies as it erodes the trust in governments, weakens the integrity of the public sector, undermines the social contract and as a worst case it might also undermine the democracy. Often corruption also confronts general security as it challenges sustainable economic and social relations and enables both crime and terrorism. For these reasons, Organisation for Economic Co-operation and Development ("OECD") (2020c) has concluded that identifying and addressing corruption risks are essential in maintaining the trust and confidence in governments, public institutions, and businesses. (European Commission, 2020b & GRECO, 2020.)

2.1.3 Fraud

One of the most important responsibilities for a bank is to defend the integrity of the institution by protecting the funds that it commands. This entails that banks need to address the risk that individual or organizational customers or employees may illegally attempt to possess or receive money held by banks i.e. commit a fraud.

Association of Certified Fraud Examiners ("ACFE") defines fraud as "*a criminal deception intended to result in financial or personal gain*", and this definition can further be categorised into internal and external fraud. Internal fraud, also referred as occupational fraud, is a form of fraud where an employee or manager intentionally misuses organization's resources or assets. In external fraud, the fraudulent action is committed by external stakeholders like customers, vendors, or third-party service providers. There are several different ways for conducting fraud, it can occur as an identity theft, scams where customers are manipulated or coerced to make payments for fraudster, submitting fake invoices or phishing. (ACFE, 2020.)

Through recent years, the amount of fraudulent transactions has increased (Hoffman & Birnbrich, 2012). A banking fraud research conducted by KPMG (2019) showed that especially the volume, but also the cost, of external fraud has increased in the industry, while the volume and cost of internal bank fraud has either decreased or stayed stable. The increase in the volume of external fraud is likely due to technical and especially digital transformation of the financial industry, which has resulted in higher value of low cost card frauds, accompanied with increasing typologies related to identity thefts, impersonation fraud, scams and cyber-attacks. (KPMG, 2019.)

Though the volume of external fraud attempts is often higher than the amount of internal frauds conducted in financial institutions, the loss caused per internal fraud is often higher. ACFE (2019) concluded that the median loss for a financial institution per internal fraud incident is globally 110,000 USD. The high cost of insider fraud is likely to be a consequence of employees being aware of the used systems and existing controls and by identifying the weaknesses they are able to target the most valuable customers. This and employees' access to customers funds may explain why internal frauds most often are conducted in the financial institutions. (KPMG, 2019 and ACFE, 2019.)

2.1.4 Tax evasion

The final subcategory used in this study is tax evasion. Tax evasion refers to an illegal arrangement where tax liabilities are fully ignored or hidden which entails that individuals or companies pay less taxes than they are supposed to pay. This can be done by not declaring either all or part of the income, deducting from the taxable income expenses which did not exist or which should not be deducted, or submitting a tax return assumed legal because not all relevant information has been provided. In most jurisdictions globally, tax evasion is a punishable action by law. (European Parliament, 2017.)

One of the challenges with tax evasion is that it has not been in detail and consistently defined in all countries. It is also quite close to, but should not be mixed with, tax avoidance, which according to OECD's definition refers to a situation where taxpayer aims to reduce their tax liability with an arrangement which might be legal, but is in principle contradicting with the purpose of the law it is meant to follow (OECD, 2020b). In developed countries, tax avoidance is commonly referred to as aggressive tax planning in relation to multinational enterprises. The aim for such action is to artificially shift profits to a jurisdiction where the enterprise may not actually have any economic activity, but instead it can utilize the lower or zero tax base or stricter bank secrecy regulations for profit maximization. This is done by taking advantage of the technicalities in international tax system i.e. abusing the variation in the tax systems of individual countries to reduce the amount of taxes. These solutions as such are not illegal, but the use of these inconsistencies in tax regulations lowers the tax income in companies home jurisdictions, and institutions promoting and enabling these complicated structures may be seen dubious. (Bohoslavsky, 2019 and European Parliament, 2017.)

European Commission (2020c) underlines tax evasion to be a substantial problem which often includes a cross-border dimension and by which up to trillion euros are estimated to be lost annually. The amount of lost tax profits poses negative impacts for countries as the amount of funds is not available for national authorities to e.g. support economic growth, maintain and develop public services like healthcare and education, and invest into infrastructure. With the lost tax funds governments could do more to tackle some of the socioeconomic issues by e.g. supporting employment and lowering income inequality.

2.2 Global measures to tackle financial crime

The purpose of a government is to maximize social welfare, which can be undermined by allowing financial crime to flourish (Takats, 2009). Therefore, in order to reach more stable and healthy societies, jurisdictions and multiple different organizations have imposed regulations and guidelines, respectively, to fight against financial crime. In most countries, all of the four types of financial crime described in previous sections have been criminalized, but e.g. globalization and technical improvements make the identification, prevention and prosecution of financial crime challenging (Borlini, 2014). Similarly, the world is becoming continuously more international and

interrelated, and criminals are increasingly creative in finding new ways to take advantage of the financial system (Hardouin, 2009).

Though these different types of financial crimes are in certain circumstances related to each other, they are different by the nature and the extent. For this reason, often each of these crime types are addressed by separate regulations and guidance. However, the common nominator for the fight against financial crime is the inclusion and prominent role of financial institutions. Kerzner & Chodikoff (2016) state in their study "*Where there is bank secrecy, there is often a convergence of evil: international tax evasion, global financial crime and international terrorism."* Also public authorities have recognised the same – financial institutions are necessary for the criminals, not only due to the bank secrecy but also due to the specific role of enabling movements of funds and having and access to transaction information which authorities do not have. Therefore, the regulations have been built on an assumption that criminals' attempts to conduct financial crime leave a trace, which can be detected with the information that banks have on their customers and financial transactions (Alexander, 2000). For this reason, regulators have set financial sector on the frontline in the fight against money laundering, bribery & corruption, fraud, and tax evasion: financial institutions are required by a law to know their customers and to monitor, investigate and report suspicious activities. When all banks follow these reporting requirements, authorities have a better possibility to do their job and to follow the traces of money. This also entails that the regulation needs to be designed in a way that it outweighs the associated costs to reach a point where it reduces possibilities for criminal activities to continue and issues proper incentives for effective implementation (Masciandro and Filotto, 2001). (Borlini, 2014 & Hardouin, 2009).

In Europe, the first anti-money laundering directive was published in 1990. Since then, European Union has updated the legal anti-money laundering and terrorism financing framework several times to substantially improve the protection of the Union and its financial system from financial crime efforts. The recent increased development and utilization of technology has transformed financial industry to become more international and with the current systems it is easy and cheap to transfer money anywhere in the world. This entails that there is a need also for international rules and standards which provide efficient and coherent procedures. To address this need, an inter-governmental body Financial Action Task Force ("FATF") was set up in 1989 to "*examine and develop measures to combat money laundering.*" Currently more than 200 countries and jurisdictions have committed to follow and effectuate FATFs Recommendations, which are regularly updated to address the emerging risks and to reflect the evolving financial crime landscape. These

Recommendation also create the basis for European Union's anti-money laundering framework. (European Commission, 2018 and FATF, 2020c.)

A similar approach has been established to address tax crimes and to aim at securing the integrity of the financial market. The Organisation for Economic Co-operation and Development's ("OECD's") Global Forum on Transparency and Exchange of Information for Tax Purposes gathers 161 jurisdictions to discuss and adhere the same high standards for international cooperation and to increase transparency. Tax authorities are not allowed themselves to recover taxes outside their own borders, and for this reason the standards address e.g. information sharing and cooperation to enable effective investigations. As the consequences of lost tax profits are notable in Europe, European Commission has lately developed an action plan supporting member states' actions in the fight against tax evasion and tax fraud. As part of this initiative EU has issued two new directives in 2019 to protect union's financial interest and to encourage whistle-blowers to report misconducts by protecting them. The intention of these directives and action plan is also to harmonize the member states' fraud prevention controls, better coordinate anti-fraud controls and improve analytical methods. The plan also notes that no jurisdiction can alone prevent tax evasion, and therefore it is essential to enable and increase transparency and information exchange between authorities and countries. In addition, a special challenge related to tax evasion are so called tax havens, i.e. countries or jurisdictions that offer a minimal or zero tax liability, fictitious residences and tax secrecy to foreign individuals and businesses (Sandmo, 2005). (European Commission, 2012, European Commission, 2020d & OECD, 2020b.)

The challenge with imposing legal framework via directives instead of EU level regulation is that all jurisdictions transpose directives into their national legislation (key difference between regulation and directive is that regulation is binding for all EU countries whereas directive allows each country to apply the minimum requirements as they see best) which leads to an asymmetry between legislations of different jurisdictions. These asymmetries and loopholes can be exploited by criminals to launder money and conduct other illicit transactions (Borlini, 2014). In most countries, the legal and practical barriers limit the international information sharing and cooperation weakening the efficiency and effectiveness of the monitoring, investigation, and prosecution (Weeks-Brown, 2018). (European Commission, 2018.)

Due to the negative and widespread impacts which corruption has on societies all over the world, it has been recognized by multiple international organizations. The most extensive legal instrument in the fight against corruption is the United Nations Convention Against Corruption ("UNCAC"). It is a legally binding document negotiated by Member States of the United Nations, and all parties who

have ratified the convention need to comply with its requirements. The UNCAC covers five aspects which include both preventive and punishable measures defined as "*preventive measures, criminalization and law enforcement, international cooperation, asset recovery, and technical assistance and information exchange*". (United Nations Office on Drugs and Crime, 2020b.)

European Union ratified the UNCAC in 2008 (United Nations, 2020), and therefore it is adhering the requirements in the convention. In European Union, corruption is listed as a severe crime to which minimum criminal offences and sanctions may be established. Additionally, trading influence, concealment and laundering of proceeds gained by corruption are criminalized. However, due to the wide variety of forms in which corruption can exists, this phenomenon is difficult to fully measure, identify and prevent. In addition, to convict people committing corruption and bribery is a challenge for authorities. Often, to even become aware of these crimes taking place, authorities are dependent on whistle-blowers who should feel safe enough to express any suspicions. In addition, both investigation and prosecution of these cases are often challenging. (European Commission, 2020b).

As described above, regulators and international organizations have put in substantial amount of effort in creating and updating regulations and guidance with an aim to tackle all types of financial crime. The challenge with the regulation is to ensure that it is and remains relevant. Therefore, international cooperation is essential for achieving further global harmonization of local regulations across the world. In addition, modern technology develops quickly, globalization continues, and occasional financial market turbulence change the global financial environment, and often criminals are quick in taking advantage from newly emerging opportunities while regulators require more time to changes via legislative framework.

2.3 Banks' compliance, reputation, and shareholder value

As described in the previous chapter, there are regulations, guidelines, policies, and instructions that are needed to successfully prevent financial crime. For banks, this poses a challenge: to comply with all of them or not, and at what cost. Who is going to know if a bank decides to turn a blind eye on some small misconduct practice in some remote satellite office if it provides good financial returns? Or alternatively, how much extra expenses would it generate if said bank would decide to increase controls and monitoring to prevent illicit practices completely? And what would the business impact be?

It has been estimated that the profits generated by organized crime in Europe add up to €110 billion annually, and only a bit over 1% of criminal proceeds are confiscated by the authorities in European Union (Angelini et. al., 2015 & Europol, 2016). These figures entail that criminals still seem to be few steps ahead of both regulators setting the requirements and financial institutions implementing the required controls. As these funds could be used to increase the welfare and wellbeing of societies, it is evident that regulators and supervisors are continuously paying attention into enhancing the current legal frameworks and ensuring that financial institutions have efficiently and effectively implemented the required controls. This is also supported by the annual financial crime sanctions figures, which have been steadily growing since 2015, and in 2019 a second highest number of fines were issued (Monroe, 2020). If the same development continues, also Nordic banks, which in the past have faced relatively low amount of regulatory consequences, may become subject to more detailed investigations, and possibly be fined.

As described in section 2.1, money laundering, bribery & corruption, fraud, and tax evasion are complicated phenomena, which all are closely related to movements of funds and therefore regulators have required banks to perform part of the prevention of financial crime work on behalf of themselves. This entails that banks need to spend substantial amounts of funds to implement and maintain efficient internal financial crime compliance frameworks. An overall estimation is that banks are spending around $20 billion annually on their financial crime compliance programs (Paravicini, 2018). As an example, Nordea Bank (2020a) has stated that it has invested during 2015-2018 850 million euros on enhancements of its prevention of financial crime program, and for Danske Bank (2019) the figures were DKK 1 billion in 2017 and since that investments have grown annually, and are expected to reach DKK 3.3 billion in 2020. Both of these banks have revealed these figures after they have been publicly accused of allegations of money laundering and “turning the blind eye to dirty money” as a result of enabling dirty money to flow via them due to weak implementation and effectiveness of preventive controls. These examples address the challenge with effectiveness of issued regulation from banks’ perspective, without proper incentives only weak implementation can be expected (Masciandro and Filotto, 2001). Therefore, Nordic authorities seem to become more active in conducting investigations as their most effective incentives are to issue fines or in ultimate case to retract the operating licence as a consequence of detected non-compliance.

So, what can banks do to avoid getting fined? A fight against financial crime is challenging for financial institutions due to the constant existence of information asymmetry. This asymmetry exists between regulators and financial institutions, between different financial institutions and

between financial institutions and their customers. With the current international financial markets, it is fast and easy to conduct e.g. a drug crime in Colombia and launder the money via European banks. For this reason, any transaction performed in or routed via bank can potentially be related to criminal activity, which entails that in order to detect the suspicious activities, banks need to monitor every transaction and all customers, including correspondent banks. In addition, the work is becoming increasingly challenging while modern technology enables conducting multiple transactions quickly across borders. The financial institutions are facing the similar challenges as regulators, their efforts to track and investigate complex and multiple forms of financial crime are lagging the high speed of transactions and creativity of criminals (Hardouin, 2009).

Additional challenge in the global world is the banks' dependency on external factors: a poor compliance or weak controls in other institutions or relaxed regulation and supervision in other jurisdictions may expose financial institutions to increased risk of financial crime. The regulation of financial crime is varying a lot, though there are several international or regional parties setting common rules and guidelines on how to tackle financial crime. The inconsistencies in regulations between jurisdictions can be utilized by criminals but also by financial institutions, which may have seen e.g. differences in jurisdictions' tax or opaqueness as a possibility to attract wealthy customers and corporates by offering less regulated services and products (Bohoslavsky, 2019).

Often banks have centralized most of their financial crime prevention to dedicated units. However, in terms of organizational structure, many banks have separated fraud prevention and investigation into a stand-alone and separate unit, though in the wider context fraud is recognized to be part of financial crime. Additionally, less money is often invested in these fraud-related controls, though banks are in certain circumstances required to refund any monetary losses stemming from fraud to customers. A reason for this might be that fraud is defined as a loss problem instead of a financial crime compliance issue where financial services are exploited by the criminals. Additionally, there are different reporting requirements for fraud cases, and in global scale fraud related penalties have been considerably lower. However, the fraud cases are as severe for banks as other crimes if, in addition to the regulatory consequences, also the effect on reputation is considered. Reputation is one of the most valuable assets that financial institutions have, and if shareholders' trust and loyalty on financial institutions is weakened or lost, financial institutions might end up losing customers, having difficulties to attract new customers and investors, and consequently their share value may be negatively impacted. Therefore, reputational consequences might be a partial reason

explaining why banks have lately been allocating more money to financial crime compliance controls. (Hasham et al., 2019, Hoffman & Birnbrich, 2012 & KPMG, 2019).

Reputational damage caused by financial crime related news has become more topical for banks in recent years, especially after 2018 when the Europe's biggest money laundering scandal was revealed having taken place in the Danish Danske Bank. This incident, at the latest, raised banks' role in the prevention of financial crime to wider public attention in the Nordics, as the case has been frequently covered and followed in media (Berglund & Ekelund, 2019). Swedish Swedbank was also found to be involved in the same money laundering case, resulting to a SEK 4billion fine being issued in March 2020. These kinds of huge financial crime cases have increased media's attention into financial crime, which entails that banks may be more likely to face reputational damage if they become linked to enabling illicit money flows. The purpose of a publicly listed company's management is to maximize shareholder value, and in the end the decision not to implement and maintain proper financial crime controls may become more costly than the required investments itself. These potential consequences have also been summarised by the former U.S. Deputy Attorney General Paul McNulty: "*If you think compliance is expensive, try non-compliance*."

2.4 Efficient market hypothesis

For any new information to impact stock prices, markets need to have an opportunity and possibility to consider that new information in an efficient manner. As stated by Fama (1970) the primary function of the capital markets is to allocate the funds efficiently. Generally, in the ideal situation all information including both public and insider is available to investors simultaneously and it is completely and quickly incorporated into stock price. Due to this it should not be possible to achieve abnormal returns consistently.

The purpose of efficient markets theory is to explain whether security and stock prices reflect all available information at any given time. According to the efficient market hypothesis, three forms of efficiency exist in the markets: weak, semi-strong and strong. The weak form assumes that the prices of a security and stock fully incorporate all historical information. Secondly, in the semi-strong form, all publicly available information should be reflected, and finally, in the strong form the prices of a security and stock fully reflect all the relevant information whether it is public or private. In practice, however, the perfectly efficient markets do not exist. (Fama, 1970.)

In the further study Fama (1991) modifies the initial concept of hypothesis by changing the title of the second category from semi-strong form tests into the event studies. The change is conducted because for this category it is relevant to study how quickly stock prices reflect public information announcements. According to this study the typical result with daily data is supportive for the efficient market hypotheses: stock prices adjust to published news within a day from the announcement. (Fama, 1991.)

2.5 Contracting and agency theories

Financial crime prevention and compliance to various regulations is not cheap. It requires additional resources, processes, instructions, technology – all that cost money. From a managerial decision making point of view, banks may have been struggling with the cost and benefit comparison of financial crime compliance: increased compliance means increased investments and costs, whereas the benefit has not been tangible, especially in terms of increased profitability. With this premise, it may have been easy for managers to turn a blind eye on some non-compliant branch office actions that continue to generate high revenues, instead of investing more in compliance functions that effectively may reduce revenues from certain operations.

Conflicts between owners' and managers' interests are common, and agency theory is set to explore these conflicts and ways to resolve them. Jensen & Meckling (1976) define an agency relationship as "*a contract under which one or more persons (the principal(s)) engage another person (the agent) to perform some service on their behalf which involves delegating some decision making authority to the agent*." When both the agent and principal aim at maximizing utility, it is reasonable to assume that their interests may conflict. Consequently, the agency problem arises when management (agent) makes decisions which are not aligned with the best interest of shareholder (principal) (Jensen & Meckling, 1976). This dilemma is relevant in the context of Nordic banking sector where large institutional investors, often pension funds, are representing large portion of the shareholders in the ownership structure of listed Nordic financial institutions. Profit maximization and "the right way of achieving it" are increasingly subject to a societal debate, where short term returns may be in the interest of managers and long-term viability of the business more in the interest of shareholders.

How to align interests between management and shareholders? Part of the agency problem is the principal's challenge to verify actual actions taken by the agent and whether those actions are

aligned with principal's objectives. Performing verification can be expensive or practically impossible. Additionally, the risk tolerance of agent and principal may differ with a consequence of disagreement on the actions that should be taken (Eisenhardt, 1989). Controlling the agency problem is especially important when agents with decision making power do not bear the financial impact of their decisions (Fama & Jensen, 1983). This setup is especially true in the context of banking, where poor management decisions on financial crime compliance end up costing money or share price value for shareholders while the monthly compensation for managers remain the constant. In an attempt to limit the discrepancy of interests, principal can set incentives to the agent to ensure that the agent will be compensated for desirable actions. Costs resulting from agents misusing their position and costs for principal in monitoring and disciplining the agent create together an agency cost (Jensen & Meckling, 1976).

In short, shareholders of a bank do not have full visibility or means to verify that managers are taking necessary steps to protect the shareholders' interests related to financial crime prevention. Proper anti-money laundering and anti-fraud controls (as inspected by local financial supervisory authorities) can be seen as a way of mitigating risk related to financial institutions being abused by criminals. As referred earlier in this text, Danske Bank for example has paid in 2017 DKK 1 billion for the prevention of financial crime and the amount is estimated to increase to DKK 3.3 billion in 2020. For a shareholder, this type of disclosure may be one of the few ways to identify management's efforts in protecting shareholder's interest.

2.6 Literature review

The overall stock performance and predictability of the stock prices has been a broadly researched and analysed topic. Several different approaches have been used in an attempt to identify possible impact on the stock performance. Chan (2003), Tetlock (2007) and Sinha (2016) have conducted studies to investigate how the overall tone of news impacts the stock performance, and according to the results of Tetlock (2007) investors often underreact to bad news and additionally they are slow to react on those. Sinha (2016) further concludes that the high media pessimism can increase the downward pressure on bad news. However, the more common approach for studying the effects of news is to conduct an event study.

The purpose of the event study is the assess the impact of major events to companies' stock price performance. The data for a study can either consist of public news or corporate announcements

and the more unanticipated the news is, more likely it is to have a financial impact (McWilliams et. al, 1999). Event studies are widely applied in research as the basic approach is rather easy, versatile data can be used, and the methodology can be applied in multiple occasions. As an example, event studies have been widely applied in accounting and finance research covering both market wide and company specific events. For example, mergers and acquisitions, earnings and divided announcements, and impact of a change in regulatory environment have often been studied by conducting event studies. (MacKinlay, 1997.)

The use of event studies to assess managerial decisions has increased a lot over time (McWilliams et al., 1999). Different managerial decision topics covered by event studies include e.g. layoff programs, formation of joint ventures and management problems related to human resources. However, the most often studied topic has been managerial decisions related to corporate social responsibility (CSR). General perception is that taking due CSR measures into account, companies can be better prepared for future development and success through improved conditions on important areas that affect their business, such as human capital, societal connections, regulatory interaction, environmental risks and so on. Not considering these aspects might also lead into reputational damages. In order to measure how well companies are implementing CSR and ESG as part of their operations, there are different databases collecting and assessing relevant news about companies and based on the analysis an ESG-score can be determined. This scoring can support investors and customers in making decision on which company to invest in or with which company to cooperate.

Corporate reputation and behaviour are getting increasing amount of attention from multiple stakeholders including customers, shareholders, and employees. Additionally, media has become more active in reporting misconducts, which has increased companies pressure to adhere international standards and local legislation and avoid unethical actions as customers are more conscious in making decisions towards positive choices e.g. companies having a good and trustworthy reputation (Pruzan, 2001). Williams and Barret (2000) examined in their study the relation of criminal activity to company's reputation and according to their results, illegal activities and especially public sanctions cause significant negative reputational damage. This conclusion is also supported by Gatzert (2015), who studied several event studies and came into a conclusion that reputational damage leads to decreasing company value, and the negative impact has been most severe when fraudulent actions have occurred.

Financial crime is an issue which clearly has a relation to criminal activities and may expose financial institutions to public sanctions. Therefore, an assumption could be that reputational damage

caused by financial crime decreases companies' value, and several event studies have been conducted to study whether this assumption holds. Studies by Sun & Zhang (2006), Sampath et al. (2016) and Karpoff et al. (2014) have concentrated on several industries in single countries resulting in consistent findings of negative abnormal returns thought the studied financial crime types have differed. In Sun & Zhang's (2006) study the focus has been on corporate fraud scandals in China, and according to their results these events had a slightly negative impact on stock prices with cumulative average abnormal return being -0.014% on a 95% confidence level. Sampath et al. (2016) came to a similar conclusion while investigating the market penalties resulting from bribery in US: fined companies' stock performances were negatively impacted resulting in negative abnormal returns of 1.85%. Also the study by Karpoff et al. (2014) concentrated on bribery cases in US, and they concluded that in general stock price reactions following the bribery news were statistically significant and negative, and the impact was especially severe when bribes were related to financial fraud.

In addition to studies having only one country in scope, the impact of financial crime events has been studied in wider scope covering multiple jurisdictions and multinational corporates. Botn & Dahl (2015) focused on corruption news in six countries in four continents, and their conclusions were aligned with the studies conducted for individual countries: corruption news led into negative cumulative average abnormal return of 1.68% for the whole sample during 7 days before and after the event day. Similar effect is observed when studying tax evasion committed by multinational corporates, a cumulative average abnormal returns have decreased by around 0.25% during 3-day event window after the news' publication, and during the 121-day event window the decline has increased to 3.7% (Shumi et al., 2017). This result also supports the finding of Tetlock (2017) on investors underestimating the bad news and reacting slowly on those.

Some events studies have also covered more than one financial crime types. Tanimura & Okamoto (2012) studied multiple corporate scandals in Japan and concluded that companies experience negative 2-day mean abnormal returns of 1.0% for internal frauds committed by employees, while tax evasion news led to average decline of 2.6% in the same period. Davidson et al. (1994) focused on corporate illegalities including e.g. bribery, tax evasion and fraud and found out that though the whole sample resulted in insignificant stock market effects for the whole sample, only bribery and tax evasion were associated with statistically significant negative abnormal returns on an event day. An interestingly different conclusion was derived by Katsikides et al. (2016) who studied the impact of five CSR events to financial performance of five companies in different industries. One of the chosen events was banking & financial services institution HSBC's money laundering scandal in

2012, and that was the only event not resulting in any statistically significant negative abnormal returns.

In addition to studies covering multiple industries, event studies have been performed specifically in financial industry to study how negative news impact banks' financial performance. Brockman (1995) focused on in his research to investigate the impact of reputation damaging news related to e.g. fraud and insider trading on investment banking industry. He came to a conclusion that these news had a negative impact on investment banks' stock value. Similar conclusion was derived by Salomonsson and Thormählen (2015), who investigated the operational loss announcements caused by internal frauds in banks. According to their results, a bank under allegations of internal fraud faces negative impact on its reputation and share price, and at the same time there is a positive cross-bank reaction entailing that investors could achieve excess returns by investing in another banks.

Lately in Nordics, there have been two event studies that examine how negative financial crime news have impacted the banks' value. Berglund and Ekelund (2019) focused on examining Danske Bank's money laundering scandal, revealed in 2017, as this case is one of the largest money laundering scandals in Europe and it has been heavily followed up by media. The results show that there is no significant negative abnormal return on the event day, but the negative news and weakened reputation cases caused severe loss in the share price in a longer time period. Additionally, no spill-over effects in the near region were noticed until the significant decrease three days after the event. Similar results were reached by Njoku and Zetterstöm (2020), whose event study on Swedbank's money laundering scandal in 2019 concluded that significant negative abnormal returns were found for Swedbank and SEB after the event day. Additionally, no significant financial impact was caused to other banks in Sweden. Both of these studies concluded that there is no full support for the efficient market hypotheses, and investors seem to react slowly to negative news.

Another view on financial crime event studies has been to examine the impact of new anti-money regulations to banks' financial performance. Balani's (2019) study concentrated on the US with a conclusion that increased operational costs caused by recent anti-money laundering regulations outweighs the benefits of improved processes, and this is evident especially for the largest banks where investors seem to expect decrease in their profits due to regulations. This result may indicate that banks are reluctant in implementing all required controls, as the operational cost is substantial. While both Sun & Zhang (2006) and Sampath et al. (2016) concluded in their studies on fraud scandals in China and bribery cases in US, respectively, that the impact on regulatory fines is less

significant for companies when comparing to the reputation damage seen in a decreasing stock values, it seems that banks' investment decisions on financial crime are not only led by regulatory obligations but banks are concerned about the possible consequences for stock value.

3 DATA AND RESEARCH METHOD

The purpose of this study is to seek an understanding on whether news about alleged money laundering, bribery & corruption, fraud, and tax evasion have an impact on the share value of Nordic banks. The theoretical background and previous literature were presented in the previous chapter, and this chapter focuses on building of theoretical framework, and continues through description of the data collection and introduction of the chosen event study methodology.

3.1 Data collection and analysis

This thesis studies the possible effects of financial crime related news to Nordic banks' share prices. For data collection, this means that news publications related to alleged weaknesses in banks' money laundering, bribery and corruption, fraud or tax evasion prevention controls constitute 'events'. Only the initial publication of news are considered as events and any follow-up announcements, repetition of news on the same topic, or following publications are thus not identified as events.

The event data for the study has been collected from a centralized database, RepRisk, which screens and analyses on a daily basis news from tens of thousands of public sources globally with an aim to detect the news having an effect on companies' reputation. The screened sources include various types of public sources, such as local and global online news sites, print and social media and publications by research companies and regulators. Additionally, the database does not collect information from individual companies' websites, which entails that companies' own press releases and other public corporate announcements as such are not included in the event data. In this study all the banks are publicly listed and often especially negative incidents, or suspicions of such, related to banks are reflected by media in a timely manner. Additionally, some news might also be based on information leakages entailing that media is capturing events that banks may have not been prepared to publish yet.

In addition to the most spoken languages in the world, the database covers also local Nordic languages (Danish, Finnish, Icelandic, Norwegian and Swedish). This ensures that both news recognized internationally, and news reported locally in Nordic countries are captured. Examples

of the covered sources are Financial Times, BBC, Bloomberg, Reuters, and local Nordic news sites e.g. Danish Dagbladet Børsen, Finnish Kauppalehti and Swedish Dagens Nyheter.

The database gathers and evaluates information specifically about companies Environment, Social and Governance (ESG) status. As part of the Governance issues, the database collects and classifies data on financial crime related issues, specifically about i) money laundering, ii) anti-bribery and corruption, iii) fraud, and iv) tax evasion. The previously mentioned topics cover the main financial crime related issues in interest of this study, and therefore only news related to these topics have been extracted from the database for further analysis.

The first AML fines for banks were issued in the Nordics in 2013 (Fenergo, 23.5.2020), and therefore the sample period for this study is set to cover years 2012-2019. The financial data consists of daily adjusted share prices and total return market indices, both general indices (namely OMXH25, OMXC25, OMXS30 and OSEAX) and industry indices (Nordic Financial and OSE40GI), and it has been downloaded through combination of data services (Yahoo Finance) and local stock exchanges (Nasdaq Nordics and Oslo Bourse). Power Query in Microsoft Excel has been utilized in the financial data collection to avoid manual work and reduce mistakes due to human errors. All news published during the sample period by the news database have been extracted and read through to assess the relevancy and authenticity of the news and to filter out all subsequent news linked to original news. For companies listed in several Nordic stock exchanges it has been assessed if the news article is related to a single bank branch in Nordics or whether the news affect all Nordic branches.

The relevant news have been divided by the type of the news into four subsamples: money laundering, bribery and corruption, fraud or tax evasion. The subsample is logged with the date of publication. The precise identification of an event data is important, as the event study is conducted based on the daily frequencies. Events published out of trading hours (e.g. during weekends and national holidays) are logged with an event date being the next trading day to enable a precise impact assessment.

As a starting point, there are 54 stock listed Nordic banks, but relevant events were recorded only for 20 banks having a jurisdiction in Denmark, Finland, Norway, and Sweden. This was due to the fact that either those 34 banks were too small to be recognized by the news database or alternative those banks did not have any financial crime related news during the sample period of 2012-2019. The amount of relevant news differs between banks, typically for smaller local banks the number of events is lower and for bigger banks the number is higher. The final sample consists of 89 events and more descriptive figures are presented in the table 1 later in this paper.

3.2 Event study methodology

As described earlier in this study, the hypothesis on efficient markets suggests that capital markets take into consideration all available information in company's stock price. According to MacKinlay (1997) impact of particular event to company's stock price can be measured with the event study methodology. This methodology is widely applied in financial research to examine changes in the companies' value and to test the market efficiency. McWilliams & Siegel (1997) explain that stock price based event studies describe the financial impact of an event as stock prices are assumed to reflect the true value of a company because they encompass all pertinent information and reflect future cash flows' discounted value. In addition, stock prices are less subject to insider manipulation, which has elevated event study to become a popular method to analyse the performance and true value of a company instead of only relying on accounting-based figures. (Binder, 1998 & McWilliams & Siegel, 1997.)

Henderson (1990) summarises the structure of an event study to consists of 5 steps. First step is to define the date when market becomes aware of the event. Secondly and thirdly, the returns of the stock in absence of the observed event are determined which leads to calculation of abnormal returns for individual companies by measuring the difference between observed returns and returns without an event taking place. The fourth step is to combine the abnormal returns across companies and time, before finally, as the fifth step, statistically testing whether the abnormal returns are significant. (Henderson, 1990.)

The standard approach for performing an event study is to apply a market model, with which a significance of an event can be concluded. Holler (2014) found out that of all event studies, almost 80% have applied the market model methodology, and in most circumstances market model performs at least as well as any other model (Armitage, 1995). Therefore, this study uses an event study approach which is conducted according to market model. In market model, the return of a single stock is compared against the return of a market benchmark or portfolio, through which t it can be assessed whether an unanticipated event causes abnormal stock price effects. Abnormal returns are considered as a deviance from expected excess return i.e. the experienced stock behaviour if an event had not occurred. An abnormal return can either occur as positive wealth gains or as negative loss of wealth. This study focuses primarily on negative abnormal returns due to the nature of the events in the scope of this study. (McWilliams & Siegel, 1997.)

For each stock, the expected excess returns are calculated based on market parameters which are derived from observed returns of each stock and market index during an estimation period. Holler (2014) analysed 400 event studies and found out that the estimation period usually ranges from 30 days to 750 days, and Armitage (1995) concluded that periods longer than 100 days are sufficient for estimating alpha and beta accurately. The estimation period for alpha and beta is chosen to be 260 days, starting from one day prior to the event day, for this study. This approach is chosen based on previously described literature on the topic as well as to match the estimation period with an average number of trading days a year. Starting the estimation period one day ahead of the event day also ensures that the event day itself is not part of the estimation period.

Holler (2014) notes that a typical event window is a short-term window, from one up to 11 days. In this thesis the event window is 11 days, covering the event day and 10 days following the event day i.e. taking into account only the post-event window. No preceding days, i.e. pre-event window, are included as the news in scope of this study are random and no effect of information leakage should take place before the event announcement given that the events are based on externally announced news that independent of the banks in scope. The below figure 1 illustrates the time periods for this study. An impact of the event is analysed in five different time intervals: [0], [0…1], [0…5], [1…5], and [1…10].

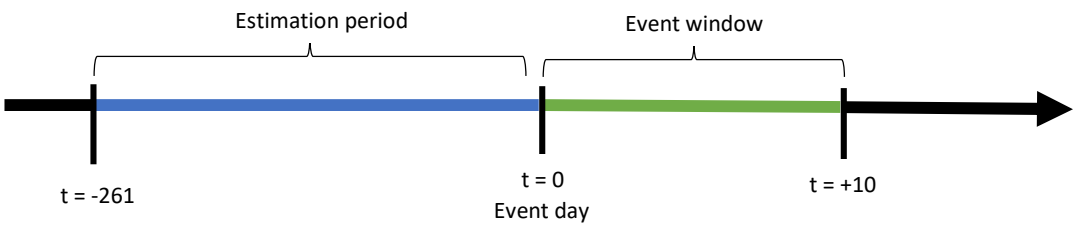

Figure 1. Illustration of the event study timeline for this study

The daily returns R_t are calculated with the following equation:

$$R_t = ln \frac{P_t}{P_{t-1}} \tag{1}$$

In above equation (1) R_t is the logarithmic return, *P* represents the stock price and *t* presents time. Alphas and betas are estimated using the equation 2 below:

$$R_{i,t} = \hat{\alpha}_i + \hat{\beta}_i R_{m,t} \qquad (2)$$

In the equation (2) observed return of the stock i on a day t is represented by $R_{i,t}$, and $R_{m,t}$ is an observed market return of an index m on a day t. Estimation period for alpha and beta is 260 days starting from the day preceding an event day. For each stock both of these parameters are estimated by regressing bank *i*'s daily returns with reference market returns during the estimation window.

In this thesis, two different market benchmarks are used. For each bank's stock a local all-share stock index is used to represent general market index and general market return. These market benchmarks are OMXC25, OMXH25, OMXS30 and OSEAX. In addition, Nordic Financial Industry index (Nordic Financial and OSE40GI) is used for all sample stocks to capture any industry wide impacts. The purpose of using two alternative indices for each stock is to compare possible outcomes between industry and general market in case of financial crime event. Dividends are adjusted for all bank's stock prices and market benchmark values.

As the market model is a standardized way to conduct an event study, it is also applied in this study. The following equation is used to derive the expected returns:

$$E(R_{i,t}) = \hat{\alpha}_i + \hat{\beta}_i R_{m,t} \qquad (3)$$

In the above equation (3), $E(R_{i,t})$ refers to expected return of a company i during a day t. Components $\hat{\alpha}_i$ and $\hat{\beta}_i$ denote the sensitivity and performance of R_i against the market benchmark R_m and are estimated as explained in connection to equation (2).

Next, calculation of abnormal returns for the eleven-day event window is performed for all bank's stocks through deduction of expected returns from observed returns:

$$AR_{i,t} = R_{i,t} - E(R_{i,t}) \quad (4)$$

In the equation (4), $AR_{i,t}$ refers to abnormal return of a stock i on a day t.

The cumulative abnormal performance of an individual bank's stock i from day t though days T is detected by aggregating the abnormal returns with the following equation:

$$CAR_i = \sum_{i=t}^{T} AR_{i,t} \quad (5)$$

Next, the average abnormal returns for full sample are measured separately as the arithmetic means of abnormal returns for each 11 days in the event window i.e. t = 0 + 10 days. The corresponding sample includes all companies and shares. Average abnormal returns during a day t for a sample with a size of N companies are derived with the following equation:

$$AAR_t = \frac{1}{N} \sum_{i=1}^{N} AR_{i,t} \quad (6)$$

The final step is to compound the results to form cumulative average abnormal returns for full sample. This signifies an average abnormal return through a period that includes multiple days:

$$CAAR = \frac{1}{N} \sum_{i=1}^{N} CAR_i \quad (7)$$

After calculating and aggregating average abnormal returns, hypothesis testing is conducted to determine the statistical significance. The null hypothesis of this study is that the average abnormal returns will significantly differ from zero. This entails an event causing positive or negative abnormal impact to bank's stock. Based on the statistical testing, the rejection or acceptance of the null hypothesis may be justified, meaning that the observed event does not or does have significant impact on the company's share performance.

H_0 = ((C)AAR ≠ 0)

H_1 = ((C)AAR = 0)

To test the statistical significance, a t-test is applied. The significance of average abnormal returns for single day are derived from the below equation:

$$t_{AAR_t} = \sqrt{N}\frac{AAR_t}{\sqrt{\sigma^2(AAR_t)}} \sim t(N) \qquad (8)$$

The abnormal returns of cross-sectional variance on day *t* during the event window $\sigma^2(AAR_t)$ are determined as:

$$\sigma^2(AAR_t) = \frac{1}{N-1}\sum_{i=1}^{N}(AR_{i,t} - AAR_t)^2 \qquad (9)$$

For cumulative average abnormal returns, the statistical significance is tested similarly as in equation (8), where the significance was calculated for single-day average abnormal returns:

$$t_{CAAR} = \sqrt{N}\frac{CAAR}{\sqrt{\sigma^2(CAAR)}} \sim t(N) \qquad (10)$$

The parameter $\sigma^2(CAAR)$ is in this equation the cross-sectional variance of cumulative abnormal returns within the data sample through the event window:

$$\sigma^2(CAAR) = \frac{1}{N-1}\sum_{i=1}^{N}(CAR_i - CAAR)^2 \qquad (11)$$

For clarification, while t-test is used to test statistical significance, p-value of each t-test is used to show the significance level for each AAR and CAAR reported in this study.

3.3 Problems and assumptions

Event study is a commonly applied methodology to assess the impact of an event to company's share value and therefore several studies have been conducted to also analyse the problems and weaknesses related to different models for conducting an event study. Brown and Warner (1985) studied potential problems related to applying daily stock data and concluded that the validity of an event study is dependent on strong assumptions, and deviations from these assumptions may hamper the credibility of final results. McWilliams and Siegel (1997) further analysed the findings from Brown and Warner and highlighted the following assumptions to be the most critical: markets work efficiently and take into consideration all available information immediately, events are not anticipated, and the event window is clean from possible confounding events. These assumptions are further described in the following chapters.

3.3.1 Efficient markets assumption

The premise for an event study is to assume that markets are efficient, which entails that all available information is reflected in stock prices and any newly announced information is available for all investors at the same time. McWilliams and Siegel (1997) recommend using event study only if the event is plausible to result in financial impact, the event is unanticipated, and the information is new to the market. In this study it is assumed that the events are random, and management has not leaked the information before the announcements are published. The fact that the event news are collected from an independent source and events are not banks' own announcements supports this assumption. To test how efficiently the markets have incorporated the information, the event window consists of 11 post-event window days including the day of an announcement, but not the days before announcement has been made.

3.3.2 Identification of the event day

In order to conduct reliable analysis, the event date should be identified as precisely as possible to enable accurate identification of abnormal returns (Armitage, 1995). For some events, the identification of the actual event day may be challenging because the information can be released in multiple periods (Hells, 2004). As an example, Hells (2004) refers to mergers considering whether the actual event day should be the day for announcing the possible merger or the day for completing the merger. In this study only the initial events are considered to be relevant as

especially for some money laundering suspicions there have been multiple news released over longer time period. This decision is also based on the previously introduced efficient market hypothesis, which entails that the stock prices should incorporate the impact of an event immediately. For this reason, e.g. news regarding fines have not been regarded as an individual events if the reason for fines has been in publicity before the decision to issue a fine for the company has been published.

3.3.3 Assumption of unanticipated events

In the event study it is assumed that markets have not been aware of the event, and the information is published by the press to all market participants simultaneously (McWilliams & Siegel, 1997). Then it can be presumed that the abnormal returns reflect the reaction of markets to the newly announced information. The problem with this assumption is to know whether the event has been suspected or if there has been a possibility for information leakage before the announcement. In case of financial crime related events it can be assumed that management has not been aware of the wrong-doings or not willing to announce to public what the actual stage of controls in company has been. Therefore, it is assumed that the information is not leaked before the news is announced, and in many cases the announcement has not been decided by the company itself but markets have found out the potential problems and the company's announcement is a reaction to information already existing in the market. For this reason, it is not seen requisite to include companies' press releases into data as either the event has originally been published by the press or press has reacted to company's press release instantly. To mitigate the challenge of event day not being precisely estimated, the post-event window includes 10 days in addition to the event day. This approach is supported by the study of Chang and Chen (1989), noting that multiple day event window enables markets to react.

3.3.4 Confounding events

The longer event window enables observation of the possible reactions on a longer time period, but it also increases the risk of confounding events to take place during the event window. To ensure the reliability of the results, the impact of the studied events should be isolated from other irrelevant or confounding events. Confounding event can be any news influencing stock price during the event window. Event study contains the initial assumption that the studied event has an impact to the stock price of the company, and a failure to capture and control irrelevant and confounding

events can result in significant and severe negative impact on the validity of the empirical results and conclusions (McWilliams & Siegel, 1997).

In event studies where the data is collected from an external database, there may be companies' own announcements published relatively close to events, causing distortion into the analysis. In this study, banks' own communication has been taken into account.

3.3.5 Small sample size and outliers

An initial event study framework assumes normality which is associated with large samples. McWilliams & Siegel (1997) note that often the samples used in event studies are small, and according to Hells (2014) this can cause challenges as the confounding factors or "white noise" cannot be filtered out, which weakens the statistical results. In addition, when a study concentrates only on one industry, risk for returns not being independent across the sample increases, which might result in events coinciding with each other (Hells, 2014).

From the sample size of 119 events, outliers are excluded to ensure that individual news causing statistically exceptional values will not influence the results. Outlier threshold is defined by multiplying the standard deviation in both ways three times, as this approach should result in 99.7% of the data to be included while also leaving significant deviations out of the scope – provided that the sample is normally distributed. The same approach has been used in other event studies (see Ahonen, 2015). In this thesis, there are 30 outlier events outside the set range. The same number of outliers is controlled through all testing with a various subsamples and benchmarks. This approach ensures that the results for each tested sample are comparable. Outliers have been excluded from all subsequent results unless otherwise stated.

Table 1. Decomposition of the sample

	General Market Index		Financial Industry Index	
	N		N	
Initial sample	119	100 %	119	100 %
Outliers, including events with incomplete estimation period	30	25 %	30	25 %
Final Sample	89	75 %	89	75 %

4 EMPIRICAL RESULTS

In this chapter, the focus is on presenting the empirical results. In section 4.1 the final sample is first tested against a general market index and subsequently against a financial industry index. Section 4.2 presents the empirical results for the subsamples on ML, B, F and TE categories (money laundering, bribery & corruption, fraud and tax evasion), which is followed by section 4.3 focusing on subsample tests on a country level. Finally, in the section 4.4. the subsample is tested over the full sample period to observe possible differences between sample years.

The average abnormal returns and statistical significance, denoted as p-value, are reported for each event window day and for preceding event window days. Additionally, cumulative average abnormal returns and statistical significance, denoted as p-value, are presented for additionally tested event window intervals. Through this study, ***, ** and * denote the statistical confidence levels of 99%, 95% and 90%, respectively.

4.1 All-inclusive sample

The testing of all-inclusive sample is started with analysing the average abnormal returns and cumulative abnormal returns for all events in the sample. Table 2 present the findings when applying the market index and industry index as a benchmark for market returns. Results include the initial sample of 119 events and the final sample with 89 events.

Based on the initial findings, the null hypothesis that financial crime events result in statistically significant average abnormal returns is confirmed. For the initial sample, the average abnormal return of general market index on event day is -0.45% and financial industry index -0.05%, of these only the general market index yields statistically significant result at a moderate level. After the exclusion of the outliers, the results are reduced down to -0.29% and -0.04% for general market index and financial industry index respectively, and neither of these results are statistically significant. This might signal some bank facing so substantial changes in the stock value that it has distorted the results resulting in disqualification from the final sample. For the general market's final sample, the only statistically significant result is on seventh day after the event, when there is an illogical positive abnormal result of 0.23% at the significance level 0.05. The results of the final

sample for financial industry index are generally insignificant with the first day after the event being an exception with negative average abnormal value of -0.20% at a moderate significance level.

Table 2. AAR for the all-inclusive sample

	General Market Index				Financial Industry Index			
	Initial sample		Final sample (excludes outliers)		Initial sample		Final sample (excludes outliers)	
	N = 119		N = 89		N = 119		N = 89	
Day	AAR	(p-value)	AAR	(p-value)	AAR	(p-value)	AAR	(p-value)
0	**-0.45 %****	**(0.013)**	**-0.29 %**	**(0.170)**	**-0.05 %**	**(0.693)**	**-0.04 %**	**(0.782)**
1	-0.25 %*	(0.084)	-0.13 %	(0.431)	-0.18 %*	(0.067)	-0.20 %*	(0.085)
2	-0.12 %	(0.365)	-0.17 %	(0.273)	0.07 %	(0.511)	-0.01 %	(0.939)
3	-0.02 %	(0.879)	-0.03 %	(0.819)	0.15 %*	(0.085)	0.10 %	(0.321)
4	-0.11 %	(0.391)	-0.09 %	(0.553)	-0.04 %	(0.710)	0.07 %	(0.629)
5	-0.31 %*	(0.078)	-0.31 %	(0.122)	0.05 %	(0.732)	0.07 %	(0.683)
6	0.04 %	(0.701)	0.01 %	(0.923)	0.08 %	(0.339)	0.02 %	(0.843)
7	0.25 %**	(0.011)	0.23 %**	(0.043)	0.07 %	(0.677)	0.12 %	(0.490)
8	-0.13 %	(0.156)	-0.11 %	(0.302)	-0.04 %	(0.719)	0.04 %	(0.761)
9	-0.04 %	(0.644)	-0.04 %	(0.672)	0.28 %	(0.106)	0.13 %	(0.493)
10	0.03 %	(0.793)	0.02 %	(0.855)	0.04 %	(0.761)	0.19 %	(0.178)

*, **, *** Statistically significant at 90%, 95% and 99% confidence level, respectively

Next the in the table 3 the cumulative average abnormal returns on the samples including all events for both benchmark indices are presented to observe any delays in the market's reaction or untimely abnormal performance because of the published event. Cumulative average abnormal returns are aggregated from day zero all the way up to 10 days after the financial crime related event taking place. General market index shows negative performance for all analysed time periods, with significant results at the 95% confidence level on intervals [0…5] and [1…5]. This seems to be broadly in line with the previously mentioned slowness of market reactions to negative events or negative information and shows that while there may not be statistically significant impact on the event day, the market reaction builds up to significant levels in a short period of time after the event has reached public knowledge (Tetlock, 2007). Figure 2 further illustrates CAAR for the final sample against the general market index. The industry index instead does not provide as consistent results as only intervals [0…1] and [0…5] provide negative results. The results indicate that the whole industry has reacted to the event simultaneously resulting to the CAAR of industry index being insignificant on all event windows.

Table 3. CAAR for the all-inclusive sample

	General Market Index				Financial Industry Index			
	Initial sample		Final sample (excluding outliers)		Initial sample		Final sample (excluding outliers)	
	N = 119		N = 89		N = 119		N = 89	
Window	CAAR	(p-value)	CAAR	(p-value)	CAAR	(p-value)	CAAR	(p-value)
AAR(0)	**-0.45 %****	**(0.013)**	**-0.29 %**	**(0.170)**	**-0.05 %**	**(0.693)**	**-0.04 %**	**(0.782)**
[0 … 1]	-0.70 %**	(0.014)	-0.41 %	(0.203)	-0.24 %	(0.240)	-0.25 %	(0.297)
[0 … 5]	-1.25 %***	(0.001)	-1.01 %**	(0.022)	-0.01 %	(0.984)	-0.01 %	(0.970)
[1 … 5]	-0.74 %**	(0.014)	-0.72 %**	(0.037)	-0.19 %	(0.486)	0.03 %	(0.923)
[1 … 10]	-0.92 %***	(0.007)	-0.61 %	(0.119)	0.25 %	(0.469)	0.54 %	(0.181)

*, **, *** Statistically significant at 90%, 95% and 99% confidence level, respectively

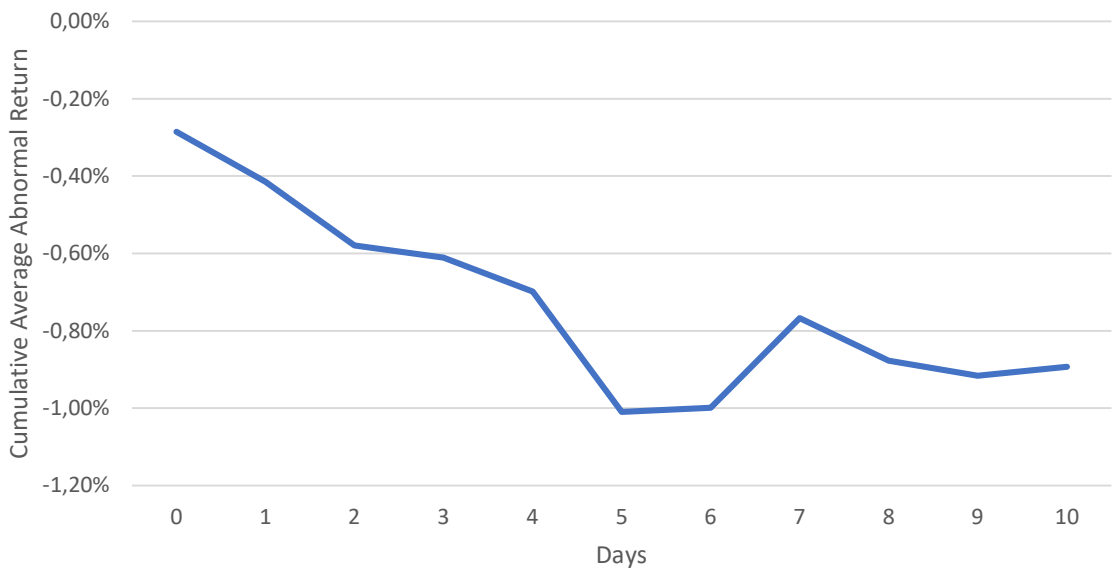

Figure 2. CAAR for the final sample, general market index.

4.2 Subsample on financial crime and fraud events

Based on the hypothesis 2a, there should not be a difference between categories. Table 4 shows average abnormal returns for each financial crime related event category against the general market index. There are clear differences in impact and statistical significance of different event categories, and tax evasion is the only category with highly significant negative average abnormal

return on event day. Additionally, on an event day, money laundering related events result in negative average abnormal return of 0.33% at 90% confidence level. Overall, after the event day, money laundering and fraud events' average abnormal returns are not statistically significant. Tax evasion events result in highly significant average abnormal results on the first and seventh day after the event day. Illogically, the seventh day shows wealth gain of 1.18%, indicating possible distortion due to the small sample size or confusing market reaction. Similar to tax evasion events, bribery & corruption events show delayed market reaction to negative news with the most significant impact (0.99%) occurring on eight days after the event. The results suggest that the hypothesis 2a should be rejected, but it is worth noting that the variance in results may also be due to the sample size differences.

For clarification, the final sample size remains 89 through all sub-sample testing. In some instances, for the purposes of the sub-sample testing, an event may be classified under two separate sub-samples. An example could be an event where a bank has being accused of a broad financial crime related misconduct (see appendix 2), and this event is counted as 1 for the purpose of the full sample testing but divided into two or three separate sub-categories based on financial crime related topics.

Table 4. AAR for event categories, general market index

	General Market Index							
	Money Laundering		Fraud		Tax Evasion		Bribery & Corruption	
	N = 60		N = 25		N = 9		N = 5	
Day	AAR	(p-value)	AAR	(p-value)	AAR	(p-value)	AAR	(p-value)
0	**-0.33 %***	**(0.054)**	**-0.02 %**	**(0.943)**	**-0.63 %*****	**(0.005)**	**-0.43 %**	**(0.638)**
1	-0.19 %	(0.246)	0.24 %	(0.227)	-1.10 %***	(0.000)	-0.81 %*	(0.066)
2	-0.23 %	(0.112)	-0.08 %	(0.835)	0.47 %*	(0.099)	-0.93 %	(0.105)
3	-0.11 %	(0.529)	0.02 %	(0.926)	0.02 %	(0.971)	0.43 %	(0.310)
4	-0.16 %	(0.168)	-0.04 %	(0.926)	-0.39 %	(0.438)	0.20 %	(0.592)
5	-0.44 %	(0.117)	-0.03 %	(0.875)	0.01 %	(0.988)	0.33 %	(0.674)
6	-0.15 %	(0.131)	0.27 %	(0.373)	0.20 %	(0.434)	0.44 %*	(0.095)
7	0.08 %	(0.486)	0.18 %	(0.429)	1.18 %***	(0.006)	-0.57 %*	(0.061)
8	-0.08 %	(0.555)	-0.08 %	(0.624)	-0.54 %**	(0.025)	-0.99 %**	(0.023)
9	0.01 %	(0.906)	-0.19 %	(0.387)	-0.09 %	(0.537)	-0.28 %	(0.449)
10	-0.01 %	(0.924)	0.27 %	(0.459)	0.02 %	(0.921)	0.07 %	(0.906)

*, **, *** Statistically significant at 90%, 95% and 99% confidence level, respectively

When observing differences between event categories within the financial industry itself, the results show slight differences compared to the general market index. At first, these results seem to be aligned with Tetlock's (2017) findings on sub-industry arbitrage in a situation where one bank is hit with fraud-related event. However, Tetlock did not study impacts on other financial crime categories. The average abnormal returns of each event category against the financial industry index are presented in the table 5. Tax evasion and fraud result in negative impact of -0.53% and 0.41%, respectively, at the 95% confidence level on the event day. Average abnormal returns for bribery & corruption events are also significant with the confidence level of 90%, but against the expectations with wealth gain of 1.09% (one would expect negative bribery & corruption news to result in negative share price reaction). After the event day, there are inconsistencies in the signs of statistically significant average abnormal returns for tax evasion events, which are similar to the results when using general market index especially for the latter half of the event window. In broad terms, fraud and tax evasion events seem to result in immediate negative average abnormal results compared to the industry, while money laundering and corruption events have less significant impacts, suggesting that perhaps money laundering and corruption are event types that concern not just one bank at a time.

Table 5. AAR for event categories, financial industry index

	Financial Industry Index							
	Money Laundering		Fraud		Tax Evasion		Bribery & Corruption	
	N = 60		N = 25		N = 9		N = 5	
Day	AAR	(p-value)	AAR	(p-value)	AAR	(p-value)	AAR	(p-value)
0	**0.11 %**	**(0.446)**	**-0.41 %****	**(0.031)**	**-0.53 %****	**(0.048)**	**1.09 %***	**(0.073)**
1	-0.25 %**	(0.033)	0.06 %	(0.639)	-0.89 %***	(0.001)	-0.41 %	(0.387)
2	0.02 %	(0.871)	-0.18 %	(0.498)	0.62 %**	(0.030)	-0.48 %	(0.194)
3	0.07 %	(0.437)	0.04 %	(0.832)	0.12 %	(0.711)	0.41 %*	(0.061)
4	0.06 %	(0.608)	0.07 %	(0.797)	-0.25 %	(0.593)	0.26 %	(0.627)
5	0.04 %	(0.872)	0.11 %	(0.455)	0.31 %	(0.337)	0.33 %	(0.583)
6	-0.02 %	(0.850)	0.03 %	(0.867)	0.19 %	(0.421)	-0.14 %	(0.529)
7	0.03 %	(0.831)	0.19 %	(0.366)	0.48 %**	(0.042)	-0.14 %	(0.633)
8	0.15 %	(0.194)	-0.17 %	(0.309)	-0.50 %***	(0.005)	0.23 %	(0.553)
9	0.10 %	(0.207)	0.16 %	(0.254)	0.66 %***	(0.008)	0.07 %	(0.753)
10	0.16 %	(0.142)	0.29 %	(0.375)	0.30 %*	(0.069)	0.50 %	(0.448)

*, **, *** Statistically significant at 90%, 95% and 99% confidence level, respectively

In comparison to final sample CAARs shown in the table 3, the cumulative average abnormal returns for each financial crime category show more insights into the significance of various news events

to share price. As shown in the table 6, the CAAR for tax evasion related events is highly significant (p-value 0.005) with an impact of -0.63% whereas for the other categories there is no statistically significant impact on share price performance. When observing the impact within the event window, money laundering and tax evasion related events show statistically significant cumulative average abnormal returns in multiple observed intervals. For money laundering related events the cumulative average abnormal return is statistically significant at 99% confidence level for each [0…5], [1…5] and [1…10] interval, resulting in -1.46%, -1.14% and -1.28% respectively. For tax evasion related events, the negative cumulative average abnormal returns are also statistically significant at 99% confidence level for intervals [0…1] and [0…5]. Similar to Berglund & Ekelund's (2019) and Njoku & Zetterström's (2020) findings, these results do suggest that there is a statistically significant negative impact on money laundering events, but in this study that impact is only visible when aggregating average abnormal returns for at least a five-day period. Figure 3 presents the cumulative average abnormal returns for each event type through the event window, and while fraud events result in consistent positive abnormal returns it is also the only event type with zero statistically significant observations.

Table 6. CAAR for event categories, general market index

	General Market Index							
	Money Laundering		Fraud		Tax Evasion		Anti-Bribery & Corruption	
	N = 60		N = 25		N = 9		N = 5	
Window	CAAR	(p-value)	CAAR	(p-value)	CAAR	(p-value)	CAAR	(p-value)
AAR(0)	**-0.33 %**	**(0.196)**	**-0.02 %**	**(0.943)**	**-0.63 %*** **	**(0.005)**	**-0.43 %**	**(0.782)**
[0 … 1]	-0.52 %	(0.189)	0.23 %	(0.518)	-1.73 %***	(0.000)	-1.24 %	(0.297)
[0 … 5]	-1.46 %***	(0.008)	0.10 %	(0.910)	-1.62 %***	(0.008)	-1.21 %	(0.970)
[1 … 5]	-1.14 %***	(0.008)	0.12 %	(0.884)	0.01 %	(0.991)	-0.78 %	(0.923)
[1 … 10]	-1.28 %***	(0.008)	0.57 %	(0.532)	0.02 %	(0.978)	-2.11 %	(0.181)

*, **, *** Statistically significant at 90%, 95% and 99% confidence level, respectively

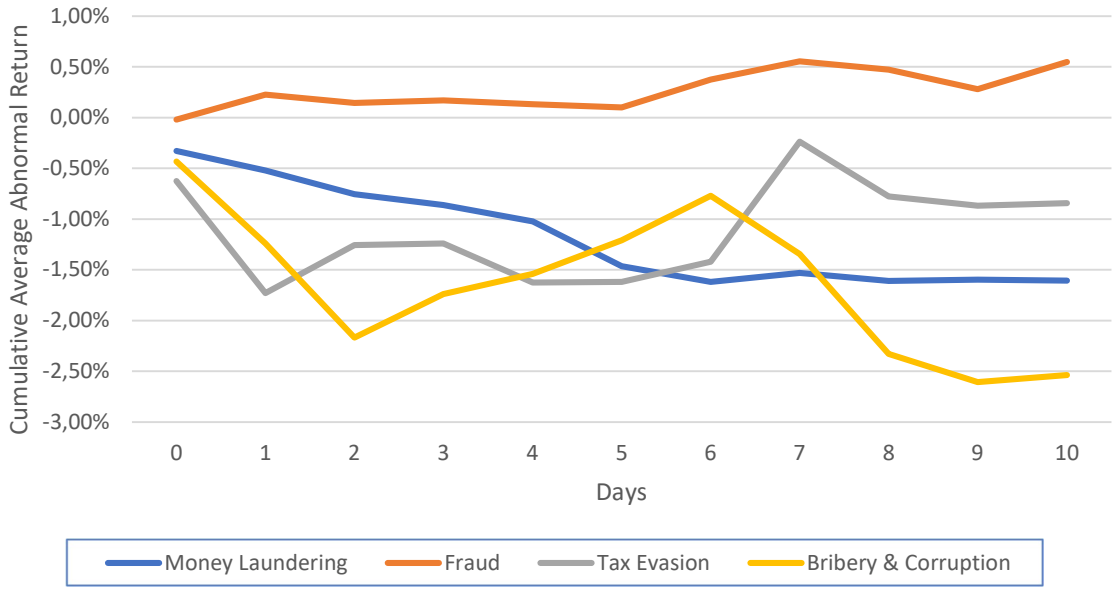

Figure 3. CAAR for each event type, general market index

When observing the impact against the financial industry index in table 7, the results differ from the results against the general market index. The event day yields statistically significant returns but only one interval shows highly statistically significant cumulative average abnormal returns. This supports the overall notion of financial crime events having broader impact on the industry.

Table 7. CAAR for event categories, financial industry index

	Financial Industry Index							
	Money Laundering		Fraud		Tax Evasion		Anti-Bribery & Corruption	
	N = 60		N = 25		N = 9		N = 5	
Window	CAAR	(p-value)	CAAR	(p-value)	CAAR	(p-value)	CAAR	(p-value)
AAR(0)	**0.11 %**	**(0.590)**	**-0.41 %****	**(0.031)**	**-0.53 %****	**(0.048)**	**1.09 %***	**(0.073)**
[0 … 1]	-0.14 %	(0.620)	-0.35 %	(0.132)	-1.43 %***	(0.001)	0.68 %	(0.347)
[0 … 5]	0.05 %	(0.912)	-0.30 %	(0.498)	-0.62 %	(0.315)	1.20 %*	(0.093)
[1 … 5]	-0.05 %	(0.886)	0.10 %	(0.812)	0.31 %	(0.581)	0.11 %	(0.852)
[1 … 10]	0.38 %	(0.443)	0.61 %	(0.193)	0.30 %	(0.627)	0.64 %	(0.204)

*, **, *** Statistically significant at 90%, 95% and 99% confidence level, respectively

4.3 Subsample on all Nordic countries

Subsampling into country specific impacts is done to observe anomalies between each Nordic country. Berglund & Ekelund (2019) and Zetterström (2020) conducted their studies in the Danish and Swedish markets, with both studies showing significant impacts, thus suggesting that there should not be a difference between countries. However, on the event day, Denmark is the only country with statistically significant (p-value 0.043) average abnormal return (-0.75%), whereas other countries show non-significant negative average abnormal returns. This result might be explained by the previously mentioned money laundering case related to Danske Bank, headquartered in Denmark, as 94% of Danish events in the sample have taken place after this Europe's biggest money laundering scandal was revealed in March 2017. Consequently, the market may have become more sensitive for similar events. When comparing against the general market index, Sweden is the only country with statistically significant average abnormal returns during the event window. However, there is inconsistency in the sign of significant returns with the day 7 showing positive average abnormal return of 0.25% at 95% confidence level. Table 8 summarises these results.

Table 8. AAR for country subsample, general market index

	General Market Index							
	Denmark		Finland		Norway		Sweden	
	N = 17		N = 9		N = 11		N = 52	
Day	AAR	(p-value)	AAR	(p-value)	AAR	(p-value)	AAR	(p-value)
0	**-0.75 %****	**(0.043)**	**-0.12 %**	**(0.701)**	**-0.31 %**	**(0.585)**	**-0.16 %**	**(0.293)**
1	0.00 %	(0.992)	-0.62 %	(0.252)	-0.11 %	(0.754)	-0.09 %	(0.542)
2	-0.17 %	(0.775)	0.05 %	(0.900)	-0.30 %	(0.423)	-0.17 %	(0.198)
3	-0.53 %	(0.206)	-0.01 %	(0.987)	0.33 %	(0.383)	0.05 %	(0.745)
4	-0.01 %	(0.983)	0.28 %	(0.231)	0.08 %	(0.854)	-0.21 %*	(0.069)
5	0.09 %	(0.690)	0.08 %	(0.825)	-0.15 %	(0.535)	-0.54 %*	(0.097)
6	-0.11 %	(0.733)	-0.47 %	(0.112)	0.36 %	(0.442)	0.06 %	(0.607)
7	0.20 %	(0.499)	0.32 %	(0.537)	0.11 %	(0.793)	0.25 %**	(0.047)
8	0.05 %	(0.845)	-0.60 %	(0.204)	-0.25 %	(0.393)	-0.05 %	(0.706)
9	0.22 %	(0.375)	-0.33 %	(0.407)	0.03 %	(0.945)	-0.09 %	(0.353)
10	0.27 %	(0.382)	-0.74 %	(0.161)	0.30 %	(0.657)	0.02 %	(0.887)

*, **, *** Statistically significant at 90%, 95% and 99% confidence level, respectively

When observing the CAARs for the country subsample against the general marker index in the table 9, the only highly statistically significant result is found from the Swedish subsample. On the interval [1…10], the Swedish subsample yields negative cumulative average abnormal return of 1.62% at confidence level of 99%. Less statistically significant (90% confidence level) results can be observed for the Swedish subsample on the interval [0…5] and for the Finnish subsample on the interval [1…10], showing cumulative average abnormal returns of -1.12% and -2.05% respectively. The CAARS for each country are illustrated in the figure 4. The Norwegian subsample results in positive CAAR, which however is not statistically significant.

Table 9 CAAR for country subsample, general market index

	General Market Index							
	Denmark		Finland		Norway		Sweden	
	N = 17		N = 9		N = 11		N = 52	
Window	CAAR	(p-value)	CAAR	(p-value)	CAAR	(p-value)	CAAR	(p-value)
AAR(0)	**-0.75 %****	**(0.043)**	**-0.12 %**	**(0.701)**	**-0.31 %**	**(0.479)**	**-0.16 %**	**(0.653)**
[0 … 1]	-0.75 %	(0.192)	-0.74 %	(0.275)	-0.41 %	(0.388)	-0.25 %	(0.560)
[0 … 5]	-1.38 %	(0.294)	-0.34 %	(0.530)	-0.46 %	(0.706)	-1.12 %*	(0.063)
[1 … 5]	-0.58 %	(0.620)	-0.22 %	(0.635)	-0.15 %	(0.884)	-0.55 %	(0.164)
[1 … 10]	-0.06 %	(0.961)	-2.05 %*	(0.078)	0.40 %	(0.739)	-1.62 %***	(0.000)

*, **, *** Statistically significant at 90%, 95% and 99% confidence level, respectively

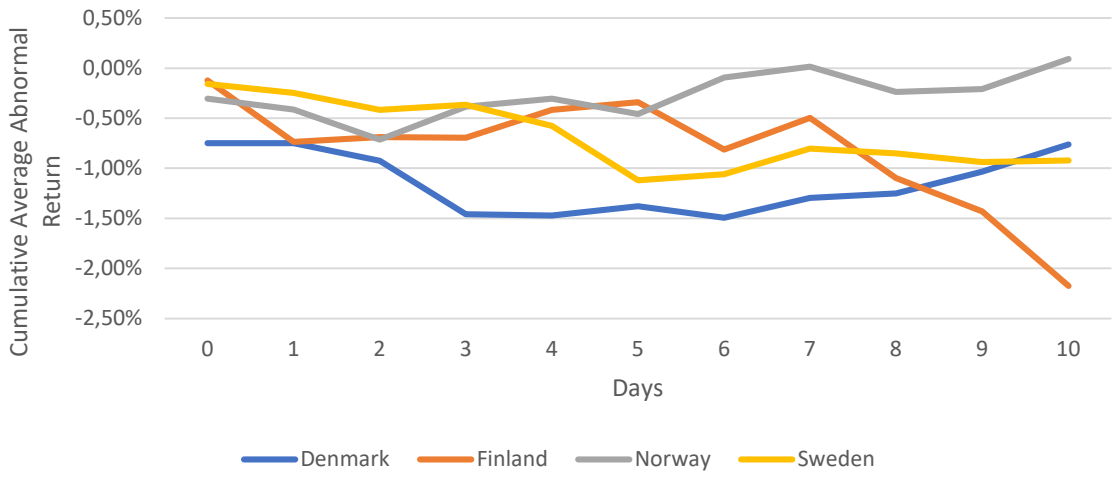

Figure 4. CAAR for each country sample, general market index

While observing the same country subsample against the financial industry index, the results differ in significance as shown in table 10. The average abnormal return for the Norwegian subsample is highly statistically significant -0.15%, and the Danish subsample yields negative average abnormal return of -0.60% at the confidence level of 95% on the event day. Looking at the post-event day impacts, the results start showing mixed reactions: the Norwegian subsample has multiple positive average abnormal returns with day one and four being the most significant. Also, from the Swedish subsample day nine shows positive average abnormal returns of 0.18% at the confidence level of 95%, while on the day one the average abnormal return is -0.25% (p-value 0.021).

Table 10. AAR for country subsample, financial industry index

	Financial Industry Index							
	Denmark		Finland		Norway		Sweden	
	N = 17		N = 9		N = 11		N = 52	
Day	AAR	(p-value)	AAR	(p-value)	AAR	(p-value)	AAR	(p-value)
0	**-0.60 %****	**(0.015)**	**-0.02 %**	**(0.962)**	**-0.15 %*****	**(0.002)**	**0.14 %**	**(0.281)**
1	0.01 %	(0.959)	-0.56 %	(0.108)	0.30 %***	(0.001)	-0.25 %**	(0.021)
2	-0.17 %	(0.706)	0.28 %	(0.428)	-0.08 %	(0.548)	0.00 %	(0.978)
3	-0.01 %	(0.973)	0.02 %	(0.942)	-0.11 %	(0.428)	0.17 %*	(0.056)
4	0.13 %	(0.776)	0.29 %	(0.248)	0.13 %***	(0.006)	0.00 %	(0.997)
5	0.38 %	(0.115)	0.06 %	(0.677)	0.29 %**	(0.016)	-0.04 %	(0.888)
6	-0.17 %	(0.511)	-0.06 %	(0.816)	-0.22 %	(0.428)	0.11 %	(0.266)
7	-0.11 %	(0.711)	-0.19 %	(0.676)	0.28 %	(0.187)	0.24 %*	(0.070)
8	0.33 %	(0.146)	-0.21 %	(0.495)	-0.37 %	(0.384)	0.01 %	(0.899)
9	0.19 %	(0.242)	0.07 %	(0.769)	-0.58 %*	(0.065)	0.18 %**	(0.034)
10	0.39 %	(0.106)	-0.19 %	(0.661)	1.60 %	(0.127)	0.09 %	(0.440)

*, **, *** Statistically significant at 90%, 95% and 99% confidence level, respectively

The cumulative average abnormal returns table 11 gives different results when comparing to the general market index results. Only the Danish subsample shows any statistically significant results, however the most significant result on interval [1…10] is positive rather than negative – an illogical outcome suggesting positive market reaction. Overall, the results of the country comparison suggest that the hypothesis 2b should be rejected as there are significant differences between the market reactions across Nordic countries.

Table 11. CAAR for country subsample, financial industry index

	Financial Industry Index							
	Denmark		Finland		Norway		Sweden	
	N = 17		N = 9		N = 11		N = 52	
Window	CAAR	(p-value)	CAAR	(p-value)	CAAR	(p-value)	CAAR	(p-value)
AAR(0)	**-0.60 %****	**(0.015)**	**-0.02 %**	**(0.962)**	**-0.15 %**	**(0.429)**	**0.14 %**	**(0.595)**
[0 … 1]	-0.59 %*	(0.094)	-0.59 %	(0.301)	0.16 %	(0.549)	-0.11 %	(0.733)
[0 … 5]	-0.26 %	(0.672)	0.06 %	(0.910)	0.39 %	(0.749)	0.02 %	(0.969)
[1 … 5]	-0.01 %	(0.982)	0.09 %	(0.854)	0.54 %	(0.623)	0.03 %	(0.947)
[1 … 10]	2.36 %***	(0.001)	-0.50 %	(0.654)	1.25 %	(0.231)	0.40 %	(0.373)

*, **, *** Statistically significant at 90%, 95% and 99% confidence level, respectively

4.4 Subsample on all individual years

To gain insights into possible change in share price reactions over time, the sample is further divided into annual subsamples. As stated in earlier in this thesis, the first financial crime –related fines for Nordic banks have been issued in 2012-2013, and regulators have been increasing their focus across Europe ever since. As there are no studies to suggest otherwise, the initial assumption and hypothesis (2c) is that there should not be significant differences in market reactions over the sample years. However, as authorities have started to issue fines and penalties only at the beginning of the chosen sample period, these first sanctions may have provided higher impacts on share price as the market had not been accustomed to such events – whereas the following years may provide mixed market reactions. On the one hand side, stricter and more systematic regulatory approach could result in higher fines, thus more impact on banks' financial performance, leading to higher share price impacts. On the other hand, however, such approach could be already adjusted well-ahead by investors, resulting in no significant share price movements at the time of fines being announced.

Of all eight individual annual subsamples shown in the table 12, two resulted in statistically significant AARs on the event day when comparing against the general market index. Years 2014 and 2017 show average abnormal return of -0.23% and -0.95%, respectively. However, both results are statistically significant only at 90% confidence level. When observing all annual subsamples and the whole event window, only years 2015 and 2019 do not have any statistically significant share

price impacts at all. It is, however, worth noting that the day 5 in both samples shows relatively large negative average abnormal return.

Similar high-level pattern remains when observing the results on CAARs for each year, as shown in the table 13 below. Years 2014 and 2017 show multiple statistically significant cumulative average abnormal return intervals, while years 2013, 2015, 2016 and 2019 have no statistically significant results in any of the tested intervals.

The results are interesting, as 2014 is resulting in statistically significant impacts immediately on an event day, while it is also the year with highest amount of financial crime fines being imposed on banks globally (Monroe, 2020). These results do also suggest that the initial hypothesis 2c could be rejected as there is a difference in significance across the sample years.

Figure 5 shows the CAAR for each event year through the event window. Although the results show positive CAAR for 2012, 2015 and 2016, none of these years have statistically significant observations within the illustrated sample.

Table 12. AAR for annual subsample, general market index

	General Market Index															
	2012		2013		2014		2015		2016		2017		2018		2019	
	N = 3		N = 10		N = 8		N = 6		N = 14		N = 13		N = 8		N = 27	
Day	AAR	(p-value)	AAR	(p-value)	AAR	(p-value)	AAR	(p-value)	AAR	(p-value)	AAR	(p-value)	AAR	(p-value)	AAR	(p-value)
0	**-0.20 %**	**(0.454)**	**0.04 %**	**(0.914)**	**-0.23 %***	**(0.089)**	**0.30 %**	**(0.514)**	**-0.23 %**	**(0.422)**	**-0.95 %***	**(0.088)**	**-0.12 %**	**(0.708)**	**-0.32 %**	**(0.206)**
1	-0.98 %**	(0.041)	0.13 %	(0.630)	0.00 %	(0.991)	-0.18 %	(0.688)	0.01 %	(0.974)	-0.46 %*	(0.060)	-1.05 %	(0.272)	0.20 %	(0.302)
2	-0.13 %	(0.623)	-0.71 %**	(0.028)	-0.78 %***	(0.001)	-0.58 %	(0.159)	0.10 %	(0.763)	0.01 %	(0.973)	-0.36 %	(0.657)	0.14 %	(0.682)
3	0.35 %	(0.274)	0.60 %**	(0.011)	-0.28 %*	(0.070)	0.65 %	(0.258)	-0.33 %**	(0.029)	-0.31 %	(0.150)	0.15 %	(0.800)	-0.15 %	(0.685)
4	0.10 %	(0.860)	0.44 %	(0.126)	-0.28 %	(0.183)	0.12 %	(0.686)	-0.11 %	(0.708)	-0.08 %	(0.722)	-0.21 %	(0.638)	-0.25 %	(0.530)
5	-0.31 %	(0.155)	-0.02 %	(0.961)	-0.75 %***	(0.000)	-0.63 %	(0.236)	0.30 %	(0.252)	-0.12 %	(0.505)	0.29 %	(0.332)	-0.81 %	(0.189)
6	0.59 %	(0.355)	-0.51 %	(0.189)	-0.49 %*	(0.073)	0.53 %	(0.469)	0.30 %	(0.193)	-0.02 %	(0.894)	-0.52 %	(0.196)	0.20 %	(0.385)
7	-0.35 %	(0.680)	0.55 %*	(0.074)	0.19 %	(0.449)	0.12 %	(0.804)	0.75 %**	(0.022)	0.05 %	(0.817)	-0.59 %	(0.331)	0.28 %	(0.168)
8	-0.19 %	(0.396)	-0.47 %	(0.107)	0.43 %*	(0.099)	-0.13 %	(0.827)	0.16 %	(0.498)	0.19 %	(0.279)	-1.13 %**	(0.023)	-0.11 %	(0.555)
9	0.37 %	(0.230)	-0.87 %*	(0.059)	-0.53 %**	(0.011)	0.17 %	(0.321)	-0.15 %	(0.229)	0.23 %	(0.209)	0.23 %	(0.333)	0.17 %	(0.404)
10	0.89 %	(0.247)	-0.42 %	(0.605)	-0.15 %	(0.381)	0.00 %	(0.992)	-0.10 %	(0.652)	-0.19 %	(0.499)	0.57 %	(0.285)	0.15 %	(0.407)

*, **, *** Statistically significant at 90%, 95% and 99% confidence level, respectively

Table 13. CAAR for annual subsample, general market index

	General Market Index															
	2012		2013		2014		2015		2016		2017		2018		2019	
	N = 3		N = 10		N = 8		N = 6		N = 14		N = 13		N = 8		N = 27	
Window	CAAR	(p-value)	CAAR	(p-value)	CAAR	(p-value)	CAAR	(p-value)	CAAR	(p-value)	CAAR	(p-value)	CAAR	(p-value)	CAAR	(p-value)
AAR(0)	**-0.20 %**	**(0.454)**	**0.04 %**	**(0.914)**	**-0.23 %***	**(0.089)**	**0.30 %**	**(0.514)**	**-0.23 %**	**(0.422)**	**-0.95 %***	**(0.088)**	**-0.12 %**	**(0.708)**	**-0.32 %**	**(0.206)**
[0 … 1]	-1.18 %*	(0.076)	0.17 %	(0.776)	-0.23 %	(0.394)	0.12 %	(0.863)	-0.22 %	(0.698)	-1.42 %**	(0.045)	-1.17 %	(0.110)	-0.12 %	(0.714)
[0 … 5]	-1.18 %	(0.370)	0.49 %	(0.449)	-2.31 %***	(0.003)	-0.32 %	(0.435)	-0.26 %	(0.498)	-1.91 %**	(0.017)	-1.29 %*	(0.303)	-1.19 %	(0.957)
[1 … 5]	-0.97 %	(0.378)	0.44 %	(0.274)	-2.08 %***	(0.004)	-0.62 %	(0.279)	-0.02 %	(0.939)	-0.96 %**	(0.024)	-1.18 %	(0.150)	-0.87 %	(0.859)
[1 … 10]	0.34 %	(0.791)	-1.28 %	(0.275)	-2.62 %***	(0.000)	0.08 %	(0.942)	0.93 %	(0.145)	-0.70 %	(0.212)	-2.63 %	(0.081)	-0.18 %	(0.659)

*, **, *** Statistically significant at 90%, 95% and 99% confidence level, respectively

Table 14. AAR for annual subsample, financial industry index

	Financial Industry Index															
	2012		2013		2014		2015		2016		2017		2018		2019	
	N = 3		N = 10		N = 8		N = 6		N = 14		N = 13		N = 8		N = 27	
Day	AAR	(p-value)	AAR	(p-value)	AAR	(p-value)	AAR	(p-value)	AAR	(p-value)	AAR	(p-value)	AAR	(p-value)	AAR	(p-value)
0	**0.30 %**	**(0.261)**	**-0.09 %**	**(0.441)**	**0.26 %***	**(0.063)**	**0.27 %**	**(0.544)**	**0.20 %**	**(0.426)**	**-0.23 %**	**(0.652)**	**0.00 %**	**(0.989)**	**-0.31 %**	**(0.109)**
1	-0.14 %**	(0.041)	0.03 %	(0.846)	-0.37 %**	(0.041)	-0.08 %	(0.762)	-0.22 %	(0.456)	-0.15 %	(0.477)	-0.87 %	(0.199)	-0.10 %	(0.475)
2	-0.06 %	(0.827)	-0.45 %**	(0.022)	-0.10 %	(0.482)	-0.19 %	(0.507)	0.41 %	(0.118)	0.27 %	(0.275)	0.24 %	(0.713)	-0.19 %	(0.462)
3	0.22 %	(0.439)	0.28 %*	(0.088)	0.18 %	(0.268)	0.51 %	(0.227)	0.05 %	(0.657)	-0.07 %	(0.720)	0.32 %	(0.437)	-0.07 %	(0.702)
4	-0.02 %	(0.971)	0.13 %	(0.171)	-0.10 %	(0.619)	0.25 %	(0.482)	-0.04 %	(0.881)	0.20 %	(0.417)	-0.33 %	(0.487)	0.17 %	(0.617)
5	-0.05 %	(0.780)	0.38 %*	(0.088)	-0.26 %**	(0.034)	-0.54 %*	(0.069)	0.41 %*	(0.071)	0.02 %	(0.919)	-0.11 %	(0.494)	0.13 %	(0.842)
6	0.16 %	(0.803)	-0.07 %	(0.715)	0.22 %	(0.249)	0.05 %	(0.858)	0.13 %	(0.561)	0.43 %**	(0.014)	-0.71 %*	(0.096)	-0.09 %	(0.618)
7	1.31 %	(0.129)	0.54 %**	(0.012)	0.44 %*	(0.066)	0.53 %*	(0.066)	0.36 %*	(0.088)	0.15 %	(0.535)	-1.10 %	(0.127)	-0.19 %	(0.334)
8	0.08 %	(0.878)	-0.54 %*	(0.096)	-0.17 %	(0.360)	0.59 %	(0.180)	-0.24 %*	(0.083)	0.83 %***	(0.001)	-0.66 %*	(0.074)	0.16 %	(0.328)
9	0.75 %	(0.179)	-0.26 %	(0.325)	-0.25 %**	(0.045)	0.33 %	(0.376)	0.24 %**	(0.017)	0.47 %**	(0.027)	-0.06 %	(0.841)	0.13 %	(0.257)
10	0.48 %	(0.273)	0.04 %	(0.957)	-0.10 %	(0.579)	-0.12 %	(0.651)	0.19 %	(0.358)	0.48 %*	(0.056)	0.85 %*	(0.060)	0.06 %	(0.693)

*, **, *** Statistically significant at 90%, 95% and 99% confidence level, respectively

Table 15. CAAR for annual subsample, financial industry index

	Financial Industry Index															
	2012		2013		2014		2015		2016		2017		2018		2019	
	N = 3		N = 10		N = 8		N = 6		N = 14		N = 13		N = 8		N = 27	
Window	CAAR	(p-value)	CAAR	(p-value)	CAAR	(p-value)	CAAR	(p-value)	CAAR	(p-value)	CAAR	(p-value)	CAAR	(p-value)	CAAR	(p-value)
AAR(0)	**0.30 %**	**(0.261)**	**-0.09 %**	**(0.441)**	**0.26 %***	**(0.063)**	**0.27 %**	**(0.544)**	**0.20 %**	**(0.426)**	**-0.23 %**	**(0.652)**	**0.00 %**	**(0.989)**	**-0.31 %**	**(0.109)**
[0 … 1]	0.16 %	(0.506)	-0.07 %	(0.762)	-0.10 %	(0.642)	0.19 %	(0.756)	-0.01 %	(0.971)	-0.38 %	(0.548)	-0.88 %	(0.128)	-0.41 %*	(0.094)
[0 … 5]	0.24 %	(0.761)	0.28 %	(0.246)	-0.39 %	(0.225)	0.21 %	(0.756)	0.81 %*	(0.052)	0.04 %	(0.946)	-0.75 %	(0.557)	-0.37 %	(0.080)
[1 … 5]	-0.06 %	(0.940)	0.37 %	(0.129)	-0.66 %**	(0.035)	-0.06 %	(0.851)	0.61 %	(0.171)	0.27 %	(0.460)	-0.74 %	(0.669)	-0.06 %	(0.135)
[1 … 10]	2.73 %*	(0.078)	0.08 %	(0.869)	-0.51 %**	(0.048)	1.31 %*	(0.079)	1.28 %**	(0.024)	2.63 %***	(0.001)	-2.42 %	(0.205)	0.01 %	(0.315)

*, **, *** Statistically significant at 90%, 95% and 99% confidence level, respectively

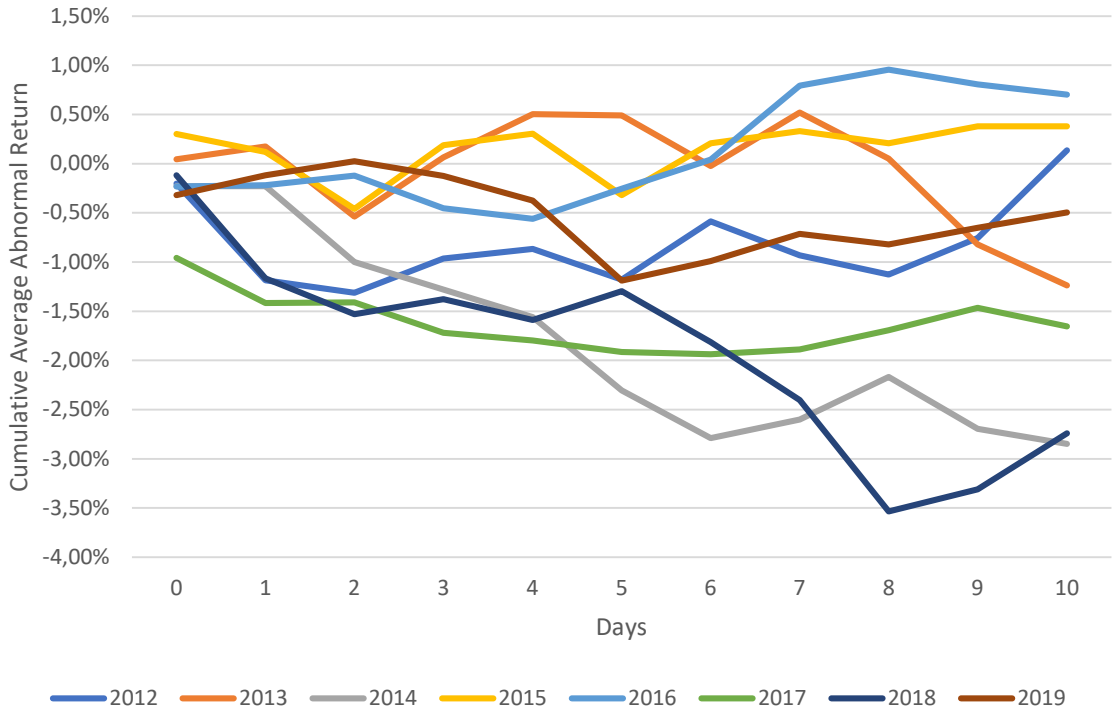

Figure 5. CAAR for each event year, general market index

Tables 14 and 15 summarize results for the same annual subsampling but this time using the financial industry index as a benchmark for calculating market returns. The results on average abnormal returns (table 14) continue on the same pattern as in table 12: statistical significance on individual observations is relatively low, and when observing the event day results, only 2014 includes any statistical significance – however, the sign is illogically positive.

Years 2012, 2013 and 2014 show immediate share price reactions following the news event – the impact is -0.14% on day 1, -0.45% on day 2 and -0.37% on day 1, respectively. All these are also statistically significant at 95% confidence level. This notion supports the initial assumption on stronger market reaction early in the sample when regulators started issuing their first fines on financial crime. As the financial crime is heavily bank focused area, especially in terms of regulation, it seems also natural that the share price impact is more visible in the sample with financial industry index applied as a proxy for market returns.

When observing the cumulative average abnormal returns, it is intriguing to notice that the interval [1…10] results in positive cumulative average abnormal return in six out of eight annual subsamples. Of these, the years 2014, 2016 and 2017 are significant at 95% or 99% confidence level, whereas the other positive results show less statistical significance.

4.5 Robustness checks

Supplementary robustness checks are conducted to perform validity tests on the chosen event study methodology, namely the market model methodology. This is done by repeating all the performed tests first with controlling alpha and beta, and then the estimation window.

In the first test, for all sample shares alpha and beta are set to one and zero, respectively. This approach entails that all sample shares' movements are equivalent to the changes in general market index and in financial industry index. On event day, this additional control results in the AAR being -0.46% (p-value 0.029) and -0.08% (p-value 0.618) for the final sample when having market index and industry index as benchmarks. Based on this outcome, it seems that the results may have had some influence from the chosen event study model.

Next, the estimation window is controlled to test whether the initial results are relying on the estimated parameters. This control test is performed twice, first by narrowing the estimation period down to 125 days and then widening it up to 375 days. The chosen time periods reflect half of a normal trading year and one-and-half of a trading years. With 125-day estimation window the AAR is -0.43% (p-value 0.039) and -0.04% (p-value 0.818) with general market index and financial industry index as benchmarks. The wider 375-day estimation window results in AAR to be -0.45% (p-value 0.001) and -0.07% (p-value 0.685) with general market index and financial industry index as benchmarks. The statistical significance of the results on the event day changes slightly as a result of amending the estimation period. Full results of these controls can be seen in the appendices 1a, 1b and 1c.

5 CONCLUSIONS

This final chapter summarises the whole study and discusses the main results. Additionally, main limitations together with suggestions for future research are presented.

5.1 Summary of results

This thesis set out to study if there is a connection between negative financial crime related news and short-term stock price performance of Nordic banks, and if so, has the possible impact changed over time and does it vary between different types of financial crime related events and Nordic countries. For this purpose, four hypotheses were formed:

1. Financial crime events result in statistically significant negative abnormal returns

2a. There is no difference in financial crime categories and their impact on banks' short-term stock price performance

2b. There is no difference in impact between Nordic countries

2c. The impact on bank's short-term stock price performance does not vary depending on the event year

In addition, this thesis aims to contribute to the existing literature by providing insights on whether news related to alleged financial crime have an effect on Nordic banks' short-term stock values.

The overall results support the notion of financial crime events decreasing the short-term stock value of banks when using a general market index as a benchmark. On an event day, the final sample results in statistically insignificant abnormal return of -0.29%, and daily CAARs for the final sample show statistically significant negative abnormal returns from day 2 onwards. More specifically, the CAARs for tested event windows of [0…5] and [1…5] result in -1.01% and -0.72% respectively, and both results are statistically significant at 95% confidence level. This confirms the hypothesis 1.

On the contrary, when observing results against an industry benchmark as a market reference, events do not result in statistically significant impacts, except for the day one where the impact is -0.20% at 90% confidence level. The result of insignificant CAARs of financial industry index on all

event windows indicates that the whole banking industry may be impacted by a published financial crime -related event. This may be a result of the chosen event data collection approach, where the events for this study are not controlled by each bank but instead events are based on independent sources and media. Public and negative media coverage on one bank's wrongdoings may hamper the general trust in the whole industry.

When studying the subsample of money laundering, bribery & corruption, fraud, and tax evasion, no consistent results are observed. The results suggest that money laundering and corruption may be event types that concern not just one bank at a time, and the observation of the CAARs for the industry further supports the notion of financial crime events having a wider impact on the industry. However, there are inconsistent negative and positive abnormal returns as well as high variance in significance of results between different event types. Only money laundering and tax evasion event categories result in statistically significant immediate impacts on an event day, with -0.33% and -0.63% AARs respectively. Same categories result in most consistent statistically significant negative CAARs within the tested event windows. Though the sample size is rather limited for tax evasion and bribery & corruption news, the hypothesis 2a on the similar impact for all financial crime categories is rejected, as the results vary significantly between these categories.

The results of the country comparison show differences between the market reactions across Nordic countries. On an event day Denmark is the only country facing statistically significant negative abnormal returns against both general market index and industry index (-0.75% and -0.60% respectively). This result and the larger negative impact in Denmark might be explained by the Danish subsample consisting of events which have taken place after the Europe's biggest money laundering case was revealed in Danske Bank in 2017. This scandal has been widely covered in various media entailing that the Danish market might have been more alerted in relation to any financial crime related news since then. The hypothesis 2b is rejected, as the impact across Nordic countries is not consistent. The impact in Finland and Sweden is more delayed, as statistically significant CAARs are observed at [1…10] window for Finland and [0..5] and [1…10] windows for Sweden.

Similar to country subsample, also the yearly cumulative average abnormal returns show unexpected differences between different years. Years 2014 and 2017 show statistically significant negative abnormal returns immediately during an event day (-0.23% and -0.95% respectively) and negative cumulative average abnormal returns during all event windows in comparison to general market index while other years result in inconsistent positive and negative results with only random statistical significance. This result indicates that the record high fines issued in 2014 and large

money financial crime scandal revealed in 2017 have increased the awareness of markets on the banks' role in the fight against money laundering and the concerns have impacted the whole industry. However, it seems that markets in general do not react on "smaller" incidents that happen more frequently throughout the sample period. Based on these findings, also the hypothesis 2c is rejected as the impact varies significantly across the sample period years.

According to Fama's (1970) efficient market hypothesis, new information is immediately reflected in the markets. The results from this study do not fully support this hypothesis, as both the all-inclusive sample and all subsamples result in statistically significant abnormal returns and cumulative average abnormal returns several days after the event day. This outcome is aligned with both Tetlock's (2007) conclusion on investors being slow to react to negative news and Njoku's & Zetterström's (2020) and Berglund's & Ekelund's (2019) studies which concluded that it took rather long time from the market the fully react to money laundering scandals of Swedbank and Danske Bank.

The observed results of the wider impact in the financial industry are contradictory to the previous studies of Njoku's & Zetterström (2020) and Berglund's & Ekelund (2019) on Swedish banks and Danish bank, respectively. This might be due to the rather big differences in scope of the study, as these other studies focused on a one single scandal related to individual bank, while this study covers all financial crime events in each Nordic country. The results of this study also do not align with the result of Salomonsson & Thormählen (2015) as they found it to be possible for investors to gain excess returns by investing in other industry peers when one bank is being suspected of fraudulent actions, while this study shows that the overall reaction is industry-wide though fraud events have the lowest amount of statistically significant results.

As a conclusion, the overall results are aligned with the general negative impact found in previous literature. Though the prevention of financial crime is a regulatory obligation for banks, and improper controls might lead into regulatory fines, there is also an additional risk of reputational damage which often results in decreasing stock value. A common result is also that the whole financial industry is impacted instead of only the bank associated with the event. While the biggest money laundering scandals have become public in Nordic countries during past 3 years and simultaneously Nordic supervisors are becoming more active in their investigation and issuing fines, it could be expected that banks are under more detailed scrutiny by media as well, entailing that any lacking controls in financial crime prevention are more likely to be found and become public. This should be carefully considered by the decision-makers within the banking sector.

5.2 Limitations and future research

This study concentrated only on the short-term impacts, and other methods should be applied to test potential impact on banks' financial performance on a longer time period. The data for this study was extracted from a database which did not include banks' own announcements, and for this reason, including company announcements could provide additional events. This could also have an impact on the event day if the events have been covered by banks' own releases before media has captured those. Additionally, including the sub-events following the initial event could provide interesting insights on markets reactions to the further information gained on financial crime events. Furthermore, this study could be conducted by studying the cost of debt instead of equity prices. Some previous studies also suggest that conducting the test with only one model, in this case market model, might provide rather unilateral results, and for this reason also other methodologies could be applied.

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APPENDICES

Appendix 1a: Control for alpha and beta

	General Market Index				Financial Industry Index			
	Initial sample		Final sample (excludes outliers)		Initial sample		Final sample (excludes outliers)	
	N = 119		N = 89		N = 119		N = 89	
Day	AAR	(p-value)	AAR	(p-value)	AAR	(p-value)	AAR	(p-value)
0	**-0.46 %****	**(0.012)**	**-0.46 %****	**(0.029)**	**-0.08 %**	**(0.563)**	**-0.08 %**	**(0.618)**
1	-0.27 %**	(0.049)	-0.27 %*	(0.089)	-0.21 %**	(0.044)	-0.21 %*	(0.082)
2	-0.15 %	(0.252)	-0.15 %	(0.322)	-0.02 %	(0.843)	-0.02 %	(0.865)
3	-0.02 %	(0.836)	-0.02 %	(0.858)	0.12 %	(0.205)	0.12 %	(0.273)
4	-0.11 %	(0.393)	-0.11 %	(0.461)	-0.03 %	(0.814)	-0.03 %	(0.839)
5	-0.30 %*	(0.088)	-0.30 %	(0.140)	0.03 %	(0.855)	0.03 %	(0.874)
6	-0.01 %	(0.921)	-0.01 %	(0.931)	0.08 %	(0.414)	0.08 %	(0.480)
7	0.21 %**	(0.033)	0.21 %*	(0.066)	-0.13 %	(0.409)	-0.13 %	(0.476)
8	-0.11 %	(0.224)	-0.11 %	(0.294)	0.02 %	(0.842)	0.02 %	(0.863)
9	-0.04 %	(0.631)	-0.04 %	(0.678)	0.23 %	(0.184)	0.23 %	(0.251)
10	0.03 %	(0.777)	0.03 %	(0.807)	0.07 %	(0.520)	0.07 %	(0.578)

*, **, *** Statistically significant at 90%, 95% and 99% confidence level, respectively

	General Market Index				Financial Industry Index			
	Initial sample		Final sample (excluding outliers)		Initial sample		Final sample (excluding outliers)	
	N = 119		N = 89		N = 119		N = 89	
Window	CAAR	(p-value)	CAAR	(p-value)	CAAR	(p-value)	CAAR	(p-value)
AAR(0)	**-0.46 %****	**(0.012)**	**-0.46 %****	**(0.029)**	**-0.08 %**	**(0.563)**	**-0.08 %**	**(0.618)**
[0 … 1]	-0.73 %***	(0.009)	-0.73 %**	(0.024)	-0.29 %	(0.141)	-0.29 %	(0.203)
[0 … 5]	-1.32 %***	(0.001)	-1.32 %***	(0.003)	-0.19 %	(0.532)	-0.19 %	(0.589)
[1 … 5]	-0.84 %***	(0.005)	-0.86 %**	(0.012)	-0.36 %	(0.178)	-0.12 %	(0.706)
[1 … 10]	-1.08 %***	(0.001)	-0.78 %**	(0.036)	-0.12 %	(0.715)	0.16 %	(0.680)

*, **, *** Statistically significant at 90%, 95% and 99% confidence level, respectively

Appendix 1b: Robustness check using 125 days test

	General Market Index				Financial Industry Index			
	Initial sample		Final sample (excludes outliers)		Initial sample		Final sample (excludes outliers)	
	N = 119		N = 89		N = 119		N = 89	
Day	AAR	(p-value)	AAR	(p-value)	AAR	(p-value)	AAR	(p-value)
0	**-0.43 %****	**(0.017)**	**-0.43 %****	**(0.039)**	**-0.04 %**	**(0.790)**	**-0.04 %**	**(0.818)**
1	-0.26 %*	(0.076)	-0.26 %	(0.125)	-0.17 %	(0.105)	-0.17 %	(0.161)
2	-0.10 %	(0.455)	-0.10 %	(0.519)	0.05 %	(0.610)	0.05 %	(0.659)
3	-0.02 %	(0.867)	-0.02 %	(0.885)	0.11 %	(0.222)	0.11 %	(0.291)
4	-0.11 %	(0.381)	-0.11 %	(0.449)	-0.05 %	(0.674)	-0.05 %	(0.717)
5	-0.30 %*	(0.079)	-0.30 %	(0.129)	0.06 %	(0.705)	0.06 %	(0.744)
6	0.01 %	(0.900)	0.01 %	(0.914)	0.09 %	(0.287)	0.09 %	(0.357)
7	0.26 %***	(0.009)	0.26 %**	(0.023)	-0.01 %	(0.944)	-0.01 %	(0.951)
8	-0.12 %	(0.208)	-0.12 %	(0.277)	-0.01 %	(0.929)	-0.01 %	(0.939)
9	-0.03 %	(0.687)	-0.03 %	(0.727)	0.25 %	(0.136)	0.25 %	(0.198)
10	0.03 %	(0.771)	0.03 %	(0.802)	0.03 %	(0.808)	0.03 %	(0.834)

*, **, *** Statistically significant at 90%, 95% and 99% confidence level, respectively

	General Market Index				Financial Industry Index			
	Initial sample		Final sample (excluding outliers)		Initial sample		Final sample (excluding outliers)	
	N = 119		N = 89		N = 119		N = 89	
Window	CAAR	(p-value)	CAAR	(p-value)	CAAR	(p-value)	CAAR	(p-value)
AAR(0)	**-0.43 %****	**(0.017)**	**-0.43 %****	**(0.039)**	**-0.04 %**	**(0.790)**	**-0.04 %**	**(0.818)**
[0 … 1]	-0.69 %**	(0.015)	-0.69 %**	(0.036)	-0.21 %	(0.312)	-0.21 %	(0.382)
[0 … 5]	-1.22 %***	(0.001)	-1.22 %***	(0.006)	-0.03 %	(0.923)	-0.03 %	(0.933)
[1 … 5]	-0.74 %**	(0.014)	-0.78 %**	(0.025)	-0.22 %	(0.407)	0.01 %	(0.985)
[1 … 10]	-0.92 %***	(0.008)	-0.63 %	(0.115)	0.16 %	(0.647)	0.36 %	(0.379)

*, **, *** Statistically significant at 90%, 95% and 99% confidence level, respectively

Appendix 1c: Robustness check using 375 days test

	General Market Index				Financial Industry Index			
	Initial sample		Final sample (excludes outliers)		Initial sample		Final sample (excludes outliers)	
	N = 119		N = 89		N = 119		N = 89	
Day	AAR	(p-value)	AAR	(p-value)	AAR	(p-value)	AAR	(p-value)
0	**-0.45 %****	**(0.014)**	**-0.45 %*****	**(0.001)**	**-0.07 %**	**(0.639)**	**-0.07 %**	**(0.685)**
1	-0.24 %*	(0.087)	-0.24 %*	(0.064)	-0.19 %*	(0.068)	-0.19 %	(0.115)
2	-0.12 %	(0.336)	-0.12 %	(0.396)	0.04 %	(0.744)	0.04 %	(0.778)
3	-0.03 %	(0.822)	-0.03 %	(0.846)	0.18 %*	(0.065)	0.18 %	(0.110)
4	-0.12 %	(0.361)	-0.12 %	(0.411)	-0.02 %	(0.890)	-0.02 %	(0.905)
5	-0.32 %*	(0.066)	-0.32 %	(0.112)	0.00 %	(0.996)	0.00 %	(0.996)
6	0.04 %	(0.665)	0.04 %	(0.706)	0.07 %	(0.457)	0.07 %	(0.520)
7	0.24 %**	(0.016)	0.24 %**	(0.036)	0.04 %	(0.803)	0.04 %	(0.829)
8	-0.12 %	(0.198)	-0.12 %	(0.244)	-0.07 %	(0.534)	-0.07 %	(0.591)
9	-0.03 %	(0.747)	-0.03 %	(0.783)	0.21 %	(0.211)	0.21 %	(0.280)
10	0.03 %	(0.756)	0.03 %	(0.790)	0.02 %	(0.848)	0.02 %	(0.869)

*, **, *** Statistically significant at 90%, 95% and 99% confidence level, respectively

	General Market Index				Financial Industry Index			
	Initial sample		Final sample (excluding outliers)		Initial sample		Final sample (excluding outliers)	
	N = 119		N = 89		N = 119		N = 89	
Window	CAAR	(p-value)	CAAR	(p-value)	CAAR	(p-value)	CAAR	(p-value)
AAR(0)	**-0.45 %****	**(0.014)**	**-0.45 %*****	**(0.001)**	**-0.07 %**	**(0.639)**	**-0.07 %**	**(0.685)**
[0 … 1]	-0.69 %**	(0.015)	-0.69 %***	(0.001)	-0.26 %	(0.232)	-0.26 %	(0.301)
[0 … 5]	-1.28 %***	(0.001)	-1.28 %***	(0.001)	-0.06 %	(0.852)	-0.06 %	(0.872)
[1 … 5]	-0.76 %**	(0.012)	-0.83 %**	(0.016)	-0.18 %	(0.533)	0.01 %	(0.981)
[1 … 10]	-0.94 %***	(0.007)	-0.66 %*	(0.099)	0.08 %	(0.828)	0.29 %	(0.484)

*, **, *** Statistically significant at 90%, 95% and 99% confidence level, respectively

Appendix 2: Example of event data

Reporter	Reuters News (reuters.com)
Date	March 21, 2017
Headline	Danske Bank and Nordea investigated for potential laundering of DKK 7 billion between 2011 and 2014 (French)
Summary	The Danish newspaper Berlingske has reported that Danske Bank and Nordea are being investigated by Latvian and Moldovan authorities relating to the potential laundering of DKK 942 billion through foreign subsidiaries between 2011 and 2014. Meanwhile, Danske Bank has stated that these transactions were almost exclusively effected through its Estonian subsidiary and that it has already discussed this issue with Danish and Estonian authorities. In 2016, Danske Bank was already reprimanded by the Danish Financial Supervisory Authority. The NGO Organized Crime and Corruption Reporting Project has also been mentioned in relation to data about the money laundering allegations.
Related ESG issues	Corruption, bribery, extortion and money laundering; Violation of national legislation
Related countries	Denmark; Estonia; Latvia; Moldova
Link to source	https://www.mediapart.fr/journal/economie/210317/danske-bank-et-nordea-cooperent-une-enquete-pour-blanchiment