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The stock market effects of legal insider trades

A study of legal insider trades at Oslo Stock Exchange

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Preface

This master thesis is written as an ending to our master's degree in economics with a specialization in financial economics at Oslo Metropolitan University. This thesis aims to empirically shed light on short-term reactions to stock prices of companies listed on the Oslo Stock Exchange when primary insiders are buying or selling stocks.

Working with this thesis has been both instructive and exciting. In particular, has the challenge of an event study with a big amount of data been instructive. There have been a lot of new challenges on the way to the final paper, but we have learned to cope with them calmly and patiently. We will bring these lessons with us in our future careers.

We want to thank our supervisor Danielle Zhang for her guidance, constructive input, and answers throughout this semester.

Abstract

In this thesis, we study the market reaction to insider trades at Oslo Stock Exchange. More specifically, we investigate the abnormal return on legal insider trades in the short run. Our study is conducted for the period 01.01.2020 – 31.12.2021. By using an event study approach, we document a significant market reaction to both insider purchases and insider sales. We also found evidence that the size of the trade and the size of the company is significant factors. We conclude that there are informational asymmetries between outsiders and insiders and that the market does not hold a strong-form efficiency.

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1. Introduction

In this thesis we study Oslo Stock Exchange throughout 2020-2021 intending to answer our research question:

How will legal insider trades affect the stock price of companies listed on the Oslo Stock Exchange?

By insider trading, we mean legitimate insider trading that is reported according to Oslo Stock Exchange regulations. Illegal insider trading is trades conducted based on information that is not publicly known. We have chosen this topic because we thought that this was an effective way to test the efficient market hypothesis, and to which degree insider trades exploit the asymmetric information on Oslo Stock Exchange. An efficient market and the least possible amount of asymmetric information are important for the stock exchange to function as a place for companies to raise capital (Mishkin, 1990). The efficient market hypothesis says that stock prices reflect all available information at any given time (Bodie et al., 2021), which also includes inside information. If we were to see a reaction in the market when insider trades are being conducted, it would give us an indication that the market does not have a strong form of market efficiency and that there might exist some degree of asymmetric information between the insider and the outsider. To test this, we wanted to conduct an event study.

Our sample consists of 1421 insider trades over the two years 2020-2021. We had to make several criteria for the trades we wanted to include in our research. And in this way, we could isolate the effect of the insider trades as much as possible. Our study tested the market reaction on both sales and purchases. We also wanted to test the market reaction to different characteristics regarding the trades. These characteristics were the role of the insider, the size of the trade, the size of the trade relative to total shareholding, and the size of the company.

Insider trading is highly regulated, so when insiders buy or sell it should be based on the same information as every other participant in the market. We wanted to examine whether the market thinks primary insiders possess more information regarding the company which will indicate asymmetric information. Executives are in a position that might give them a different quality of information, in opposition to an owner. Based on this theory we think that trades made by primary insiders could create a response in the market.

Our study contributes to the literature in the following way. First, there have been conducted many studies regarding the market effect of legal insider trades, but not so many of the studies are on the Oslo Stock Exchange. The fact that Eckbo (1998) came to a different conclusion with a slightly different approach, caught our interest. Secondly, most of the research is from older periods, hopefully allowing us to contribute to the literature by looking at today's market. Thirdly, our investigation period is during the Covid-19 pandemic which created turmoil in the market. Fourthly, we are looking at the specific characteristics of insider trades to find out what affects the market the most.

The rest of the thesis proceeds as follows. Section two summarizes the literature in the field, together with our hypothesis development. In sections three and four, we present our data and method, and section five includes our analysis and findings. In the last section, we will summarize our conclusion of the thesis.

2. Literature review and hypothesis development

In this chapter, we address insider trading and regulation. Further, we will present previous research and literature regarding this topic. We will also go through some theoretical bases, and in the end, we will show our hypothesis and our reflections regarding them.

2.1 Insider trading and regulations

The market for securities plays an important role in being a fundraiser for companies noted on the stock exchange. This is an important factor in our society's value creation and is important for economic growth. In the last couple of years, there has also been an increase of participants in the market, as well as market information become easily available to everyone. Consequently, it is important that the stock exchange is perceived as honest and transparent, and that the participants trust that laws and regulations are followed. Insider trading is therefore heavily regulated in the securities trading act ("Verdipapirhandelloven"). The law is implemented to prevent an investor to utilize inside information on companies that is not publicly available and publicly known. If the regulations were not in place, then both private and institutional investors could decide not to participate in the market because of the existence of asymmetric information. The extreme consequence with this, could be that the market dries up, and it becomes difficult to raise funds.

The regulations also ensure that information about legal insider trade will be communicated properly. On the Oslo Stock Exchange, information about insider trading is reported on Newsweb. This ensures that everyone knows where to find this information, and also receives it fast and at the same time.

2.1.1 Definitions

Insider trading involves trading in a public company's stock by a company director, executive, or officer. The Board of Directors, management, and those responsible for financial administration, finance, legal matters, and communications are commonly defined as primary insiders. Insider trading should not be misinterpreted as illegal insider trading, whereas illegal insider trading is trading on information that is not publicly known. There are different

opinions whether insider trading should be legal or not. Friedman wanted insider trades because this gives the market knowledge about deficiencies in the company and makes the public aware of that (Durnev & Nain, 2007). While others find that insider trading undermines the investors' confidence in the integrity of the market (Bodie et al., 2021). Manne meant that insider trades were helping with efficient pricing in the market, and securing theoretical correct stock price (Manne, 1966).

2.1.2 Primary Insiders

Primary insiders are persons with key positions in a company trading on a stock exchange. Because these individuals are easier exposed to price-sensitive information, they are tied to certain requirements about their trading and when they can trade, § 3-1 (Verdipapirhandelloven, 2014). Norway is one of few countries where the listed companies are obliged to notify the authorities about an insider trade no later than one trading day after the trade.

2.1.3 Inside Information

In the Norwegian securities trading act § 3-1 (Verdipapirhandelloven, 2014) inside information is defined as precise information about a financial instrument, the issuer, or other conditions that may influence the stock price, and that is not publicly known. This is thought of as information that a rational investor would use in an investment decision. If a person has inside information, the person cannot pass the information on, and the information must be treated carefully and confidentially. If you act on this information, this is regarded as illegal insider trading.

2.2 Stock market reactions to legitimate insider trading

There has been a lot of previous research on legal insider trading. Most of them conclude that an insider can earn a significant abnormal return, despite having different time horizons in the analysis. Studies show that insider trades add new information to the market. These results have been documented both in the late 1900s (Finnerty, 1976; Jaffe, 1974; Seyhun,

1986) and also in the early 2000s (Aktas et al., 2008; Aussenegg & Ranzi, 2008; Jeng et al., 2003). Insiders earn abnormal returns because of a contrarian investment style or being able to exploit private information and predict future cash flows more precisely than outsiders.

Finnerty (1976) found that, in the short run, insiders were able to identify profitable as well as unprofitable situations in their own companies. John and Lang (John & Lang, 1991) examined informational aspects of insider trading around the time of corporate dividend announcements. They found that insider trading before the announcement has significant explanatory power. Aktas et al. (2008) analyzed insider trading's contribution to market efficiency and found that financial markets responded weakly to insider purchases while insider sales did not show any significant signs. Jian and Zaman (Jiang, 2007) looked at insider trading strategies and concluded that excess return came from the insiders' ability to predict future cash flows, and not that they were contrarian investors. This is contrary to the findings of other papers (Aussenegg & Ranzi, 2008; Lakonishok et al., 1998; Zaman, 1988) which have concluded with the opposite.

Most of the previous research on the topic focused on the U.S., but in the last ten years, more studies on insider trading in Europe have emerged. Aussenegg & Ranzi (Aussenegg & Ranzi, 2008) examined the information content of insider trading in seven European countries. Their findings showed that inside purchases followed a contrarian investment style, with purchases being made after a period of a decline in stock price. They also found that when insiders conducted sales it contained price-relevant information and the reactions from insider trading were stronger in smaller firms compared to larger firms. Their last finding was that small volume insider trades revealed more information about the firm value than large volume trades do.

On the Italian stock market, it was concluded that insiders have private information and were able to contain significant abnormal returns (Bajo & Petracci, 2004). The same study was conducted on the Warsaw Stock Exchange in Poland (Gurgol & Majdosz, 2007) with the same conclusion on insider purchases, but no significant findings were made on insider sales. On the German market, there is also found proof of a contrarian investment style (Klinge et al.,

2007) while there was also found proof of significant abnormal returns after insider disclosures (Stotz, 2006).

In the research done by Lin & Rozeff (1992) they showed that 85 % - 88 % of the information from the insider trades was reflected in the stock price during the first trading day. This was also confirmed by Holen (2008). Lin & Rozeff (Lin, 1995) also found that the larger the daily trading volume was the faster the information got reflected in the price. This was also dependent on if the company was listed on a stock exchange or not. They concluded that the market was efficient in a semi-strong form.

The most noticeable research that has come to a different conclusion is Eckbo and Smith´s (E. Eckbo, 1998) research. They researched over 18 000 trades from 1985 to 1992 on Oslo Stock Exchange and could not find proof of abnormal returns of insider trading. They structured their analysis a bit differently than other research on the same topic. They wanted to see if insiders made any abnormal returns until they sold their position, not only if the stock itself had an abnormal return for a given time after the trade. They, therefore, looked at the insiders' whole holding period. Their results suggest that insiders had a negative return on their trade.

Even though the studies are not all similar in their approach, their findings are somehow similar. Most of the research claims that insider trades lead to significant abnormal returns and that these trades add new information to the market. These literature exhibits show that there is evidence of asymmetric information in the market between insiders and outsiders at least to a small degree, and when insiders make trades, it often gets quickly reflected in the stock price.

2.3 Theoretical Basis

2.3.1 Asymmetric Information

Asymmetric information occurs in situations where one party in a transaction has information the other party does not have. This is relevant in our analysis because it is likely that the insider has more information about the company and its future cash flows than the outsiders. You could say that every transaction has asymmetric information to a large or small degree.

In many markets, this is highly regulated, but it is difficult to exclude it completely. This comes from the fact that a buyer of e.g., insurance knows more about his risk appetite, than the seller of the insurance, a seller of a product knows more about the product than the buyer, and a borrower knows more about his willingness to pay back the money than the lender. In all these situations you will have some degree of asymmetric information. We can split asymmetric information into two types, depending on where the asymmetry occurs. These two types of asymmetries are "moral hazard" and "unfavorable selection" (Solli, 2009).

2.3.2 Moral Hazard

Moral hazard is an asymmetric information problem that occurs after the deal has been made (Bebczuk, 2000). This is more often a problem when agreeing on contracts, for example in the insurance business. This comes from the fact that when one party is insured against risk, the behavior of the first party can change to the other party's disadvantage. A good example of this is fire insurance. When your house is insured against fire you may lack the necessary incentives to install or maintain, expensive fire protection equipment. If these upgrades are not being made the likelihood of fire will rise. The company selling you the insurance must account for the rise in the probability of fire, and this prevents the insurance company from offering you insurance at a more favorable premium. This hurts both parties as the insured party must pay a bigger prize, and the insurer must cover a bigger loss than expected.

2.3.3 Unfavorable Selection

Unfavorable selection is asymmetric information that occurs before the transaction. You have an unfavorable selection when one party in a transaction knows something that the other party does not know before the transaction takes place (Bebczuk, 2000). An example of this is the market for used cars. George Akerlof used this market in his paper; "The Market for "Lemons" (Akerlof, 2003) to describe asymmetric information. "The lemon problem" is described as how the seller of the used car will have much more information regarding the condition of the car, and how the car works than the buyer itself. Because of this, you will have products, like used cars, of different qualities sold at the same price because the buyer does not have the necessary information to decide the correct qualities of the product. This

causes asymmetry. It is first after the transaction that the qualities of the product will reveal themselves, and in this case, the uninformed party is often the one being the victim.

This asymmetry is also a challenge in the money markets. An insider of a company will have more information about the company and why he decides to buy or sell. So, when he decides to buy (sell) the transaction will be at a lower (higher) price than if both parties had the same amount of information. It is therefore crucial for an efficient market that every player in the market has access to the same information. If not, the informed player will have a huge advantage. This asymmetry in the money market is heavily regulated as no one can buy if you have insider information about a company. But what you can not regulate is the fact that the insider is not buying on this type of private information. If an insider postpones a planned share purchase because he knows there will come some bad news regarding the company, this is the same type of exploitation of insider information but it is impossible to control and it is as damaging to the efficient market as a trade based on future positive news.

If the market knows that an insider will not buy his share if he knows that there will come bad news in the future and you also consider that the insider has good knowledge about the company, its finances, and the market it operates in, as well as other important factors, this is the kind of information an insider trade could add to the market in a transaction. It is this effect we take a closer look at in this analysis.

2.3.4 Efficient Market Hypotheses

This theory explains how stocks that are traded in open markets, have prices that always reflect the information available. New information is quickly reflected in prices in the market (Bodie et al., 2021). Therefore, it is difficult to foresee the movement in the market and make a good profit. But of course, there are situations where you can beat the market if you just have luck, purchase privileges, insider information, or exceptional skills. But based on the theory it is not possible to systematically beat the market. Investors who want to beat the market will constantly seek new information, but the profit of gathering all this information is small because the competition is strong. But this also ensures that the stock prices reflect all information (Bodie et al., 2021).

The theory divides market efficiency into three levels; weak – semi-strong- and strong form. Weak efficiency tells us that the prices reflect all the information that lies in earlier prices and trading data. The prices follow a random walk and it is difficult to predict future movement based on earlier prices and patterns (Brealey et al., 2020).

For a semi-strong form of efficiency, the prices reflect all the information from earlier prices but also all public available information. This means that the prices will immediately react to new public information. This can be news about dividends, earnings, product lines, patents, mergers, or macroeconomic developments. Even though the price reacts quickly to new information, it does not mean that the new price is right.

With a strong form of efficiency, prices will reflect all information that can be acquired, this also means information that is not publicly available. This can be leakage of inside information. To beat the market in strong market efficiency, you will likely need luck. Because even if you are working inside the company, the information that you have is most likely already exposed in the prices. The evidence of efficient markets has convinced many investors to give up the pursuit of superior performance. But efficient markets need some investors who gather information and attempt to beat the market. If there were perfect efficiency there would not be anyone that would be speculating (Brealey et al., 2020).

When the theory talks about prices following a random walk, it means that price change is independent of the price before. So, an increase in stock price today gives no certainty that it will continue to increase tomorrow. If this were not the case investors would immediately exploit this opportunity and their trading would eliminate this situation. It would be an easy way to make a profit (Brealey et al., 2020).

The question is, how efficient are the markets? If it is true that the market is fully efficient, then you can start questioning the job of portfolio managers. By testing our hypotheses, we hope we can say something about market efficiency.

2.3.5 Behavioral Finance

One of the reasons why prices depart from fundamental values is because people are not 100 % rational, all the time. People have different attitudes towards risk. Prospect theory says

that the value an investor places on an outcome, depends on the gains or losses they have made since the asset was acquired, and a small loss must be compensated by a large profit. This leads to the disposition effect, that emotion affects your decisions. People often sit in positions that are losing, way longer than they should, and they often take out profit too soon. This is often connected with the emotions of joy and grief. You want to trigger the reward as soon as possible and postpone the grief. Herding is also a behavioral factor that shows why investors do not always operate 100 % rationally. This is when some information gets more effect than it should have if people were acting rationally. This happens because investors tend to follow each other, rather than make individual decisions. One other problem is overconfidence. Most investors think they are better than average stock pickers. They overestimate the odds that the future will turn out as they think and underestimate the chances of unlikely events (Brealey et al., 2020).

2.4 Factors that affect stock market reactions

The stock price of a company is driven by supply and demand, but multiple factors affect a stock's price. These factors fall into three categories: fundamental factors, technical factors, and market sentiment (Harper, 2021)

A company's earnings and valuation are what we call fundamental factors (Harper, 2021). These factors comprehend how well a company is performing on its financials. Changes in earnings, expected growth, risk, and the discount rate, which are used to calculate the present value of future earnings, are some factors that affect stock market volatility.

Technical factors are external conditions that affect the supply and demand of the stock (Harper, 2021). Some of these factors indirectly affect the fundamentals, such as market strength, which contributes to the expected earnings growth. Other technical factors are inflation, substitutes, demographics, trends, liquidity, and news. Changes in one or many of these factors can have major consequences on the value of a company. These factors are often what we call the macroeconomic environment.

The last factor refers to the psychology of market participants, both individually and collectively. This is what we call market sentiment (Harper, 2021). This sentiment can be a

consequence of exogenous events such as covid-19 or 9/11, or the belief in future macroeconomic events.

2.5 Hypothesis

This part shows an overview of the null hypotheses we want to test. Since we are looking at both insider purchases and sales the hypotheses will have two sides. We will divide our analysis into two parts, starting with all insider purchases and then looking at the insider sales. This is because we assume that these trades will give the market different information and therefore different reactions. So, when we look at insider purchases, we expect a positive abnormal return, while for insider sales we expect the abnormal return to be negative. This will be the case for all the hypotheses.

Hypothesis 1: On average there is no significant stock market reaction to the announcement of legal insider trades at the Oslo Stock Exchange.

Hypothesis 2: On average there is no significant difference in stock market reaction between legal insider trade conducted by the management and the board at the Oslo Stock exchange.

Hypothesis 3: On average there is no significant difference in stock market reaction between different sizes of legal insider trades at the Oslo Stock Exchange.

Hypothesis 4: On average there is no significant difference in stock market reaction between legal insider trade conducted on different company sizes at Oslo Stock Exchange.

If we can reject these hypotheses, we will then get evidence that legal insider trades lead to a significant abnormal return in the market. Insiders, which are part of the daily operations of the company, will most likely possess more valuable information than outside investors. This study is also helping us to see if Oslo Stock Exchange has a strong form of market efficiency or not. If the exchange has a strong form of market efficiency, then the insider trades will not create a reaction in the market. Literature and empirical research regarding legal insider trades show evidence of reaction by the market when insider trades have been conducted. If the average abnormal return at the event date is significantly different from zero, we have reasons to say that this gives the market new information.

We are using hypotheses two to four to see if there are characteristics in the trades that create different reactions in the market. This might say something about the degree of asymmetric information. We are trying to categorize to see if there are significant differences in abnormal returns between the insider roles, the company sizes, and the sizes of the trades.

Hypothesis two assumes that different roles have different levels of inside information. We think that the management (CEO, CFO, and directors) have a different level of information compared with the board (Board members and Chairman). This assumes that they are closer to the company's daily operations and therefore get information of higher quality. We want to test if the market emphasizes trades made by some insiders more than others, and maybe find an explanation for this.

With hypothesis three we want to test how the market reacts to different sizes of trades. Our thoughts are that larger trades will create a larger market reaction. This is based on the assumption that it will get more attention because of the size, but also because of the risk perspective. If an insider uses a large part of their own money to invest in the company or to sell, might send a signal to the market that the insider possesses some relevant information. Aussenegg and Ranzi (2008) found the opposite result, which they claimed as interesting results.

Hypothesis four is testing different levels of asymmetric information in the market. Since small companies often have fewer media and analytical coverage than larger companies, this will have an impact on the transparency of the company. Meaning that asymmetric

information is most likely larger for smaller companies than for big companies, and therefore we think that an insider trade will have a larger impact on the market when it is conducted in a small company compared to a larger company.

3 Data

In this section, we are going to describe how we collected our data and which criteria we established. Further, we will talk about the characteristics of this data and how it is distributed over our investigation period. In the end, we will show how we distributed the data in different categories and explain why we wanted to use these categories.

3.1 Event data

Event studies will examine the abnormal returns on stocks that encounter the same information. By subtracting the expected stock return with the actual stock return it will give us an abnormal return. The abnormal return should reflect firm-specific news only (Brealey et al., 2020).

To answer our hypotheses, we had to conduct a quantitative analysis. To get a reliable answer, we needed a large selection of observations. This would also increase the validity of our findings. Our sample consists of trades conducted by primary insiders in companies listed on the Oslo Stock Exchange. To be able to answer our hypotheses, we need companies that are publicly traded. The price of publicly traded stocks will reflect the information in the market. This can help us to get answers regarding the market efficiency and asymmetric information. We wanted to focus on the Oslo Stock Exchange because this is what we are the most familiar with and it is quite easy to access data.

To collect the event data, we used NewsWeb (*NewsWeb Oslo Børs*) which is Oslo Stock Exchange´s interactive messaging system, where insider trading is published under the selection "Reportable trading". Here we manually collected all the trades that were reported through the site for the years 2020 and 2021. To find the trades that would help us answer our hypotheses, we had to make some criteria:

1. We only looked at direct stock trades or equity certificates, meaning we did not include stock options, restricted shares, forwards, and other more complicated products. We also did not include an incentive or employee program. This is because some of these products are complicated and do not necessarily send any signals to the market that the insiders possess any special information. Employee programs are often not exercised based on some special information regarding the company.

Exercising an option will often lead to a net trade because it will often be followed by a sale of the shares.

2. The companies must be traded on the stock exchange, and it must be clear who has conducted the trade.
3. We only looked at primary insiders that traded directly or through companies over which they had a controlling influence over. We did not include trades that were made by relatives, because we did not see them as having a large influence over the companies.
4. We only included trades from companies that had stock data at least 100 days before the trading day. If not, the estimation window would be too small and too imprecise.
5. Purchases and sales made the same day in the same company are not included. This is because it is often just restructuring, where the insider just sells its position to his wholly-owned company or the opposite. This is also because we assume that a purchase and sale would have different impacts on the stock price, and when they are happening at the same time, we cannot get a clear result.
6. At last, we also had to remove all trades that were done by different insiders by role on the same day in the same company. This is to get the right data when we are answering the hypothesis regarding the insider's role.

The main reason why we used these criteria is that we wanted to look at transactions that are motivated by the insider's special information. We decided that our data should be from the last two years, 2021 and 2020. We wanted to try these first and if the sample were too small, we would just keep adding more years.

Table 3.1 ***Descriptive statistics for the insider trades***

	Number of observations	Mean	Median	25%	75%
Purchases	1210	2 234 813 kr	168 991 kr	97 256 kr	654 320 kr
Sales	211	8 950 594 kr	1 282 858 kr	229 080 kr	4 326 000 kr

This table shows the descriptive statistics for our sample of 1421 trades for those two years and 1146 trades when we controlled for the role criteria. 85% of the trades were purchasing and only 15% were sales. We cannot be sure why there is such a big difference between purchases and sales, but we saw a pattern where investors purchase stocks often but at a lower amount, and when they sell the amount is much bigger but takes place less frequently. The average size for purchases was around 2,2MNOK, and for sales, it was around 8,9MNOK. So, on average the sales are larger which also is consistence with previous research. There is not a large symmetry in the sample, as we can see when we compare the median with the mean. This can be based on the fact that there exist some trades at very large amounts, which makes the median give a clearer picture of the average trade sizes. There was a big range of sizes of the trades where the largest was a sale of 363 MNOK and the smallest was a purchase of 1000 NOK.

Even though our investigation period is during the Covid-19 pandemic, we have included every month. We did not want to exclude the period with the biggest drawdown in the market in February-March 2020 because we wanted to get the result for the whole period. We can see that there were more insider trades in 2020 (835) than in 2021 (586), but we have not compared them with years before the pandemic. We cannot explain why there are differences in trades between these two years and it may also not be affected by the covid-19 situation.

3.2 Stock data

To be able to perform the event study we also needed to gather stock prices for each company, to be able to calculate the predicted return. We collected the stock data from Thomson Reuters Eikon (*Refinitiv financial solutions*, 2022). To be sure to get a large enough estimation- and event window, we collected stock prices from 01.01.2019 to 10.01.2022. We used the change in return from each day which only includes trading days. One problem that appeared was that some of the companies were listed after 01.01.2019, which meant that for some events the estimation period could be smaller. Our criteria were that the estimation window should not consist of less than 100 days. Studies have found that the length of the estimation period does not have to be equal, but it should be more than 100 days (Armitage,

1995). To be able to calculate the abnormal return we also needed an index that was representing the market portfolio. Therefore, we used the main index at Oslo Stock Exchange, OSEBX, and found the return for the same period. Now we had the data to be able to calculate the predicted return. Figure 1 shows the development of the OSEBX index during our period of interest. We can see that it has been a gradual upturn during this period, except for a major downfall at the beginning of 2020. This was the same period where the pandemic hit the global stock market the hardest which also included a period of lockdown of the society.

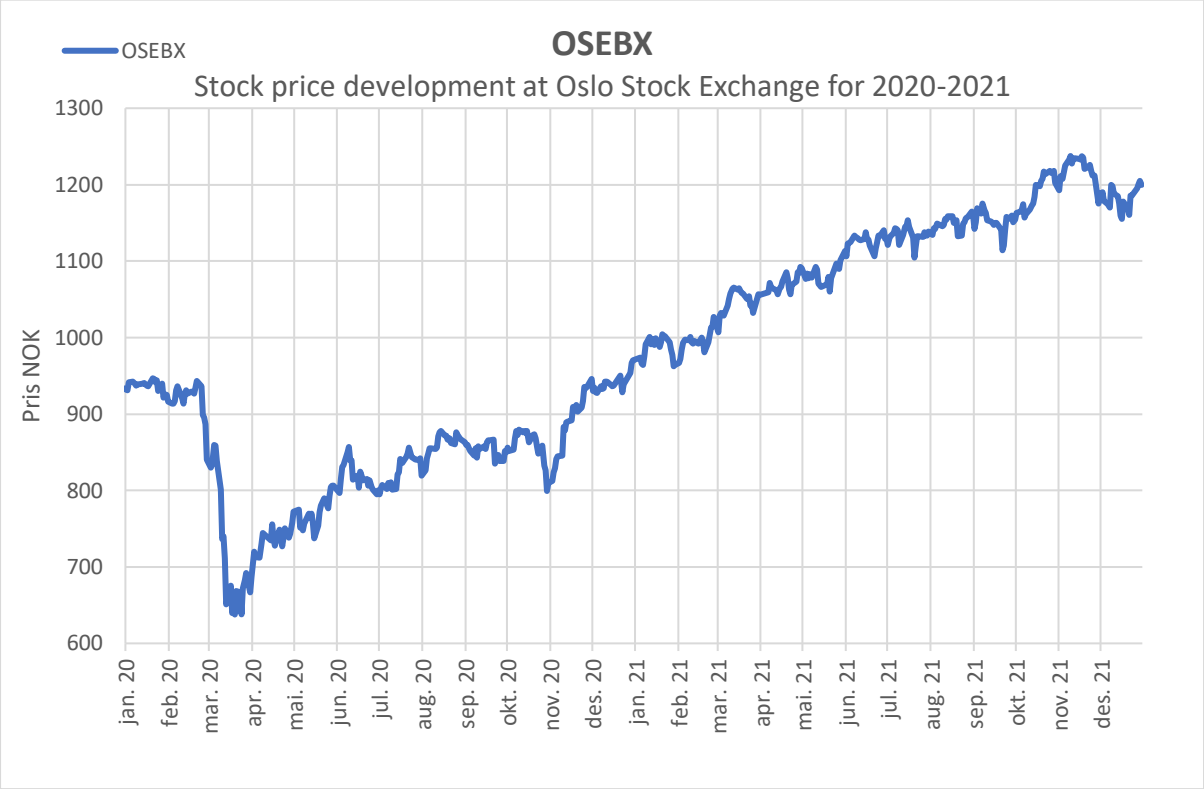

Figure 1 *Development of Oslo Stock Exchange Benchmark Index OSEBX for 2020-2021*

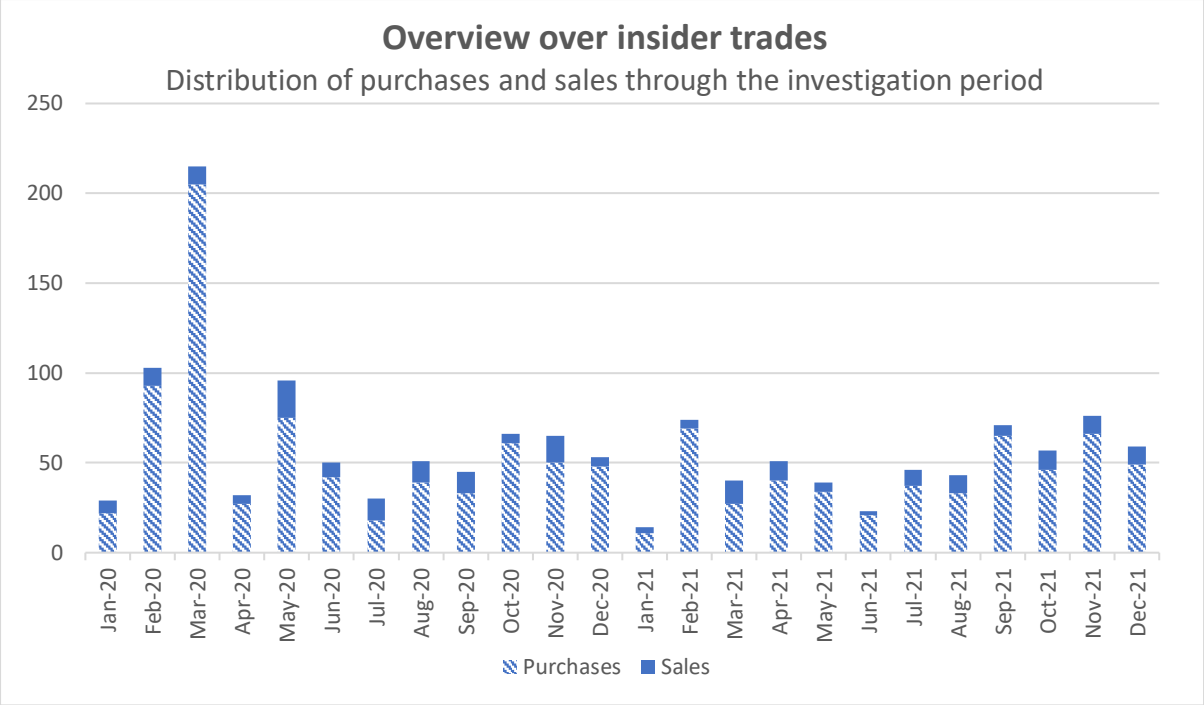

Figure 2 Insider trades distributed in each month for the research period.

Figure 2 shows us the insider trades distributed each month during the investigation period. This gave us some interesting results. The diagram clearly shows that there were conducted most purchases in February and March 2020. March 2020 had 178 more purchases than March 2021. As figure 1 shows, this was the same period as we saw a large fall in the index. This can also be one explanation for why there were more trades in 2020 than in 2021. We can also see a small increase in purchases in the last quarter of 2021. This was also a period where the infection rate was high, and society closed down again. It is clear that during this uncertain time stock prices fall, and the insiders used this situation to conduct purchases. The reason why they do this can be many. One can be the risk and diversification perspective, that they might be more diversified than other smaller investors, and that they are more comfortable making investments in an unstable environment. This can also be a case of asymmetric information. Insiders are in a position where they might possess different information regarding their company, and their market, than outside investors do. The insiders believe that their company will survive the challenging times and exploits this opportunity to buy stocks at a cheaper price. This might be evidence of how asymmetric information can be exploited by insiders.

3.3 Categories

To be able to answer our hypotheses we needed to categorize our data. In addition to dividing between purchases and sales, we also needed to categorize other factors. We categorized based on the role of the insider, the size of the trade, and the size of the company. When we include more details about the trades, it may give us information on which factors the market emphasizes.

The reason why we wanted to categorize by role, is that we wanted to see if a trade made by different roles will have different impacts on the market. Hypothesis two presumes that on average there will not exist any significant difference in abnormal return in legitimate insider trading between the management and the board. We assume that an insider that is a part of the management, which often is closer to the daily operations of the company, possesses more information than the insider that is a member of the board. In addition to dividing by management and board, we also divided the category into each role to see the effect at an even lower level. We divided the roles into Chairman, Board member, CEO, CFO, and Directors. The role of directors includes all leading roles under CEO and CFO, we included them in one role so it would be easier to interpret the result. To be able to see the isolated effect of the insider´s role we needed to be sure that there were no trades done by different insiders with different roles on the same day in the same company. So, we then removed all these trades and reduced our observation from 1421 to 1145. This also led to fewer observations for CFOs and CEOs as they often conducted trades on the same day as other insiders.

We also wanted to sort by the size of the trade, in order to test hypothesis three. On average there is no significant difference in stock market reaction between different sizes of legal insider trades at the Oslo Stock Exchange. We assume that we can reject this hypothesis because we think that when the trades are larger, they will get more attention from the market. When insiders use a larger portion of their wealth to buy or sell, this means that they are taking a higher risk. So, if they do not believe that the stock price of the company will increase they will most likely not buy many shares, and the opposite with sales. The market might think the information the insider possesses is better the larger the trade is. Therefore, we divided the trades into four categories. Under 100 TNOK, between 100 TNOK and 1 MNOK,

1 MNOK to 5 MNOK, and over 5 MNOK. We chose to divide the categories like this to avoid the samples being too small so that we easily could show the difference between a small and a large trade. The size is calculated based on the price of the stock multiplied by the number of stocks, which is stated in the announcement on NewsWeb. One problem with this factor is that the size of the trade is calculated based on the number of shares and the price on that day only. This does not look at the insider's total wealth or the percentage of his total shareholding in the company. This means that a trade of 1 MNOK is different for an insider which has a total holding of 150 MNOK and one that has a holding of 2 MNOK. So, to get an even more precise result we also tested the same hypothesis but defined the size of the trade differently. The percentage size of the trade in relation to the insider´s total shareholding in the company. This information was also given in almost every announcement on NewsWeb. We wanted to see if the market focuses on this information or if they only looked at the total amount the insider trades for. So, we divided this based on the average from our sample and then made four categories around this average. The average size for both sales and purchases was around 40% of the total shareholding. This made the sample size more equal. We assumed that the larger the trade was, based on the percentage of their total shareholding in the company, the larger affect it would have on the market.

The last factor we wanted to emphasize was the value of the company. Hypothesis four says that on average there is no significant difference in stock market reaction between legal insider trade conducted in different company sizes at the Oslo Stock Exchange. This assumption is based on a higher level of asymmetric information in companies that have a smaller market value. Aussenegg & Ranzi (2009) documented that insider trades had a larger impact on stock prices of small companies compared to larger firms. Larger companies have often more coverage through analysts and media, which will make them more transparent. Therefore, a trade made by an insider in a small company may have a larger impact on the stock price than trades made in larger companies. We found the market size of the companies at Euronext based on today's information. We divided the company value into small, medium, large, and big caps. Which equaled 0 - 1,5, 1,5 - 10, 10 - 50, 50 -> billion NOK. We have made this distribution based on what Oslo Stock Exchange defines as small companies which were up to 1,5 billion NOK and that the 15 largest companies were from 50 billion NOK and more.

Tables 3.1 – 3.4 show the distribution of purchases and sales for the different categories. As we can see the distribution is quite equal with some exceptions. As we mentioned earlier there are conducted significantly more purchases than sales. For the sample consisting of purchases, it had more trades performed by CEOs than for the sample of sales. For purchases, 15 % of total observations were CEOs while for sales it was only 4 %. This can be because other insiders often sell when the CEO does, but it is difficult to draw a distinctive conclusion. We can also spot other differences in distribution between sales and purchases. When we look at the size of the trades, we see that 53% of sales were above 1 MNOK, whereas for purchases it was only 19 %. This shows again that sales are on average done at higher amounts. For company sizes, it was quite similar. For company value we see that it is quite a big difference in distribution, this may influence our findings. To illustrate this, we found four times more trades for medium-sized companies than for big companies.

Table 3.2 Role of the insider

	Director	CFO	CEO	Chairman	Board member
Sales	85	10	7	13	60
Purchases	280	44	141	85	399
The total value of sales and purchases	1 908MNOK	604MNOK	6 948MNOK	3 965MNOK	8 966MNOK

Role of the insider distribution overview

Table 3.3 Size of trade in NOK

	Under 100K	Between 100K & 1 million	Between 1 million & 5 million	Over 5 million
Sales	27	72	63	50
Purchases	320	677	153	63

Size of the trade in NOK distribution overview

Table 3.4 Size of trade in relation to the insider´s total shareholding

	0-20%	20-40%	40-60%	60% ->
Sales	65	42	12	56
Purchases	421	94	64	241

Size of trade in relation to the insider´s total shareholding distribution overview

Table 3.5 Size of company

	Small-cap	Medium-cap	Large-cap	Big-cap
Sales	27	80	42	25
Purchases	326	553	196	132

Size of company distribution overview

4 Method

In this section, we are first going to describe the event study methods, where we show how an event study can help us answer our hypotheses. We will mostly be focusing on the market model. We are also going to talk about multiple regression. In the end, we show what method we will use to test the significance of our results.

4.1 Event study

Our research question is questioning if the announcement of legal insider trades at the Oslo Stock Exchange will lead to a market reaction. We thought that the best way to answer this was through an event study. An event study tests how one single event will affect the stock price. This method will help isolate the announcement and make it possible to measure the reaction at this event. Based on the assumption that the stock price reflects the value of the company, this makes it possible to measure the effect one event has on the company's value.

McWilliams & Siegel believes that there should be some preconditions when conducting an event study (McWilliams, 1997). 1. Efficient capital markets. 2. The event that is going to be analyzed is unforeseen. 3. The effect of the event must be isolated from other events, which are sensitive to the stock price. An event study will test the market efficiency. Therefore, if assumption one is true it will be possible to measure the effect new relevant information has on the market. As the efficient market hypothesis tells us, all available information in the market will be reflected in the stock price. This means that if an event gives the market new information it will be reflected in the stock price. Abnormal return after an event will lead to a profitable investment strategy which will be a violation of the efficient market hypothesis. The second precondition is that the information is unforeseen so that it is new to the market and has not been leaked before the announcement. The last precondition is important because to be able to read the effect the event has on the market it must be isolated. If other events occur in the same event window that influences the stock price, it will be difficult to see the exact impact this information has on the stock price. For our study, we fulfilled these preconditions. We were looking at stock exchange-traded companies, which means that information regarding these companies quickly is reflected in the stock price. Meaning we are looking at efficient markets. The trades were unforeseen because there is a law against

leaking insider information, and they were often conducted the same day as the trade was announced.

To isolate the event from other price-sensitive events was not that easy. We tried to isolate the effect by not including purchases and sales on the same day. This is because we think that these trades will give different information to the market and that sales and purchases create opposite reactions. To find all events that influenced the stock price and then remove all these trades, were both time-consuming and would make our sample very small. A small sample will affect the validity of the thesis. So, instead, we chose to have a large sample, so this effect become reduced. We also chose a small event window to isolate the event as much as possible.

One event that was quite easy to discover was the Covid-19 lockdown. As we mentioned before, our period consists of one event that affected the stock price a lot. We did not want to exclude this period because we wanted to see if this would create some different results compared to previous research. And as we experienced in chapter 3 there were conducted significantly more purchases in these months than in any other months during these two years. We know that this might influence our results, and we must therefore be observant of this when we are evaluating our results. We thought that including this period would give our thesis a new perspective and the results will probably also differ from previous research.

Having defined what the events are and selected our sample, we needed to divide the study into two time periods. The first thing we had to define was the event date and the event window. The event date in our case is the date where the trade is announced on NewsWeb. It is not always easy to identify the event day because there could be rumors of the event coming before the announcement or the transaction coming a day after. We focused on the date when it was announced on NewsWeb. Insiders are obliged to disclose their trade on Newsweb when they are conducting an insider trade. Therefore, it is also interesting to look at the surrounding days. Scholars investigating this issue found out that the information content of the first official announcement was the highest, and therefore the announcement date is representing the event date best (Benninga, 2014). The period that is going to be examined is called the event window. It is recommended that the event window is a bit larger than the event date, so it is possible to examine the days surrounding the event (Mackinlay,

1997). In our case we decided the event window to consist of five days, two days before the event date, and two days after. This is because we wanted to examine if there were any significant movements in the share price before the announcement which could indicate leakage of inside information. The reason why we wanted to include two days after the announcement was because we wanted to see how fast the market responded to the new information. This would also give us a picture of how fast the information would be absorbed by the market. The event window should not be too large, as it may weaken the significance level. The length of the event window is also depending on the type of event. For us, a five-day event window was natural because this type of event is officially announced and therefore this information will quickly reach the market.

The next step is to define the estimation window. The estimation window provides the information we need to calculate the normal return or predicted return. This is the period before the event date and should not include the event window (Benninga, 2014). This is to prevent the event to influence the normal performance model parameter estimates (Mackinlay, 1997). There is no correct answer for how long the estimation window should be, but the length should be long enough to give robust estimates and the accuracy gets greater when the sample is larger. But the window should at the same time be short enough to give valid estimates for the event window (Benninga, 2014). Meta-research regarding the length of an event study´s estimation and event window found that the sensitivity of the results was low if the estimation window was above 100 days. And the most common choice of event window length was five days (Benninga, 2014). A too-small estimation window would make our results less statically significant. But we did not want the window to be too long either, because then it might capture movements that will create disturbances in our analysis. So, no

longer estimation windows than 200 days. Mackinlay recommended an estimation window of around 120 days.

So, our distribution of the different periods is as follows:

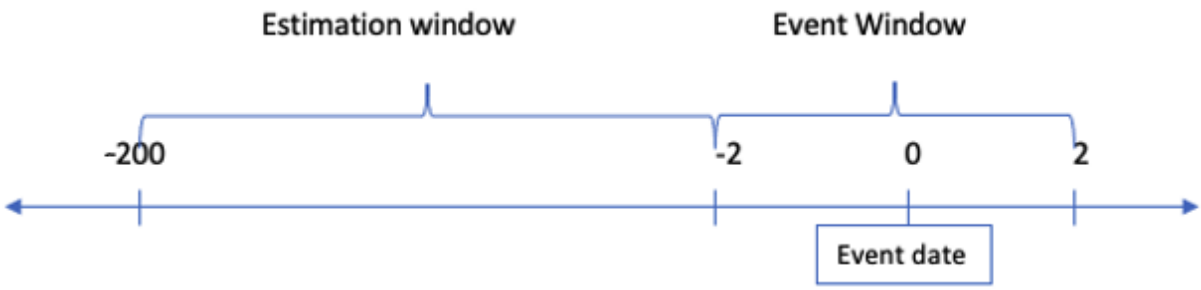

Figure 3 Overview of the different time periods in the event study

There are different models to calculate the effect of an event on the stock price, in our thesis we have chosen to use the same method as MacKinlay (1997) used, the single index market model. This model gives us a stock expected return and is determined by a market factor and a company-specific factor. The market model posits a linear relationship between the returns from given security and some market portfolio (Mackinlay, 1997). Central to an event study is the abnormal return, which shows us the difference between the actual return and the predicted return in the event window. The predicted return is defined as the expected return of the company if the event did not take place.

There also exists another model called the constant mean return model, which assumes that the mean return of a given security is constant through time (Mackinlay, 1997). The reason we chose the market model instead of the mean return model is that it is using an index, it helps us control for variation in the market´s return. This increases the ability to detect event effects. We also have other statistical models. One is called the factor model. This model is created to try to reduce the variance of the abnormal return by explaining more of the variation in the normal return. The market model is an example of a one-factor model. Other models can include industry-specific indexes in addition to the market, or they sort the companies by value. The gains of adding multifactor models for event studies are generally limited. The explanatory power of additional factors is marginal, this will lead to a little reduction in the variance of the abnormal return. The multifactor model has the best use

when the samples are all in one industry or concentrated in one market capitalization group (Mackinlay, 1997). Because our sample consisted of companies from different industries and had different sizes, it was most logical to use the market model.

In the market model, the stock return is regressed on the market returns to specify the typical relationship between the focal firm and the reference index. By using the Ordinary Least Squares method (OLS) we will get the intercept (alpha), the slope (beta), and the error term (sigma). This is being used to predict the normal return for the event window. The market model assumes a linear relationship between the market return and the company return (Benninga, 2014). The expected return for a stock *i* would be:

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

R_{it} is the stock's expected return and R_{mt} is the return on the market portfolio. We used the stock index OSEBX as our market portfolio. Alpha is the company-specific return and beta represents the stock's sensitivity toward the market return. By performing a regression of R_{it} on R_{mt} during the estimation period, it will make it possible to calculate the abnormal return for the stock *i* at time *t* (Mackinlay, 1997):

$$AR_{i\tau} = R_{i\tau} - \alpha_i - \beta_i R_{m\tau}$$

The abnormal return (AR) is the actual return minus the expected return. This is done for all trades and all days in the estimation window. This gives us the abnormal return for all the single days in the estimation window. To be able to see how it develops over time, we can aggregate across time to cumulative abnormal returns (CAR) (Mackinlay, 1997). The concept of a cumulative abnormal return is necessary to accommodate a multiple-period event window. It shows the sum of the included abnormal returns in this period (Mackinlay, 1997).

$$CAR_1(\tau_1 \tau_2) = \sum_{\tau=\tau_1}^{\tau_2} AR_{it}$$

Our sample consists of several events, we can find the average abnormal return (AAR) for the event period. The average abnormal returns can be aggregated over the event window using the same approach as when calculating CAR for each security. The formula for cross-sectionally to both time and firms yield the cumulative average abnormal return (CAAR) are:

$$AAR_\tau = \frac{1}{N}\sum_{i=1}^{N} AR_{it}$$

$$CAAR_1(\tau_1\tau_2) = \sum_{\tau=\tau_1}^{\tau_2} AAR_{it}$$

We did all these steps and calculations with the statistics program STATA with inspiration from a journal of Princeton University (University, 2008). STATA gave us the possibility to reshape variables and sort data, and it was easy to handle large datasets. Further, we structured the data into tables and diagrams in Excel.

4.2 Multiple regression

To find out the explanatory values the different characteristics had on the abnormal return we conducted a multiple regression. This will help us get a better understanding of which factors the market reacts to. This can also give us indications of whether the factors are underlying or intermediate variables. We must control for other factors to get our estimates as precise as possible and to find out if the variables we have included are relevant. The dependent variable was the cumulative average abnormal return from the announcement date and until two trading days after. Our multiple regression will look as following: $CAAR[0,+2] = ß_0 + ß_1X_1 + ß_2X_2 + ß_3X_3 + ß_4X_4 + \ldots. ß_kX_k + \varepsilon$. The variables will be the characteristics trade, role, the company size, the trade size, and trade size relative to total shareholding. A multiple regression could help us give a more complete picture of the causal relationships behind an insider trade.

5 Results

In this chapter, we will discuss the results we obtained from the analysis and try to answer our hypotheses. We will first look at the multiple regression model, to help us get a clearer picture of the causal relationship between the trades and the abnormal return. Further, we will test each characteristic´s effect on the market. The results are measured in average abnormal return (AAR) and cumulative average abnormal return (CAAR). We will focus on the event date and the event window. To find out if our hypothesis is true or false, we will use the T-statistic to measure the significance level. We will be looking at a one-sided test since we want the abnormal return to be higher than zero for purchases and lower than zero for sales. The results are mainly presented graphically. To be able to answer the hypothesis we must divide the analysis into purchases and sales, and we start with the purchases.

5.1 Multiple regression model

All the characteristics have been made into a dummy variable so that they are independent of each other. To avoid the dummy variable trap, we excluded one value for each category. Our default dummies were the board, mid-cap, trade between 60-100 % relative to total shareholding, and trades between 1 MNOK & 5 MNOK. These were just randomly chosen.

Table 5.1 Three-day CAAR multiple regression

	Model 1	Model 2	Model 3
Trade	3,16%***	3,25%***	3,40%***
	(0,0055)	(0,006)	(0,006)
Small	1,52%***	1,43%***	1,44%***
	(0,0044)	(0,004)	(0,0046)
Medium	0,19%	0,09%	0,12%
	(0,0041)	(0,004)	(0,004)
Large	0,16%	0,15%	0,17%
	(0,004)	(0,004)	(0,0042)
S100	-2,92%***	-2,84%***	-2,98%***
	(0,006)	(0,006)	(0,006)
S1000	-1,80%***	-1,70%**	-1,78%***
	(0,005)	(0,006)	(0,0049)
S5000->	-0,55%	-0,58%	-0,53%
	(0,006)	(0,006)	(0,006)
Change 20		0,03%	-0,04%
		(0,004)	(0,003)
Change 40		-1,99%***	-2,00%***
		(0,006)	(0,006)
Change 60		-0,96%	-1,00%
		(0,007)	(0,007)
Management			0,31%
			(0,003)
_cons	-1,39%***	-1,35%***	-1,57***
	(0,004)	(0,004)	(0,005)
R^2	0,0181	0,0224	0,0227
N	1421	1421	1421

What we can see from this table is that company size and trade size have explanatory value regarding the cumulative average abnormal return. This is shown in model 1 where the adjusted R-squared is 0,0181, which tells us that this regression model explains 1,81 % of the

total variance in CAAR for this period. The constant tells us that the average CAAR for sale conducted by an insider on the board in a big company at a trade size of between 1 MNOK and 5 MNOK and is between 60-100 % of the total shareholding is -1,39 %, which is significant.

The trade variable is a dummy variable, where one is a purchase and zero is a sale. For the trade variable, we can see that on average the CAAR is larger on purchases than on sales. This is significant when controlled for company size and trade size. This shows us evidence that the market on average reacts positively when insiders purchase shares. Which were the same results as Jaffe (1974) and other researchers have found.

Small, medium and large are the variables for the company size. The small variable has on average a significantly larger CAAR compared to big companies, controlled for trade size and trade. This might tell us that trade that is conducted through a small company might create a larger market reaction compared to big companies. This is similar to earlier studies and may be due to transparency and a larger degree of asymmetric information.

S100, S1000, and S5000 represent the different trade sizes under 100 TNOK, between 100 TNOK and 1 MNOK, and over 5 MNOK. The omitted variable is trade size between 1 MNOK and 5 MNOK. We can see that on average insider trades between 1 MNOK and 5 MNOK have a significantly larger CAAR than trades lower than 1 MNOK. Under 100 TNOK had on average a lower CAAR of -2,92 % compared to trades that were between 1 MNOK and 5 MNOK. This shows some evidence that the size of the trade matters, and that the larger the trade is, the more reaction in the market.

Models 2 and 3 show us a slight increase in adjusted R-squared. Here we included one more characteristic for each model. We can see that the R-squared does not increase a lot in model 3 when we include the management variable. The increase in R-squared means that model 3 better explains the abnormal return than model 1. Model 3 has included the dummy variable management and the dummy variables for the size of the trade relative to the insider's total shareholding. All the variables that were significant in model 1 are also significant in model 3.

The change variables represent each category for sizes of trade relative to the insider´s total shareholding. When we look at the variable change 40, we can see that this is significant, meaning that on average, the CAAR is lower for trades that are between 60-100 % of the total

shareholding. The management is one if the insider is a part of the management, and zero if the insider is a part of the board. The management variable is not significant, which shows us that there is no significant difference in CAAR between the management and the board when we control for the other variables.

Overall, we can see that we got many significant results and that the variables had explanatory power towards the abnormal return. We also got quite sizable significant results up to over 3 %. Our thought is that the variables “management” and “change” might be intermediate variables that may be affected by other underlying variables such as trade size.

5.2 Purchases

5.2.1 Analysis of abnormal returns for purchases

We start by testing hypothesis one, that the average abnormal return will not be larger than zero after the announcement of legal insider purchase at the Oslo Stock Exchange. The idea is that we make an initial assumption (Null hypothesis), and based on the available evidence we get from our sample, we decide whether or not the initial assumption is true (Stock & Watson, 2020). Our null hypothesis is that the abnormal return is zero. This means that insider trade doesn´t provide the market with new information. Our goal is to reject the null hypothesis. We want to examine if AAR and CAAR are significantly different from zero. This assumes that the market thinks that there exists asymmetric information, and therefore reacts to the behavior of the insider.

Table 5.2 Average abnormal return

Event day	AAR	T-test
-2	-0,29 %	-1,84
-1	-0,12 %	-0,82
0	0,46 %	2,50***
1	0,25 %	1,78**
2	-0,22 %	-1,23

Average abnormal return (AAR) for the event window 1211 observations

***Indicates statistical significance at a 1% level

** Indicates statistical significance at a 5% level

* Indicates statistical significance at a 10% level

Table 5.2 shows the average abnormal return for the different days in the event window. We can see from the results that there is negative AAR on the days before the announcement day, but these are not significantly different from zero. Aussenegg & Ranzi (2009) found that insiders were timing their trades and often bought shares after a period where the stock price had declined. We cannot claim this because our findings are not significant.

The biggest change in the abnormal return happens on announcement day. We can see that there is a significant positive abnormal return on the announcement day and the following day. This is similar to Lin & Rozeff (1995), which showed that most of the information regarding an insider trade got reflected in the price on the first trading day. The results show us that when an insider purchase a share at Oslo Stock Exchange the average abnormal return is 0,46 % on the announcement day. This tells us that on average the actual return was 0,46 % higher than the average predicted return. The T-test shows us that the AAR for period 0 is significantly different from zero at a 5%-level. AAR for the day after the announcement is 0,25 % and significant by 5 % level. This gives us evidence that the market reacts positively to the announcement of an insider purchase, which may indicate that these trades add new information to the market. Based on our findings we can reject hypothesis one that on average there is no significant stock market reaction to the announcement of legal insider trades at the Oslo Stock Exchange.

These findings can tell us something about the market. First, it shows us that the market does not have a strong form of market efficiency, because all information is not already reflected in the prices. If there were a strong form of market efficiency the announcement of the trade would not have had any impact on the stock price because this information would already be reflected in the price. But due to the quick reflection in the stock price, this gives us evidence that the market has a semi-strong form of market efficiency.

The second reason we see positive abnormal returns can be that the market may think that there is an unfavorable selection between the insiders and the rest of the market. The market

may believe that the insiders have information about the company that the market doesn´t have, and therefore follows the behavior of the insider. This is what behavioral finance calls "herding" when investors do not take individual decisions but follow each other. We do not know for sure if the insider has any information advantage, it may be other reasons for why this positive abnormal return emerges. This can also be because of rational behavior from the insider and the investor and that it does not exist any asymmetric information. It can also be because of demand and supply, that the prices go up because the demand is higher than the supply.

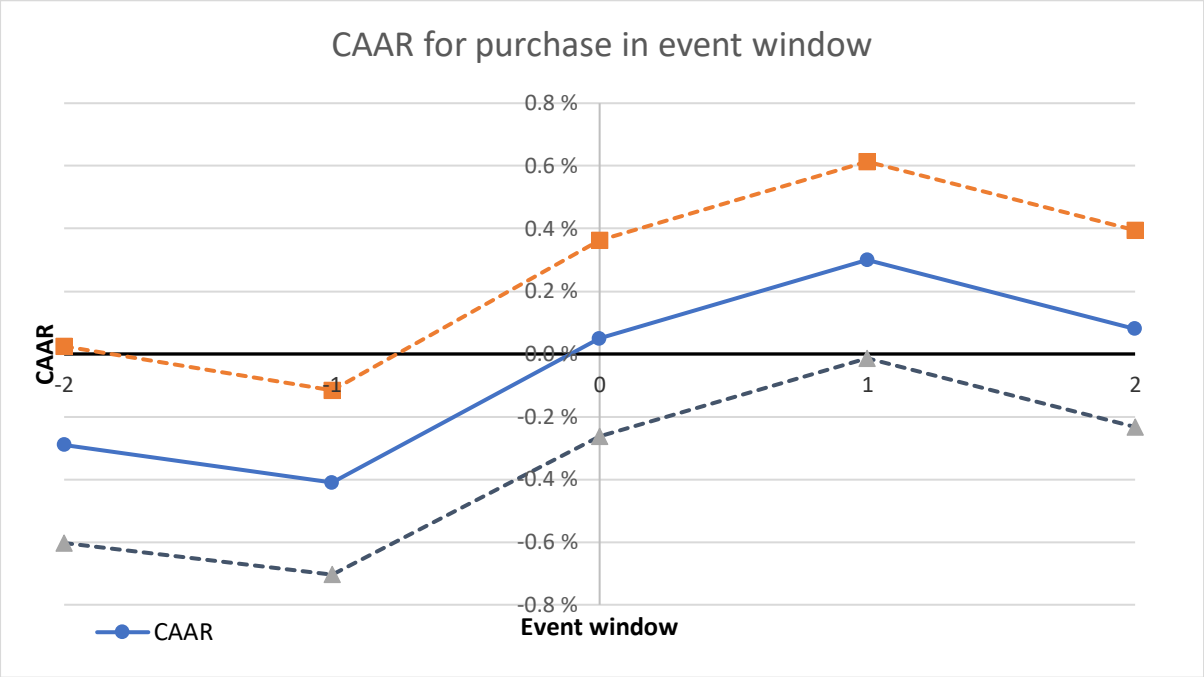

Figure 4 CAAR for purchase for the event window with a 95%-confidence interval.

Figure 4 shows the cumulative average abnormal return for the event window. By using CAAR it is easier to see the development of the abnormal return for the event window for all events. We can see that the CAAR is moving almost 1 % from -0,4 % one day before the event date to 0,3 % one day after. It is only on day 1 where the CAAR is 0,30 % which is the only significant result after the announcement date. We can see in table 5.3 that for the announcement day and the following day we got a CAAR of 0,71 %. This confirms that the market uses around one trading day to absorb the new information. When we look at the period (0,2) it is 0,5 %

which is explained by the negative AAR on day 2 as we see above. In table 5.3 CAAR is all significantly different from zero at a 1 %-level, except for the whole event window (-2,2).

Table 5.3 CAAR for different periods in the event window

Event window	CAAR	T-test
[-1,1]	0,59 %	3,81***
[0,1]	0,71 %	4,63***
[0,2]	0,50 %	3,13***
[-2,2]	0,09 %	0,54

CAAR for different periods in the event window

***Indicates statistical significance at a 1% level
** Indicates statistical significance at a 5% level
* Indicates statistical significance at a 10% level

5.2.2 Covid-19

Our results include observations of the whole investigation period. But as we saw earlier this includes one period where the stock market fell, and the insiders at the same time conducted many purchases. We thought that this might have an impact on our results, especially since the market reaction looks like it is the opposite of our assumption for this period. We assume that a purchase will lead to a positive abnormal return. Therefore, we wanted to look at our results when we excluded these months.

Table 5.4 Abnormal return with and without February and March 2020

	AAR on the event date	CAAR event window [0, +2]	T-stat CAAR	Observations
For February 2020	-1,02%	-0,25%	-0,15	93
For Mars 2020	-1,70%	-3,74%	-7,15	205
Sample without February and March 2020	1,03%	1,50%	8,17	913
Sample with February and March 2020	0,46%	0,50%	3,13	1211

Abnormal return for purchases done in February and March 2020

This table shows us that AAR for both February and March was negative with 1,02 % and 1,70 %. This gives the opposite abnormal return compared to what we got from our results for the whole period. It may look like this market reaction is affected by other factors than insider purchases. This was the period when the Norwegian society closed down due to the high infection rate caused by the Covid-19 pandemic. This created a lot of insecurity in the market and was one of the reasons why we saw a massive drop in the stock market and can be the reason we see negative AAR for these two months. And when we look at our results for 2020 and 2021 without these two months the AAR is almost 0,6 % higher and the three-day CAAR is three times larger which is significant. The CAAR for March is also significant. This shows evidence that these two months had a large negative effect on our results when we look at the insider purchases. These are important to emphasize when we are looking at our results.

5.2.3 Analysis of characteristics

We wanted to see if there were some characteristics regarding the trades that had a different impact on the stock market. We picked out some factors that we thought would have an impact, and maybe we might uncover some significant abnormal returns. We thought that these characteristics represent different degrees of information. That is why we are using the following explanatory variables: the insider's role, the size of the trade, the trade size relative to total shareholding, and the size of the company. The analyses of average abnormal return for purchases gave us an indication that the announcement day and the two following days were the optimal periods to look at. So, when we now are going to test the underlying hypothesis, we are using this period [0,+2].

5.2.4 Role of primary insider

Table 5.5 Three-day CAARs across different roles of primary insiders

Role	CAAR	T-test	Observations
Board member	0,32 %	1,41*	339
CFO	0,91 %	2,11**	44
CEO	0,18 %	0,57	141
Chairman	0,65 %	1,48*	85
Director	0,33 %	1,05	280

CAAR for primary insider roles for the three-day event window [0, +2]

***Indicates statistical significance at a 1 % level
** Indicates statistical significance at a 5 % level
* Indicates statistical significance at a 10 % level

As we explained in the previous chapter, to be able to test the isolated effect for each insider, we needed to add one more criterion. Here we removed all trades that were done by different insiders on the same date in the same firm. To be able to see the exact impact each role had on the market we could not have them conducting trades on the same day. This made our sample a bit smaller which also might explain some of the results we got. By doing this selection we wanted to test hypothesis two. Which says that on average there is no significant difference in stock market reaction between legal insider trade conducted by the management or by the board at the Oslo Stock Exchange. When we look at table 5.5, we can see that all the results are positive, which is in line with the results we got in hypothesis one. But we got only one result that is significantly different from zero at the 5 %-level, which was the role of the CFO. One explanation why CFO stands out can be that this is a role that possesses a lot of high-quality information regarding the company. But we can also see that this is the category with the fewest observations. When we looked at the CEO role isolated on the announcement day, it had an AAR of 0,63 % and was significant at a 5 %-level. Based on the result we got it is difficult to reject our hypothesis, but we can see that the CFO, as a part of the management, has a large significant CAAR. This is not enough to reject the hypothesis.

Therefore, to be more specific we divided the category into two. The roles of board member and chairman became the board, and the rest became the management. We created a dummy variable to see which had the highest CAAR. The result is shown in table 5.6. Purchases made by the management have a larger CAAR than purchases made by the board. They are both significant at the 5 %-level. The difference between the two categories is not large, but it is enough to reject hypothesis two. This means that we got evidence of a significant difference in the market reaction to legal insider purchases conducted between the management and the board. The reason for this might be because the market thinks that these two groups have different levels of information. The management is closer to the daily operations of the firm and might take better investment decisions and better predict the future based on this information.

Table 5.6 Three-day CAARs for the management and the board

	CAAR	T-test	Observations
The Board	0,42 %	2,10**	484
The Management	0,53 %	2,54***	486

CAAR for purchases made by the management and the board for the event window [0,+2]

***Indicates statistical significance at a 1 % level
** Indicates statistical significance at a 5 % level
* Indicates statistical significance at a 10 % level

5.2.5 Size of the purchase

Now we wanted to see if different sizes of the trade had a different impact on the market. Hypothesis three says that on average there is no significant difference in stock market reaction between different sizes of legal insider trades at the Oslo Stock Exchange. We think that the larger the trade is in terms of money, the more information it will give to the market. This is based on our assumption that the larger the trade is the more risk the insider takes. The information the insider has when he conducts a large trade could be of a higher quality than if the purchase were at a low amount. If the insider has more confidence in the company, they are maybe willing to invest more, this might be a convincing behavior in the eyes of the market.

Table 5.7 Three-day CAARs across different purchase sizes

Size	CAAR	T-test	Observations
Under 100K	-0,55 %	-1,76**	320
Between 100K & 1000K	0,45 %	2,53***	677
Between 1000K & 5000K	2,23 %	4,61***	154
Over 5000K	2,28 %	5,92***	65

***Indicates statistical significance at a 1 % level
** Indicates statistical significance at a 5 % level
* Indicates statistical significance at a 10 % level

If we have a look at table 5.7, it shows us CAAR for different sizes of trades in thousand NOK in the event window [0,+2]. We can see that the market reacts quite differently to the different sizes. Purchases that were made under 100 TNOK had a negative CAAR of 0,55 % which is significant on a 5 %-level. Interestingly, the market reaction is negative when insiders make a small purchase. This may be because they do not find it convincing, and that it does not radiate that the insiders possess new information. The average size of trade made in this category was 49 000 NOK. Trades that were made between 100 TNOK and 1 MNOK had a positive CAAR of 0,45 % and were significant on a 1 % level. Now we see that when the purchases got larger than 100 TNOK the reaction from the market became positive. The table shows that when the size of the category increases the CAAR also increases. Trades that were between 1 MNOK and 5 MNOK had a CAAR of 2,23 % and were significant on a 1 %-level. The same with the trades over 5 MNOK which had a slightly larger CAAR of 2,28 %.

These results can help us reject hypothesis three. Our findings give us evidence that the larger the trade gets in form of NOK the larger the positive abnormal return gets. This for us was not that surprising, but it is the opposite compared to the results Aussenegg & Ranzi (2009) got from their research. It can be several reasons why the market reacts this way. One reason might be because the market thinks that the larger the trade is the more risk the insider take, and therefore they might think that this investment is based on useful information. Then they copy the insider's investment decision.

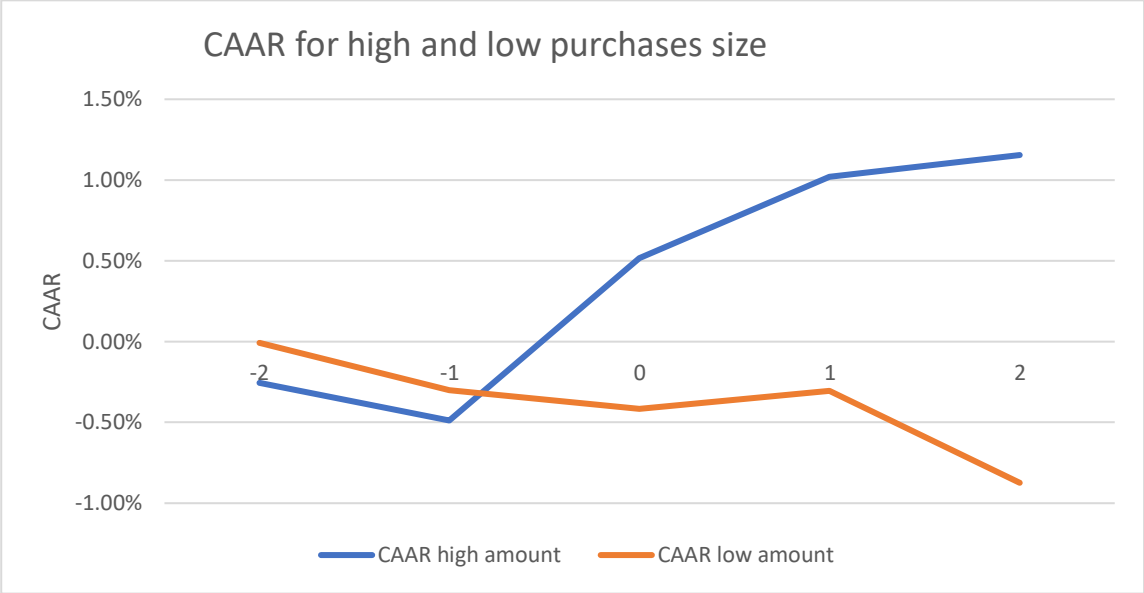

Figure 5 CAAR for high (over 5 MNOK) and low (under 100 TNOK) purchase size in the event window

Figure 5 is just a visual presentation of the difference in CAAR between high and low purchase sizes in the event window. The low amount is purchases under 100 TNOK and the high amount is purchases over 5 MNOK.

One issue with this analysis is that it only looks at the total sum of the trade. Which excludes some relevant information. This analysis only tells us how the market reacts to the relative size of the trade, and not the size based on the insider´s total shareholding. We wanted to know if, for example, a trade of 2 million NOK would give different information to the market if this was 50 % of the insider's total portfolio compared to only 5 %. That is why we tried to look at the size of the purchases relative to the insider´s total shareholding in the company. This information was often given on NewsWeb. We divided the categories based on the percentage size relative to the insider´s total holding of shares in the company. We are looking at the same period as before [0,+2]. We are still testing hypothesis three but redefined the category.

Table 5.8 Three-day CAARs for the size of purchase relative to shareholding

Share of total holding	CAAR	T-stat	Observations
0,1% - 20%	0,77 %	3,81***	541
20% - 40%	-1,24 %	-2,46**	138
40% - 60%	-0,15 %	-0,25	90
60% - 100%	1,37 %	1,56	273

***Indicates statistical significance at a 1 % level
** Indicates statistical significance at a 5 % level
* Indicates statistical significance at a 10 % level

This gave some interesting results. Purchases that were 20 % or less of the total holding had a positive CAAR of 0,77 % and were significantly different from zero at a 1 %-level. Trades between 20 % and 40 % had a negative CAAR of 1,24 % which is significant at a 5 %-level. These results are difficult to interpret, as it shows tendencies to opposite reactions from the market compared to the earlier results. One reason this might happen is that the average size of the trade in the smallest category was 3,9 MNOK, whereas for the category 20-40% the average trading size was only 550 TNOK. Which makes it look like the relative size is what the market focuses on and not the size in relation to the insider total shareholding. This finding was interesting, and we had no conclusive answer for why the CAAR was negative and substantially large for this category. We assumed that the trades that were large in relation to their total shareholding would have a significant impact on the market, the same as for the relative trade size. Our results cannot confirm this. It instead might confirm what we saw in the multiple regression that this category might be an intermediate variable that is affected by the actual trading amount.

5.2.6 Company value

Now we are looking at the company value to see if this has an impact on the abnormal return. Our thoughts are that large companies are more transparent, because of more media coverage and investor analyzes than smaller companies. Therefore, we think that there exists more information asymmetry in small companies than in big companies. We are going to test

hypothesis four that on average there is no significant difference in stock market reaction between legal insider trade conducted in different company sizes at the Oslo Stock Exchange.

Table 5.9 Three-days CAARs distributed on company size

Company size	CAAR	T-test	Observations
Smallcap	2,13 %	6,91***	325
Midcap	0,15 %	0,67	553
Largecap	-0,48 %	-1,68**	196
Bigcap	-0,46 %	-1,58	132

***Indicates statistical significance at a 1 % level
** Indicates statistical significance at a 5 % level
* Indicates statistical significance at a 10 % level

Table 5.9 shows the CAAR for purchases sorted by company size for the event window period [0, +2]. We can see that small-caps have a positive CAAR of 2,13 % which are significantly different from zero at a 1 %-level. While large-and big-cap have a negative CAAR between 0,4 % and 0,5 %, only large-cap is significant at a 5 %-level. It is interesting to see that for the large companies the CAAR is negative, which shows that the market reacts opposite of what we expect. This may indicate that because of their transparency and information flow, trades made in large companies do not have that big effect on the market because of less information asymmetry. The difference between the cumulative average abnormal return for large-cap and small-cap is over 2,5 %. Our results give some indications that insider purchases in smaller companies add more positive information to the market than insider purchases in larger companies do. This also corresponds to results from similar research. Based on this result we can reject our hypothesis. Our results clearly show that there is a significant difference in abnormal returns for insider trade made in different company sizes.

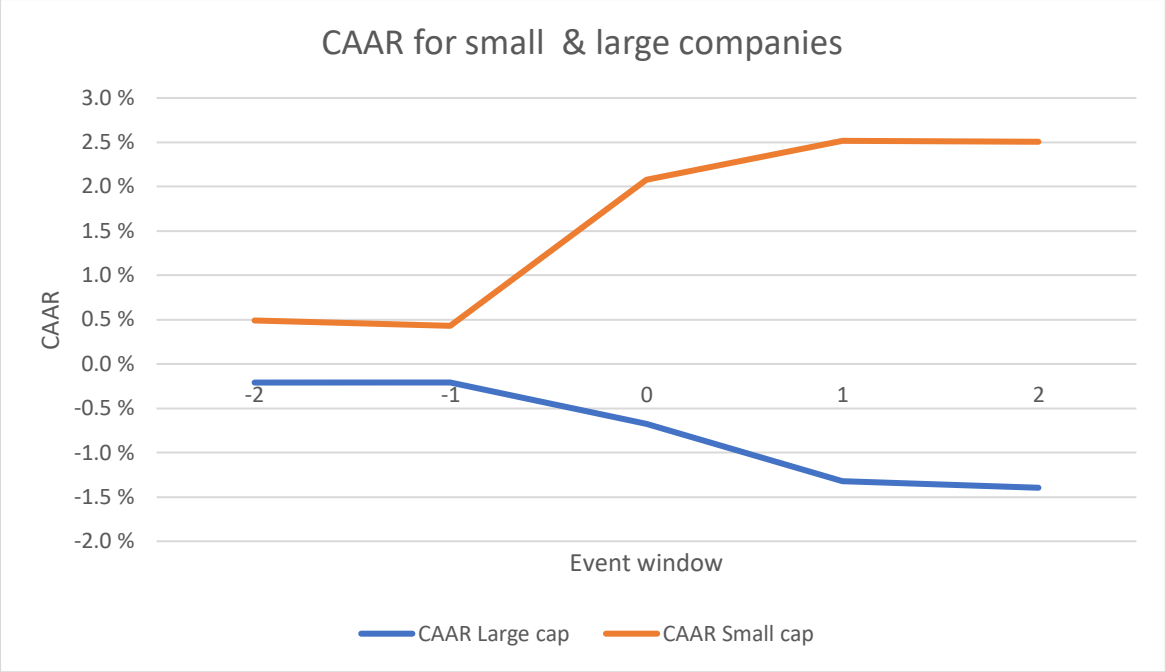

Figure 6 visual presentation of the difference in CAARs for purchases between large and small companies in the event window

Based on the findings we got from company sizes, we wanted to test the categories only for small companies. This was to see if we got some different results than for the whole sample. We assumed that there is a larger degree of asymmetric information in small companies, and then we might see clearer which categories the market reacts the strongest at. We are looking at the event window form [0,+2]. This made the sample smaller but gave some interesting results.

Table 5.10 CAAR for all categories divided by small companies

Category	CAAR	T-stat	Observations
Board member	1,75 %	4,28	110
CFO	-3,81 %	-2,66	11
CEO	1,35 %	2,19	49
Chairman	2,62 %	2,94	27
Director	2,30 %	2,85	60
Under 100K	-1,07 %	-2,53	79
Between 100K & 1000K	2,49 %	5,61	148
Between 1000K & 5000K	3,95 %	4,72	27
Over 5000K	5,07 %	6,58	7

First, we can see that all our findings were significantly different from zero at the 5 %-level. We can see in the small companies that they have positive CAAR for almost all roles. The CAAR lies between 1,35 % and 2,65 %. The only role that has a negative CAAR is CFO. This result is the opposite of what we saw when we looked at the whole sample. One reason CFO stands out might be because purchases made by CFOs in our sample were only eleven purchases. When we divided by management and board, we got a CAAR of 1,35% and 1,89 %. Both are significant at the 5%-level. This is also opposite from before and might be because of the CFO but can also be because of trading size. The average trading size for the management for small companies was 293 000 NOK while for the board it was 1,6 MNOK. Which might have had an impact if we look at the trading sizes.

We can see a gradual increase between abnormal returns and trading size. We can see that for trades under 100 TNOK the market reacts negatively, which might be because the market does not find small trades convincing. When the trade is small the insider might not convey that they possess information of great value. For trades over 5 MNOK, the abnormal return is over 5 % which is a considerable size. This might reflect the opposite for small trades because this insider has a great belief in the future of this company and invest a great amount in this company. This might also be one of the reasons why the board had a greater abnormal return than the management.

5.3 Sales

5.3.1 Analysis of average abnormal return for sales

Now we are going to look at sales made by primary insiders the same way as we did with purchases. We are first going to test hypothesis one that on average there is no significant stock market reaction to the announcement of legal insider trades at the Oslo Stock Exchange. We assume that an insider sale will lead to a negative abnormal return because we think that a sale sends a negative signal to the market. When a primary insider conducts a sale, the market may decipher this as a sign that the investor thinks the stock is overvalued or is lacking faith in the future of the company.

Table 5.11 AAR for sales at the event window

211 observations

Event day	AAR	T-stat
-2	0,68 %	2,56***
-1	1,18 %	1,91**
0	-0,67 %	-1,33
1	-0,53 %	-1,38
2	-0,72 %	-3,26***

***Indicates statistical significance at a 1 % level
** Indicates statistical significance at a 5 % level
* Indicates statistical significance at a 10 % level

If we start by looking at table 5.11 which shows the AAR for the different days in the event window. We see that before the announcement day, it has a positive AAR. Periods -2 and -1 have a positive AAR of 0,68 % and 1,18 % which are significantly different from zero at the 5 %-level. This might show evidence of the findings that Aussenegg & Ranzi (2008) found in their study. That primary insiders are timing their trades, so they often sell after a positive stock price development. This can be because of the information asymmetry between the insiders and investors. That the insider is in a position where he can take better investments decision because of their position. It may not be surprising that they sell after a positive increase in the stock price. On the announcement day, we see the AAR quickly becomes

negative by 0,67 %, but this is not significantly different from zero at a 5 %-level. On day two we see a negative abnormal return of 0,72 % which is significant at a 1 %-level. This might imply that the market needs more time to react to sales compared to purchases. This result also strengthens the assumption that the Oslo Stock Exchange has a semi-strong form of market efficiency. Because we see a significant abnormal return after the event date, it does not show any sign that the information is already reflected in the stock price.

Table 5.12 CAAR for different intervals in the event window

Period	CAAR	T-value
[-2,-1]	1,86 %	3,66***
[-1,1]	-0,02 %	-0,09
[0,1]	-1,20%	-2,96***
[0,2]	-1,94%	-6,10***
[-2,2]	-0,08%	-0,36

***Indicates statistical significance at a 1 % level
** Indicates statistical significance at a 5 % level
* Indicates statistical significance at a 10 % level

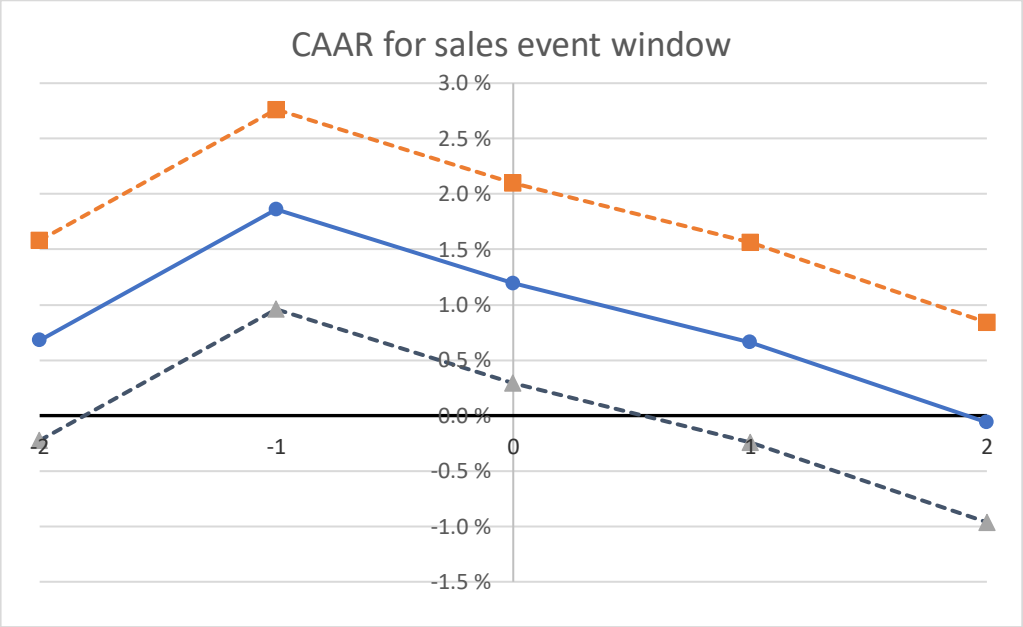

Figure 7 CAAR for sales for event window with 95 % confidence interval

Table 5.12 shows us that for the period before the event the CAAR is 1,86 % and is significantly different from zero. This confirms what we saw earlier which strengthens the assumption that sales often come after a period of positive abnormal return. The results also show that the CAAR for the announcement day and the two following days is -1,94 % and is significant at a 5 %-level. The CAAR for sales in this period is much bigger compared to purchases in the same period which were only 0,5 %. This can be seen in association with the Covid-pandemic and fall in the stock market. This can also be because of the difference in the number of trades, where only 15% of total trades during 2020 and 2021 were sales. We also saw that the average sale was much larger than the average purchase. Purchases showed us evidence that the larger the trades are the larger the abnormal return got. Figure 7 is a visualization of how the CAAR develops during the event window and where we can see it gradually falls from the day before the announcement. These results strengthen our assumption that insider sales lead to a negative reaction in the market. Since we got a significant negative cumulative average abnormal return for the announcement day and the two following days, we reject hypothesis one. We can on average see a significant market reaction when an insider conducts a legal insider sale at the Oslo stock exchange.

5.3.2 Analysis of characteristics

When we collected the data, we saw that there were far more purchases than sales by insiders. Which can explain some of the results we got. It also showed us that insiders make many, but smaller purchases and a few sales, but at a higher amount. We will again look at the CAAR for the event window consisting of the announcement day and the two following days. We are again categorizing the trades to see how the market responds to the different characteristics.

5.3.3 Role of primary insider

Our null hypothesis in hypothesis two tells us that on average there is no significant difference in stock market reaction between legal insider trade, conducted between the management and the board at the Oslo Stock Exchange. This is based on the same assumption as before, that we think the management possesses more information about the company´s daily operations than the board. And therefore, might have more valuable information. Based on

this we want to test if the market also thinks that these two groups of insiders possess different information. We think that there may exist asymmetric information between the insider and the investors, which will create a market reaction when they conduct a sale.

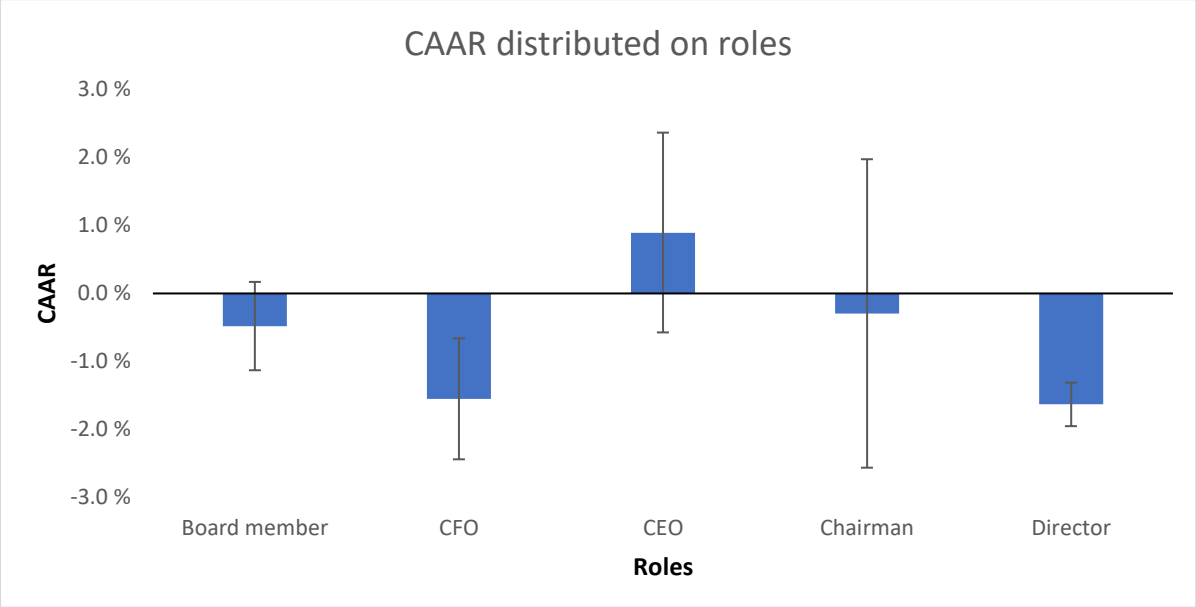

Figure 8 CAAR for insider sales sorted by insider roles with error fields. For event window [0,+2]

Figure 8 shows that CEOs had a positive CAAR in this period, but this was not significantly different from zero. One reason for this may be that our sample was too small and that some positive outliers may have affected the average. When we look at the median for the announcement day the AAR for CEO is only 0,11 %. As we saw when we analyzed the result from purchases, it showed that CFOs had a substantial impact on the market. In this case, the CFO again has a large impact with a negative CAAR of 1,55 % which is significantly different from zero on a 5 %-level. Which again may indicate that trades made by a CFO have a strong effect on the market. We should point out that our sample only consists of ten sales made by CFOs. We also see that directors have a CAAR of -1,63 % which is significant on a 1 %-level. This is the category which we have the most observations from. Board members were negative by 0,48 % but were not significant.

In table 5.13 we divide the category into the management and the board. This result shows that sales made by an insider from the management create a larger negative CAAR than if it

were done by a person from the board. This clearly shows that the management has a significantly larger impact than the board and the results are significantly different from zero. We can see that stock market reactions from sales conducted by an insider from the management are significantly different from zero. This helps us reject the second null hypothesis in hypothesis two.

***Table 5.13* CAAR for sales done by the board and the management for period [0, +2]**

	CAAR	T-test	Observations
The Board	-0,79 %	-1,28	73
The Management	-2,63 %	-7,47***	102

***Indicates statistical significance at a 1 % level
** Indicates statistical significance at a 5 % level
* Indicates statistical significance at a 10 % level

5.3.4 Size of the sale

As before we wanted to see the market reaction when we divided the trade by size. Our hypothesis three says that on average there is no significant difference in stock market reaction between different sizes of legal insider trades at the Oslo Stock Exchange.

We assume that an insider is willing to conduct a big sale if the quality of the information is good. This is also based on a risk perspective. That when an insider conducts a large sale the market might think that the information the insider possesses is of high quality because the cost of making a wrong decision is greater when the size of the trade is large.

Table 5.14 CAAR for sales sorted by size of the sale [0,+2]

Size of trade	CAAR	T-test	Observations
Under 100K	-0,47 %	-1,20	27
Between 100K & 1000K	-0,69 %	-1,31	72
Between 1000K & 5000K	-2,23 %	-5,5***	63
Over 5000K	-4,12 %	-4,22***	50

***Indicates statistical significance at a 1 % level
** Indicates statistical significance at a 5 % level
* Indicates statistical significance at a 10 % level

Table 5.14 shows how the different CAAR for different sizes of trade for the event date and the two following days. For the two smallest categories they had a CAAR between -0,4 % and -0,7 %, but they were not significantly different from zero. Compared to the two biggest categories, we see a difference. For trades made between 1 MNOK and 5 MNOK, the CAAR is -2,23 % and for the trades above 5 MNOK, it is -4,12 %. They are both significantly different from zero on the 1 %-level. These results show us evidence that when an insider conducts a sale of over 1 MNOK, the stock market reaction is on the average negative. These results help us reject hypothesis three. We can see that there is a different market reaction to different sizes of trades, which are significant. And as we expected the reaction is negative. When insiders sell for substantial amounts, the market might think that the stock is overvalued, and the insiders then want to sell some of their positions. Then the rest of the market also might get insecure and sell their holdings to avoid losing money. The result we got here is similar to the result we got when we looked at the purchase, but the CAAR for sales over 5 MNOK was almost twice as high.

As we did when we looked at purchases, we also wanted to test the size of the sale relative to the insider´s total shareholding in the company. We assume that the negative abnormal return will be larger for sales that are made with a larger share of total holding.

Table 5.15 CAAR for sales sorted size relative to total holding [0,+2]

Share of total holding	CAAR	T-stat	Observations
0% - 20%	-2,66%	-4,95***	70
20% - 40%	-1,34%	-4,54***	42
40% - 60%	-1,93 %	-1,12	14
60% - 100%	0,76 %	0,67	49

***Indicates statistical significance at a 1 % level
** Indicates statistical significance at a 5 % level
* Indicates statistical significance at a 10 % level

We assumed that the sales that were largest compared to the total shareholding would have the strongest reaction in the market. The result showed us that sales that were under 20 % relative to the total holding had a negative CAAR of 2,66 % and were significantly different from zero at the 1 %-level. This had the largest CAAR compared to the other categories. The category between 20 % and 40 % of total holding, had a CAAR of -1,34 % and was significantly different from zero at the 1 %-level. The two other categories were both positive but were not significant. This gave an opposite result to our assumption and opposite compared to the results from purchases. One explanation can be the average size of the trades in the different categories. The average size of the trade of the smallest category was 14,9 MNOK compared to the largest category which had an average of 3,7 MNOK. This is similar to when we tested the purchases. This might confirm that the information that affects the market the most is the total size of the trade, not the size relative to the total shareholding. It also shows that it is not often insiders sell shares over 40 % of their total holdings.

5.3.5 Company value

For sales sorted by company size, we had the same assumption as for purchases. We wanted to test the null hypothesis in hypothesis four that on average there is no significant difference in stock market reaction for legal insider trade conducted between different company sizes at the Oslo Stock Exchange. This is based on our assumption and earlier studies which show that smaller companies are less transparent and therefore the information asymmetry is

larger than for big companies. We think that this information asymmetry will be reflected by the reaction in the market when insiders conduct a sale.

Table 5.16 CAAR for sales sorted by company size

This is for the three-day event window [0, +2]

Company size	CAAR	T-test	Observations
Smallcap	-2,32 %	-2,69***	27
Midcap	-2,38 %	-4,28***	80
Largecap	-0,86 %	-2,65***	42
Bigcap	-1,84 %	-3,73***	25

***Indicates statistical significance at a 1 % level
** Indicates statistical significance at a 5 % level
* Indicates statistical significance at a 10 % level

Looking at table 5.16, we got almost the same CAAR for both small and medium-sized companies, which were around -2,3 %. Large-cap had a CAAR of -0,86 % which is smaller than for the two other categories. For big-cap it had a CAAR of -1,84 %. They are all significantly different from zero on a 1 %-level. All the categories have significant results which makes it easier for us to test the hypothesis. It shows that the market reacts quite similarly to trades made in both small and medium-sized firms. We also see that the market reaction is quite similar for small and big companies also. There is around 0,5 % difference in CAAR between small and big companies. The average size for sales done in big firms was around 2 MNOK, while for small companies was 4,8 MNOK. This might also be one reason that we see a difference between small and big companies. As we saw, larger transactions create more reactions in the market.

Our findings say that on average, the market significantly responds more to sales done in small firms than in big firms. Which makes it possible for us to reject hypothesis four. And if we compare the two smallest categories with the two largest, we see that the smallest have

the largest the abnormal return combined. This means that we can reject our hypothesis. The reason for this might be what we mentioned earlier, the difference in transparency. Because small firms often are less transparent the degree of asymmetric information gets larger, which might be the reason the market reacts so much to insider sales in these firms.

6 Summary

6.1 Our findings

The results in this thesis shed light on the short-term effect legal insider trades have on the stock market. In our study, we found significant abnormal returns for insider trade during the event window. We got evidence of significant positive abnormal returns for insider purchases and negative abnormal returns for insider sales. We also saw that the Covid-19 harmed our results. Since we found evidence of market reaction during the disclosure of an insider trade, we could reject our null hypotheses. The results we observed support our assumptions and were also similar to previous studies done in the same area.

Further, we also found evidence of what the market emphasizes regarding the characteristics of insider trades. We saw that for both sales and purchases trades that were conducted by insiders from the management, had the largest abnormal return. This may be caused by underlying factors such as trade size. We also got results that show how the size of the trade has an impact on the market. We saw that large trades got stronger market responses than smaller trades. The results also confirmed our assumption that a trade made in a small company had a greater abnormal return than if it was conducted in a large company. This might be the result of asymmetric information. Larger companies are often more transparent and therefore the asymmetric information is lower.

All these findings strengthen our assumptions that trades made by a primary insider will give the market new information, which results in abnormal returns. We have seen evidence that the abnormal return will be larger if the trade is conducted by someone from the management in a small company and the size of the trade is above 1 MNOK. These findings show us that the Oslo Stock Exchange is having a semi-strong form of efficiency and that it exists some degree of asymmetric information between the insiders and the market. Even if the period and the market are different from many previous studies, our findings in many ways matched their conclusions.

6.2 Policy implications

The results from our study can be used in many ways, but they will have some limitations. Firstly, our results show that the market reacts to insider trades, which shows that the market

is not strong form efficient. Insider trades must not become a way for insiders to earn great profits by exploiting this market reaction. If the asymmetry becomes too big between insiders and outsiders, might affect the liquidity in the market.

We tested which characteristics regarding the trades the market emphasized the most. This can be used as a trading strategy to exploit the abnormal return that might occur when insider trades have been conducted.

6.3 Suggestions for further research

It could be interesting to study an even larger sample consisting of over five years. This might reduce the effect of fluctuations in the market, such as Covid-19. More accurate data could lead to different, or more accurate results, and get the effect of insider trades as isolated as possible. Another suggestion is also to add more criteria such as type of industry, seasonal variations, and degree of risk to increase the explanatory value.

Based on our findings, it would be interesting to see if an outside investor can replicate insider trades and earn an abnormal return. To figure this out, the research has to be about how fast the abnormal return gets absorbed in the market. If this only takes minutes after the stock exchange opens, then outsiders will have difficulties replicating the trades.

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Appendix

Example of insider data:

event_da	company	COMPANY	Company	NUMBER	PRICE	SUM	TRADE	ROLE	INVENTORY BEFORE	INVENTORY AFTER	%- CHANG
03.01.2020	OKEA	OKEA	Midcap	5 000	kr 18,30	91500,00	BUY	CEO	-	5 000	#DIV/0!
03.01.2020	OKEA	OKEA	Midcap	21 670	kr 18,39	398582,81	BUY	Director	1 451 739	1 473 409	1,49 %
06.01.2020	OKEA	OKEA ASA	Midcap	10 000	kr 11,50	115000,00	BUY	CEO	151 000,00	161 000,00	6,62 %
07.01.2020	AQUA	AqualisBraemar LOC ASA	Smallcap	116 781	kr 3,58	418075,98	BUY	Chairman	9 367 996	9 484 777	1,25 %
07.01.2020	AQUA	AqualisBraemar LOC ASA	Smallcap	15 200	kr 3,58	54416,00	BUY	Director	110 000	125 200	13,82 %
07.01.2020	OLT	Olav Thon Eiendomsselskap ASA	Largecap	9 127	kr 166,30	1517820,10	BUY	Board memb	736 216	745 343	1,24 %
08.01.2020	AFK	Arendals Fossekompani ASA	Largecap	125	kr 2 620,00	327500,00	BUY	Board memb	300	425	41,67 %
08.01.2020	MULTI	Multiconsult ASA	Midcap	-1 847	kr 68,00	-125596,00	SALE		3 828	1 981	-48,25 %
08.01.2020	SBLK	Star Bulk Carriers Corp.		-6 000	kr 11,56	-69360,00	SALE	Director	46 750	40 750	-12,83 %
09.01.2020	AFK	Arendals Fossekompani ASA	Largecap	115	kr 2 620,00	301300,00	BUY	Board memb	425	540	27,06 %
10.01.2020	OKEA	OKEA	Midcap	5 750	kr 19,00	109250,00	BUY	Board memb	29 573	35 323	19,44 %
10.01.2020	ZAL	Zalarais ASA	Smallcap	-553 790	kr 27,60	-15284604,00	SALE	Board memb	3 973 915	3 420 125	-13,94 %
14.01.2020	KVAER	Kværner ASA		40 000	kr 10,75	430000,00	BUY	CFO	141 329	181 329	28,30 %
14.01.2020	OKEA	OKEA	Midcap	4 561	kr 18,90	86202,90	BUY	Director	114 853	119 414	3,97 %
14.01.2020	OKEA	OKEA	Midcap	1 000	kr 18,90	18900,00	BUY	Director	34 920	35 920	2,86 %
14.01.2020	WSTEP	Webstep ASA	Smallcap	4 100	kr 24,00	98400,00	BUY	Board memb	-	4 100	#DIV/0!
16.01.2020	SSG	Self storage Group ASA	Midcap	-344 805	kr 27,00	-9309735,00	SALE	Chairman	344 805	-	-100,00 %
17.01.2020	AQUA	AqualisBraemar LOC ASA	Smallcap	540 000	kr 4,20	2268000,00	BUY	Chairman	9 484 777	10 024 777	5,69 %
17.01.2020	AQUA	AqualisBraemar LOC ASA	Smallcap	60 000	kr 4,20	252000,00	BUY	Director	125 200	185 200	47,92 %
17.01.2020	SSG	Self storage Group ASA	Midcap	-415 584	kr 27,03	-11231490,07	SALE	Board memb	-415 584	-	-100,00 %
20.01.2020	AZT	ArcticZymes Technologies ASA	Midcap	40 000	kr 5,30	212000,00	BUY	Board memb	-	40 000	#DIV/0!
22.01.2020	SDSD	S.D. Standard Drilling Plc	Smallcap	1 000 000	kr 1,28	1280000,00	BUY	Chairman	3 514 021	4 514 021	28,46 %
28.01.2020	PEN	Panoro Energy ASA	Midcap	5 000	kr 18,59	92950,00	BUY	CEO	263 962	268 962	1,89 %
28.01.2020	PEN	Panoro Energy ASA	Midcap	3 000	kr 18,59	55770,00	BUY	CFO	118 877	121 877	2,52 %
29.01.2020	VVL	Voss Veksel- og Landmandsbank ASA	Smallcap	500	kr 160,00	80000,00	BUY	CFO	2 020	2 520	24,75 %
30.01.2020	BOR	Borgestad ASA	Smallcap	41 000	kr 18,78	769898,00	BUY	Board memb	2 076 629	2 117 629	1,97 %
30.01.2020	BOR	Borgestad ASA	Smallcap	3 221	kr 18,60	59910,60	BUY	Board memb	2 116 964	2 120 185	0,15 %
30.01.2020	EPR	Europris ASA	Midcap	-1 600 000	kr 32,19	-51504000,00	SALE	CEO	2 008 572	408 572	-79,66 %
30.01.2020	NOR	Norwegian Energy Company ASA	Midcap	-66 000	kr 224,00	-14784000,00	SALE	Chairman	212 975	146 975	-30,99 %