

Share Price Reaction To Insider Transactions

Simon Jaukkuri (24365) and Jesper Sundelin (24551)

Abstract

This paper examines the market reactions to insider transactions on the Swedish stock market after the implementation of the EU market abuse regulation in 2016. We have used an event-study methodology to quantitatively study the abnormal returns generated by insider trades in the short term. Furthermore, potential differences in subgroups of transactions are analysed. Our results provide strong evidence that Swedish insiders are able to earn excess returns for both acquisitions and disposals despite a stricter regulatory environment. Moreover, we find support for greater abnormal returns in firms with smaller market capitalization. Evidence provided on the information hierarchy hypothesis is mixed as the results do not unambiguously show that CEOs have the strongest signalling power. Additionally, we do not find any statistically significant difference in market reactions for different transaction sizes. In conclusion, this paper extends the previous research on insider transactions by providing new insight into the impact of market regulations.

Acknowledgements

We would like to thank our supervisor, Assistant Professor Milda Tylaite, at the Stockholm School of Economics. Milda Tylaite provided valuable feedback and insights throughout the research process.

Supervisor: Milda Tylaite

Table of Contents

1. Introduction	3
1.1 Background	3
1.2 Purpose and contribution	6
1.3 Delimitation	6
1.4 Disposition	7
2. Theory and Literature Review	7
2.1 Theoretical framework	8
2.2 Literature review and previous research	9
2.3 Research question development and hypotheses	12
3. Method	16
3.1 Selection of methodology	16
3.2 Event study	16
3.2.1 Event of interest and selection of event window	17
3.2.2 Data selection procedure	17
3.2.3 Market model for abnormal returns	19
3.2.4 Cumulative abnormal returns	20
3.3 Statistical methodology	21
4. Data Collection and Compilation	21
4.1 Data collection and selection	21
4.2 Complements to the data set	22
4.3 Limitations to data set	22
4.4 Final data sample	23
5. Empirics and Analysis	24
5.1 Descriptive statistics	24
5.2 Statistical analysis	25
5.2.1 Test on excess returns for total observations	25
5.2.2 Test on excess returns by position	26
5.2.3 Test on excess returns by market cap	28
5.2.4 Test on excess returns by transaction size	30

5.3 Discussion	32
6. Conclusion	34
7. References	37
7.1 Periodicals	37
7.2 Laws and regulations	40
7.3 Internet sources	40

1. Introduction

1.1 Background

Insider trading is a topic that is frequently covered in the business media. For example, a journalist at the leading financial newspaper in Sweden, Dagens Industri, wrote in July 2021 that insider transactions in listed Swedish companies had generated significant abnormal returns for both acquisitions and disposals (Dagens Industri, 2021). In contrast, Dagens Industri published an article in February 2022, discussing which types of insider purchases lacked signalling value (Dagens Industri, 2022). The journalist claimed that the transaction size in absolute value was a key determinant for the signalling value but also in relation to the insider's existing shareholding. There are many more business articles discussing the impact of insider transactions, however, the level of scientific submission of evidence is very low in these articles. This report, however, will be a quantitative study with a focus on the large number of trades that are reported to the Swedish Financial Supervisory Authority (Finansinspektionen; "FI") every day. Some insider transactions get acknowledged by the business press, but all trades are available to the public on FI's website. It is likely that these transactions carry information of interest to all investors and therefore a very relevant topic to explore further. Moreover, it should also be of great interest to market regulators who aim to have a transparent, fair, and efficient marketplace.

The article in the *Individual Investor* (Feb. 1998, p. 54) captures the essence of insider trading by stating: "*Company executives and directors know their business more intimately than any Wall Street analyst ever would. They know when a new product is flying out the door, when inventories are piling up, whether profit margins are expanding or whether production costs are rising.*" Simply stated, there might be an information asymmetry between insiders and all other stakeholders active in the financial markets. Consequently, there are strict regulations concerning insider transactions all over the world. For example, in Sweden, insiders are not allowed to trade for a period of 30 days before the company announces financial reports. In addition, listed companies need to have a list of individuals that have access to information that is not available to the market (Finansinspektionen, 2022). These regulations aim to reduce the risk that insiders use their informational advantage to the detriment of outside investors.

There are many previous studies on the topic of insiders' trading decisions and their ability to generate abnormal returns. In accordance with the idea of information asymmetry, the majority

have found that insiders are able to generate abnormal returns both in the short- and long term (e.g., Lin and Howe, 1990; Lakonishok and Lee, 2001; Jeng et al., 2003; Fidrmuc et al., 2013). Furthermore, several studies have also shown that these results can be attributed to insiders' informational advantage (Ke et al., 2003). Research also provides evidence that insiders trade based on their knowledge of forthcoming economic disclosures such as quarterly reports (Huddart et al., 2007).

Swedish insider regulation

The Swedish Financial Supervisory Authority (FI) is the authority supervising the financial markets in Sweden and thereby mainly responsible for supervising insider transactions. As Sweden is a member of the European Union ("EU"), the EU regulation on market abuse, introduced in July 2016, is directly applicable to Swedish national law (Finansinspektionen, 2016). The insiders in listed companies covered by FI's notification obligation are responsible for reporting transactions themselves. The notification obligation includes several financial instruments such as shares, derivatives, debt instruments etc. The definition of insiders/PDMR (persons discharging managerial responsibilities) is based on the EU's Market Abuse Regulation ("MAR") and includes the following individuals:

- a) *a member of the administrative, management or supervisory body of that entity; or*
- b) *a senior executive who is not a member of the bodies referred to in point (a), who has regular access to inside information relating directly or indirectly to that entity and power to take managerial decisions affecting the future developments and business prospects of that entity.*

Board members and CEOs are included in point (a) while point (b) includes other members of the senior management (e.g., sales directors, finance directors etc.). Furthermore, the reporting obligation also includes individuals closely associated with any person discharging managerial responsibilities.

The starting date for our study is the 3rd of July 2016 which is when the new EU directive MAR came into effect. The regulation was designed to ensure that the EU legislation is developed in line with the changing markets to hinder market abuse in the financial markets. With the new legislation, the investigative and sanctioning powers of regulators increased intending to

contribute to properly functioning financial markets (Regulation (EU) No 596/2014 on market abuse, 2014).

The new regulation resulted in several notable changes making the regulations for insider trading stricter, of which below are some of the most important ones for the Swedish market (Svenska Dagbladet, 2016; Finansinspektionen, 2016).

- Insider transactions are to be reported to FI no later than three business days after the transaction date compared to the previous regulation of five days
- The regulations for managing insider lists were extended
- Transaction made under endowment insurance policies (“kapitalförsäkringar”) was included in the reporting obligation
- Companies had to start notifying all PDMR of their responsibilities under the new regulation compared to only certain categories of PDMR before
- The 30-day trading ban prior to publication of financial reports was extended to include all PDMR instead of only certain categories
- The responsibility to report insider transactions was also broadened to include additional marketplaces such as “Aktietorget” and “First North”

Over the last decades, regulations on insider trading have gradually become stricter in Europe. In 1989, The European Community (“EC”) launched a directive on insider trading which was made into national law in the 1990s by most of the member states. This directive was later replaced by the Market Abuse Directive (“MAD”) in 2003, which aimed to introduce a standard for market regulations in the European Union (Aussenegg et al., 2018). As previously mentioned, the new directive MAR from 2016 entails further regulations in EU countries. Consequently, a relevant question to ask is whether insider trading is still informative to the market and whether insiders can generate abnormal returns under the new regulations. Several of the previous studies that found evidence of insiders generating abnormal returns were made based on data from the late 20th century (e.g., Seyhun, 1986; Lin and Howe, 1990; Lakonishok and Lee, 2001; Jeng et al., 2003). Furthermore, to our knowledge, there have been no studies made on the effects of MAR on insider transactions in Sweden. Thus, we provide a new perspective on the implications of the new regulations.

1.2 Purpose and contribution

The main purpose of our study is to examine abnormal returns generated in connection with the publication of insider transactions in listed Swedish companies. In extension, we will also investigate from three different hypotheses how abnormal returns relate to different variables. Our research question consists of two parts and is defined as: *do insider transactions after the implementation of MAR generate abnormal returns in the short perspective and to what extent do certain variables explain differences in abnormal returns?* The variables chosen for the second part of our research question are: position of the insider, market capitalization of the firm and transaction value. The underlying rationale to study the abovementioned research question is to provide insight into the effectiveness of the new regulatory directives for insider transactions introduced in 2016. In addition, we are also motivated to study how particular characteristics of the transactions determine differences in abnormal returns to better understand the grounds of market reactions. The findings of our study are not only of interest to market regulators but also to the broad public of private investors who are impacted by the effects of insider transactions. One could reason that a private investor benefit from understanding the dynamics of insider trading to effectively operate in the financial markets.

Our contribution to previous research is to provide a new angle on a well-studied subject. By only focusing on transactions made post introduction of MAR in 2016, we contribute with a study of a time frame attributable to structural changes in reporting procedures. Given the increased strictness in MAR compared to previous regulations, our analysis would contribute with strengthened evidence on abnormal returns from insider transactions studied by e.g., Seyhun, (1986); Lin and Howe, (1990); Lakonishok and Lee, (2001); Jeng et al., (2003). By analysing our results for abnormal returns in relation to the findings from studies on data before MAR, we can provide evidence on the current legislative environment. Among the limited research that specifically focuses on transactions made in Swedish listed companies, e.g., Nilsson et al. (2009, 2018) focus on the behavioural aspects of insider trading. Therefore, our thesis contributes to research on insider transactions in Sweden by focusing on the relationship between abnormal returns and the abovementioned specific variables.

1.3 Delimitation

As our study investigates transactions conducted after the introduction of MAR it will include insider transactions made between July 2016 and March 2022 meaning a period of more than

five years. We find this to be a long enough time for MAR having been in place to base our data sample on. In addition, our time frame for analysis of the share price reaction after the publication of insider transactions will disregard any potential long-term effect and instead focus on the immediate reaction. The companies included in the study are only listed companies on Stockholm Stock Exchange with a market cap greater than SEK 500m. Additionally, we have limited our study to a quantitative approach, and we thereby ignore any qualitative aspects of the underlying motivation for the transaction.

Regarding the methodology used, we have limited the study to follow the main principles of an event study outlined by MacKinlay (1997). Our analysis of differences in abnormal returns is also limited to a few firm- and trade-specific variables.

1.4 Disposition

The thesis consists of seven sections. Section 2 gives an overview of the theory and literature behind our study, where relevant previous research made in the area is presented. At the end of the section, the research question and hypotheses will also be formulated. In section 3, the selection of methodology will be discussed including a detailed description of the different stages of the methodology. Section 4 covers the data collection procedure, including how the data was obtained, the potential limitations of our dataset and an overview of the final data sample. The analysis is presented in section 5 which includes both the descriptive statistics as well the statistical analysis of our hypotheses. The results will also be discussed and compared with the previous literature in the field. In section 6, we will make conclusions based on our presented results as well as connect them to the current research field, including any potential contribution and implications for further studies. Lastly, our references are presented in section 7.

2. Theory and Literature Review

In this section, we will elaborate on the previous research that has been made on the topic which will also be used in the development of our research question and hypotheses. The theoretical background will consist of two theories which are the efficient market hypothesis and information asymmetry. These will form a basis for understanding the research question we are investigating.

2.1 Theoretical framework

The Efficient Market Hypothesis (“EMH”) (Fama, 1970) is a well-known theory that suggests that asset prices reflect all publicly available information, and it is therefore impossible to achieve abnormal returns in the long term. The idea of efficient markets has been around for a long time, but it was possibly the work by Fama (1970) that has been the most influential in the development of EMH. Fama introduced three subsets of the efficient market model: strong form, semi-strong form and weak form.

- **Weak form:** This theory suggests that current stock prices reflect all information on historical prices and past returns. Consequently, it is not possible to generate abnormal returns by analysing historical price data. However, by using other information and/or fundamental analysis it is possible to generate excess returns. In terms of insider trading, it should therefore be possible to generate abnormal returns.
- **Semi-strong form:** The semi-strong form theory is an extension of the weak form with the addition that all publicly available information is reflected in the share price. These additions imply that it should not be possible to use either fundamental or technical analysis to outperform the market. However, insiders should still be able to earn abnormal returns since they probably have access to private information.
- **Strong form:** The idea of a strong form efficient market is the most restrictive as it assumes that all information (both public and private) is always reflected in stock prices. Consequently, no market participant can earn abnormal returns, including insiders since their private information is already accounted for by the market.

The theory of information asymmetry was potentially first developed by Akerlof (1978). Akerlof (1978) stated that there might be differences in the information available to sellers and buyers in a financial market. He famously used the example of the market for cars and discussed that sellers might have incentives to sell cars of low quality (which he called lemons) at a higher price than the fair market value in a perfect information state. In parallel to the market of cars described by Akerlof, insiders in listed companies are likely to have access to company information not accessible to the outside investor. Subsequently, if asymmetric information exists between insiders and other market participants, the actions of privately informed individuals can convey important information under the signalling theory. There is

reason to believe that a motive for insider trades is to take advantage of private information. Consequently, a reasonable assumption would be that insider purchases signal that the company is undervalued and vice versa overvalued when an insider is selling shares. Moreover, variations in trade characteristics might provide different strengths of signalling. It would appear intuitively logical that a larger transaction sends a stronger signal to the market than a smaller one.

2.2 Literature review and previous research

Over the last decades, there has been a large number of academic research papers examining insider transactions and the corresponding share price reaction. A large majority of the previous research has studied insider transactions made in the United States. Several papers have found that insiders are able to generate abnormal returns, both in studies made in the late 20th century (Jaffe, 1974; Seyhun, 1986; Lin and Howe, 1990) and more recent ones (Lakonishok and Lee, 2001; Jeng et al., 2003; Huddart et al., 2007). Several studies have proved that insiders can generate abnormal profits due to their informational advantage over outside investors. Ke et al. (2003) found that insiders possess specific knowledge of important economic disclosures almost two years before publication and repeatedly used this information to trade. Similarly, Huddart et al. (2007) provided evidence that insiders trade based on their knowledge of future disclosures of quarterly and annual reports.

It is worth mentioning that although previous studies generally follow the same methodology, they investigate abnormal returns from different perspectives. Most notably, there is a difference in the time horizon of the event windows used in the analysis. The time frame varies from longer horizons (e.g., several months after the trade) to shorter ones studying the abnormal returns over a couple of days. Lakonishok and Lee (2001) found no significant share price reaction immediately after insider trades. Instead, they provided evidence that companies with a high volume of insider purchases outperform the market over a longer perspective. Consequently, their study suggests that the market underreacts to the disclosure of insider trades. As mentioned in section 1, our study only focuses on the short-term perspective (i.e., the immediate market reaction to insider trades). However, studies made on a longer time horizon do still provide relevant information to allow for our conclusions.

The study on US insider transactions between 1975 – 1983, by Lin and Howe (1990) showed abnormal returns for the day after the announcement of 0.74% and 0.16% for acquisitions and disposals respectively. Jeng et al. (2003) found abnormal returns for disposals prior to the announcement but close to zero abnormal returns for the days following the announcement. For the acquisitions, they found abnormal returns of 0.75% for the days following the announcement. Their study was made on US insider transactions from 1975 to 1996. The study by Fidrmuc et al. (2013) used data from 2002 to 2007 in 15 European countries and the US. They found abnormal returns for the entire sample of 1.42% for acquisitions and 0.24% for disposals when using a five-day event window after the announcement. A similar and more recent study by Aussenegg et al. (2018) which analysed insider transactions in seven European countries found a CAAR of 0.49% for acquisitions in the two days event window after disclosure of the trade. For disposals, they saw a CAAR of -0.27% over the same event window, for transactions between 2006 – 2013.

Furthermore, there appear to be variations in the results in different countries. Studies have provided evidence that insiders are able to generate abnormal returns in for example UK (Pope et al., 1990), Switzerland (Zingg et al., 2007), Germany (Dymke and Walter, 2008) and Sweden (Nilsson, 2003). On the contrary, Eckbo and Smith (1998) could not find any results of abnormal returns on the Norwegian market. Additionally, Dardas and Guttler (2011) documented statistically significant share price reaction around publication for the Italian market but not in Austria, while Fidrmuc et al. (2013) made the opposite observation with results of abnormal returns in Austria but not in Italy. One possible explanation for the variances between countries is different market regulations. For example, Fidrmuc et al. (2006) found that insiders were able to earn higher abnormal returns in the United Kingdom compared to the United States, and they suggested that the discrepancy between the two countries could be attributed to different market regulations. Moreover, even in countries with similar laws and regulations, there might be a difference in how the legislation is applied. Aussenegg et al. (2018) found differences in the enforcement of the market abuse regulation in EU countries. More specifically, the share price impact of insider transactions is lower in countries with stronger public enforcement. Consequently, there might be reasons to expect variances in the magnitude of results in different markets, even when the overall market regulations are the same.

Noteworthy, the study by Eckbo and Smith (1998), provided evidence of zero or negative abnormal returns generated by insiders for transactions between 1985 and 1992. The study concluded that mutual funds on the OSE outperform the insider portfolio. Eckbo and Smith also found that when applying the traditional event study methodology to their data used in studies such as Seyhun (1986), Fowler and Rorke (1984) and Pope et al. (1990), it showed some evidence for abnormal returns generated over a four-month period. Eckbo and Smith explained the dubious results by stating that the abnormal returns shown from the event study are driven by the methodology itself.

Extant literature has also been made on the motives of insider trading, and several studies have found that insiders trade for a number of personal reasons, rather than maximising profits at all times (e.g., Huddart and Ke., 2007; Ofek and Yermack, 2000; Nilsson et al., 2009). Nilsson et al. (2009) argue that insiders have the same behavioural biases as other investors, which include the disposition effect and overconfidence. Furthermore, insiders take tax considerations into account when making trading decisions. Lastly, Nilsson et al. find support that insiders want to maintain a balanced portfolio of insider stock relative to other stocks thus affecting their trading decisions. Similarly, Ofek and Yermack (2000) find evidence that insiders who receive equity incentives tend to sell more shares. Consequently, this behaviour is consistent with the idea of diversification and portfolio rebalancing. Beneish and Vargus (2002) and Fidrmuc et al. (2013) argue that there are many motives for insider selling (e.g., portfolio diversification, liquidity and tax issues) which makes disposals less informative than acquisitions. In previous research, there is some discrepancy in the results between purchase and sales transactions. Lakonishok and Lee (2001) find significant price informative results from insider purchases but not from insider sales. Zingg et al. (2007) reported the same conclusion in their study on the Swiss market. Similarly, Fidrmuc et al. (2013) found that abnormal returns in connection with insider selling were nearly zero. On the contrary, Aussenegg et al (2018) found that both purchases and sales transactions were informative to the market, in the sense that disclosures of transactions resulted in a significant price effect on the stock.

Many previous studies have investigated the correlation between insider trading performance and firm-level characteristics. For example, Seyhun (1986; 1998) and Lakonishok and Lee (2001) looked at the firm size as a possible factor for explaining the abnormal returns. Several previous studies looked at the impact of financial analyst coverage and the informational advantage of insiders. Fishman and Hagerty (1992) and Khanna et al. (1994) found that insiders

can gain an informational advantage in listed firms that do not have any coverage by analysts. Frankel and Li (2004) also found that an increased analyst coverage in a company leads to lower profitability of insider trades and a decrease in the number of purchases made by insiders. These findings have also been confirmed recently by Ellul and Panayides (2018) who concluded that analysts impact insiders' trading advantage negatively. In general, larger companies tend to have better analyst coverage, even though there has been an increase in commissioned research on smaller companies on the Stockholm Stock Exchange (Dagens Industri, 2020).

The information hierarchy hypothesis ("IHH") states that insiders who are closer to the operations of the firm have access to better information which makes their trades more informative. Lin and Howe (1990) found supporting evidence for the existence of information hierarchy as top executives, officers and directors trade on more valuable information compared to large shareholders. Similarly, Seyhun (1986; 1998) concluded that certain insiders were better informed than others and thus supported the information hierarchy theory. However, IHH was later criticised by Jeng et al. (2003) and Fidrmuc et al. (2006) who found no support for the notion that top executives' trades are more informative than other officers. Fidrmuc et al. (2006) suggest that one possible explanation for these observations is that CEOs are under considerable scrutiny from market regulators and therefore more cautious when trading on private information. Moreover, Wang et al. (2012) looked at the difference between subgroups of top executives and found evidence that CFO's trades contain more information than CEO's trades. Furthermore, trades made by CFOs are a better indicator of future earnings announcements compared to CEOs. Wang et al. also discuss that CEOs and CFOs have been under increased scrutiny from regulators as they are the ones responsible for the company's financial information. Another aspect of the differences between position types is mentioned by Hillier et al. (2015) who provide evidence that top executives (e.g., CEOs and CFOs) generate superior returns but it is not attributed to their preferential access to insider information in the firm but rather because of their better expertise and skills.

2.3 Research question development and hypotheses

We aim to investigate abnormal share price returns caused by insider transactions of individuals in top management, board of directors and other positions in public Swedish companies with a market cap greater than SEK 500m. The analysis will be made on immediate market reaction

as well as share price development for 3 days before and after the publication of the transaction. Furthermore, our study will examine a number of subgroups to determine if there is any statistically significant difference in cumulative abnormal returns between the groups. The analysis of subgroups in our dataset will include differences in the position held by insiders, differences in the value of transactions and differences in market cap of the respective companies that were traded. For example, do transactions made by CEOs convey more stock price relevant information than an equivalent trade of other insiders?

In the process of developing our hypotheses for the study, previous literature provided guidance on the relevant transaction and firm characteristics to investigate. The study by e.g., Jeng et al. (2003) investigated acquisitions and disposals along the five dimensions: firm size, the value of the transaction, insider positions in the firm, the book-to-market ratio of the firm and if the transaction was made directly by the insider or for another party.

From the abovementioned purpose in section 1.2 as well as the theory and literature review presented in sections 2.1 and 2.2, we have defined four different hypotheses that will be tested. The acquisitions and disposals will be analysed separately.

Our first hypothesis will examine the abnormal returns generated in the whole sample of insider transactions made over the period 2016 – 2022. Numerous previous studies have provided evidence that insiders earn significant abnormal returns (Jaffe, 1974; Finnerty, 1976; Seyhun, 1986, 1998; Rozeff and Zaman, 1988; Lin and Howe, 1990). However, many of the prominent studies have focused on insider transactions in American firms or proven abnormal returns for insider transactions made during earlier and less strict forms of regulation. Even more recent studies such as Aussenegg et al (2018), are analysing transactions made several years before the publication of their study. To the best of our knowledge, the hypothesis of the effects of MAR has not been tested on insider transactions in Sweden. It would thereby contribute to an analysis of transactions made under more strict regulations and thereby provide a current perspective of a well-studied phenomenon.

In accordance with previous research, we expect to find evidence for abnormal returns being generated by insider transactions. The transactions of individuals with the best insight into the future performance of a firm are likely to have a significant effect on the market's perception of the value of a stock.

H0: The abnormal returns from insider transactions equal zero. (Hyp. 1)

HA: The abnormal returns from insider transactions do not equal zero.

Following our first hypothesis, we will investigate whether there is any significant difference in abnormal returns generated based on three different variables. The first variable is the formal position which the insider held within the firm.

It appears intuitive that the market reacts differently to transactions made by insiders of varying positions. Connecting to the information hierarchy hypothesis it states that the higher position held by the insider, the larger the signalling effect would be expected. However, previous studies do not provide a clear indication that abnormal return is dependent on the position of the insider conducting the transaction. In an article by Jeng et al. (2003) they found no evidence that top executives earned higher abnormal returns than insiders of lower positions within the organisation. The article also mentions the behavioural aspect that CEOs are aware that their transactions are very likely to be scrutinised by shareholders and regulators which may result in CEOs being more reluctant to trade on their informational advantage than other insiders. This provides a somewhat complementary explanation to abnormal returns by position from solely relating to the concept of information hierarchy.

Since previous research present ambiguous evidence on differences in abnormal returns between transactions made by insiders of different positions, we do not expect our results to provide strong statistically significant evidence.

H0: There is no significant difference in abnormal returns following a transaction made by a certain position type. (Hyp. 2)

HA: The abnormal returns following a transaction by an insider of a certain position within the firm are significantly different from other positions.

The second variable we will investigate is the size of the firms in which insider transactions are conducted. We choose to investigate the abnormal returns based on this variable as it is reasonable to assume that the share price of larger firms is more effectively priced. One could also motivate our hypothesis from a regulatory perspective as the introduction of MAR might have a different impact on small and large firms. In research conducted by Seyhun (1986;

1998), Pascutti (1996) and Lakonishok and Lee (2001), they introduce firm size as a potential determinant of abnormal returns generated. The studies are using market capitalization as the measure of the firm size and divide the firms into categories based on their market value of equity. The abovementioned studies provide unambiguous evidence that abnormal returns are higher for small firms. According to the findings of Ellul and Panayides (2018), we should expect to see greater abnormal returns for firms with limited analyst coverage and thus, we expect to find evidence for greater abnormal generated in firms with smaller market cap.

H0: Abnormal returns do not vary significantly between different market values of equity of the firms.

(Hyp. 3)

HA: The abnormal returns do significantly vary between different market values of equity of the firms.

The last variable to test for statistical significance is the transaction size. Numerous previous research papers have studied the correlation between the value of a transaction and abnormal returns (Seyhun, 1986, 1998; Pascutti, 1996; Jaffe, 1974). When deciding on testing the variable of transaction size we found the reasoning of Jeng et al. (2003) to touch upon a relevant aspect. Namely that it intuitively appears to be logical that larger transactions are likely to reflect the strongest insider beliefs for the corporate performance and thereby have a larger signalling effect. However, the study of Jaffe (1974) found no statistically significant difference between the overall sample and the sample limited to high-value transactions. The dichotomy between intuitive reasoning and academic findings made our hypothesis even more relevant to test for statistical significance.

The study by Jeng et al. (2003) argues that high-volume transactions could also be motivated by non-monetary incentives such as gaining corporate control over a firm. The primary objective of such transactions would not be to gain abnormal returns by exploiting informational advantage indicating a positive outlook for the firm.

Considering the inconclusive relation between transaction size and abnormal returns provided from previous studies, we are not expecting to find statistically significant results proving the opposite.

H0: Abnormal returns do not vary significantly between different transaction sizes.

(Hyp. 4)

HA: The abnormal returns do significantly vary between different transaction sizes.

3. Method

3.1 Selection of methodology

The study is based on a quantitative empirical method conducted with an event study framework to investigate our research question. By basing the study only on open market purchases and sales we include transactions sensitive to insider information (Ke et al., 2003). Thereby, our analysis excludes transactions such as option and warrant exercises, convertibles as well as transactions relating to pension and bonus programmes.

Statistically testing our research question requires a large number of observations for the given event of study. The extensiveness of our data set allows us to test for significance although applying data filters and cleaning the data from transactions where other events may have occurred in the near time.

3.2 Event study

The usefulness of an event study is to determine the effects of a given event on security prices. Measuring the impact can be done by observing the development of share prices over different time horizons. A central part of an event study is measuring the abnormal returns caused by the event of interest (MacKinlay, 1997).

In the procedure for conducting the event study of our thesis, we have followed the methodology described by MacKinlay (1997).

1. Define the event of interest for the research question as well as the time frame (event window) over which effects on share prices will be analysed
2. Determine the selection of observations to include in the analysis of the research question
3. Appraisal of the impact on share prices of the event of interest requiring a measure of abnormal returns

3.2.1 Event of interest and selection of event window

In our study, the event of interest chosen to investigate is the share price reaction to insider transactions.

When choosing the appropriate event window MacKinlay (1997) describes that it is common to select an event window larger than the specific period of interest to allow for evaluating the time period before and after the event of interest. It is also stated that such an event window should include at least the day before and after the announcement. For our research question, we decided to include event windows stretching before the announcement of the event in order to capture the effects on share prices occurring before the announcement. Such effects include the potential information leakage of the transaction before being published on FI's website. However, a longer event window is potentially exposed to increased "noise" in the explaining variables of the share price reaction.

In guidance of MacKinlay (1997) we decided upon investigating our event of interest from three different event windows:

- [-3; +3] – Three days prior to announcement to three days after announcement
- [-1; +1] – One day prior to announcement to one day after announcement
- [0; +1] – The day of announcement to one day after announcement

3.2.2 Data selection procedure

Given the nature of the raw data retrieved from FI, we have applied a large number of stages for filtration of the data. Below is a detailed description of the procedure from our raw data of insider transactions in Swedish listed companies to the data set used for our analysis.

The selection and data preparation procedure were conducted in two main stages: Firstly, the main filtration outlined in steps 1-9 below and secondly, we conducted a filtration taking clustering into account.

Main filtration

1. *Included only transactions made on shares as the instrument type*
2. *Included only transaction types: acquisitions and disposals*

The rationale for the filtration in steps 1-2 is to include only acquisitions and disposals based on ordinary shares (i.e., excluding transactions related to option programmes, warrants, convertibles, dividends etc.). This is consistent with our goal of constructing a measure of insider trade that is sensitive to insider information.

3. Included only transactions of a size greater than SEK 500,000

We applied this filter in order to ensure the transactions analysed were material enough to have a potential impact on the share price. By applying step 3 we selected the transactions with the greatest potential signalling power.

4. Included only transactions in companies with a market cap greater than SEK 500m

We applied this filtration in order to remove illiquid stocks that might show different responses to insider transactions due to the low volumes of trading in the security.

5. Removed transactions without a correctly indicated ISIN code for the company

6. Removed transactions without values on share price and market cap from Factset

To ensure the integrity of the dataset we removed transactions that contain obvious errors or lack relevant information such as described in steps 5-6. For example, transactions in companies that had recently become listed were excluded since they lacked enough historical share price data for the estimation window.

7. Included only transactions with less than or equal to 7 days between publication and transaction date

The logic behind this filtration was to exclude transactions where the time elapsed between the insider making the trade and publishing it on FI's website was long enough for the information potentially have become public.

8. Included only transactions with stake acquired/disposed as % of market cap being less than 100%

Any transactions excluded in this stage were cases of faulty manual reporting on FI made by the insider conducting the transaction. Thus, naturally these transactions should not be included in the analysis.

9. Excluded transactions occurring in the proximity of the publication of financial reports

In this stage of the data analysis, we cleaned the data for any insider transactions occurring within ± 3 days of the publication of financial reports. Such an event is very likely to affect the share price which would distort the CAR from purely the effect of an insider transaction. Transactions with an overlap were excluded since the quality of the financial report probably impacted share price performance to a great extent.

Clustering filtration

The next stage of our data selection procedure mainly consisted of cleaning the data from the potentially distorting effect caused by multiple transactions in the same security being made within a short period of time. Another frequently occurring issue was that larger transactions made by a single insider often consisted of several smaller transactions made within a short interval. These effects were taken into account by effectively including only the first transaction made within the cluster of several trades made in the same security within the period of the event window $[-3; +3]$.

3.2.3 Market model for abnormal returns

As described by Huddart et al. (2007), the relationship between information asymmetry and insiders' trades can be described by calculating the abnormal returns. When calculating the abnormal returns, MacKinlay (1997) describes the two main statistical methodologies used. Firstly, the *constant mean return model* and secondly, the *market model*.

The first model assumes a constant mean return of a given stock over a given period while the market model estimates a linear relation between the market index return and the individual stock return to account for variations in the market portfolio. In our study, we have chosen to use the statistical market-adjusted model for calculating the abnormal returns in accordance with Campbell et al (1996) describing it as an improved model compared to the constant mean return.

We used the following formula for the calculation of abnormal returns, where the expected share price return is deduced from the actual return.

$$AR_{i,t} = R_{i,t} - E(R_{i,t}|X_t) \quad (\text{Equation 1})$$

Following the methodology suggested by MacKinlay (1997), we have used an estimation window of 120 days prior to the event window. For the calculation of alfa (α_i) and beta (β_i), we have related the return of each stock subject to an insider transaction with the return of the market index OMX Stockholm All Share over the 120 days estimation window. We have used this index because it is a value-weighted index that includes all shares listed on the entire Stockholm Stock Exchange. Therefore, the index is considered to be a reasonable approximation for the market movements with respect to our sample of transactions, when calculating abnormal returns. With alfa and beta calculated, we could retrieve the estimated stock return according to the formula below.

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + \varepsilon_{i,t} \quad (\text{Equation 2})$$

$$E(\varepsilon_{i,t}) = 0; \text{Var}(\varepsilon_{i,t}) = \sigma_{\varepsilon_i}^2$$

The last step of the calculation of the abnormal returns following the market model was to calculate the abnormal return on a daily basis over our different event windows.

$$AR_{i,t} = R_{i,t} - (\hat{\alpha}_i + \hat{\beta}_i R_{m,t}) \quad (\text{Equation 3})$$

3.2.4 Cumulative abnormal returns

To analyse the total shareholder effect of insider transactions, the abnormal returns were summarised over the three different event windows to the Cumulative Abnormal Return (“CAR”). The cumulative abnormal return will be used as the basis for our statistical analysis.

$$CAR_{i,(t_1,t_2)} = \sum_{t=t_1}^{t_2} AR_{i,t} \quad (\text{Equation 4})$$

The cumulative average abnormal return (CAAR) is calculated by taking the average CAR for each respective observation over the defined event window.

$$CAAR_{(t_1,t_2)} = \frac{1}{N} \sum_{i=1}^N CAR_{i,(t_1,t_2)} \quad (\text{Equation 5})$$

Furthermore, we assume that the distribution of CAAR under H_0 is the following:

$$CAAR(t_1, t_2) \sim N(0, \sigma^2(CAAR(t_1, t_2))) \quad (\text{Equation 6})$$

3.3 Statistical methodology

The statistical analysis has been conducted with one-sample t-tests for the individual tests of the respective samples for each dummy variable. For the tests on differences in abnormal returns between the different categories within the dummy variables, we conducted two-sample t-tests using groups.

To allow for statistically testing the significance of our null hypotheses, we made the explanatory variables into dummy variables. Firstly, we manually classified the position types of the individual conducting the transaction into the three categories: CEO, Board Member and Other. Secondly, we categorised the transaction size into three categories: Large transactions (> 5 MSEK), mid-sized transactions (1- 5 MSEK) and small transactions (< 1 MSEK). Lastly, we made the market capitalization of the firm into dummy variables with the three categories: Large market capitalization (>10,000 MSEK), mid-sized market capitalization (3,000 – 10,000 MEK) and small market capitalization (< 3,000 MSEK). For the dummy variables, we used the market capitalization for each firm at the time when each transaction occurred in order to reflect the size of the firm at the time of the transaction.

Based on the separate data samples for the different variables we test our four hypotheses. We have the following formula for testing H0:

$$\theta = \frac{CAAR(t_1, t_2)}{\sigma^2(CAAR(t_1, t_2))} \sim N(0,1) \quad (\text{Equation 7})$$

4. Data Collection and Compilation

4.1 Data collection and selection

The data on insider transactions have been collected from FI (Finansinspektionen, 2022). Our initial raw data set consists of approximately 80,000 transactions made over a period of more than five years (middle of 2016 – end of March 2022). The transaction data published on FI's website includes details on each transaction such as the nature of transaction, the value of the transaction, position held in the company by the notifier, ISIN code for the traded security, date of both transaction and publication among other things. Some of these parameters will be used in the analysis of differences in abnormal returns for subgroups of our sample.

From the total sample of transactions, we applied the filtration stages described in section 3.2.2, which condensed our data sample from ~80,000 transactions to 2,726 as described by the Data Funnel in table 1 below. The main objective of the filtration procedure was to attempt to provide an analysis of share price reactions caused by solely the effect of the insider transaction. Optimally our study should only consider observations where the only parameter impacting share price performance is the observed insider transaction. However, many factors affect the share price returns on a daily basis which made our main objective with the data selection stage to remove transactions that include such “noise”. We are also aware of the fact that the longer event windows included in our analysis may to a larger extent include other parameters that are not analysed and therefore assume that our most narrow event window [0; +1] provides the best indication for abnormal returns.

Table 1. Data filtration funnel

Description	Total observations
Total number of insider transactions reported July 2016- March 2022	79,980
Less transactions other than acquisitions or disposals of shares	53,416
Less transactions of a value smaller than SEK 500,000	14,919
Less transactions with market cap smaller than SEK 500m	10,606
Less transactions affected by filters 5- 8 in Section 3.2.2	9,448
Less filtration for cluster transactions and publication of financial reports	2,726

4.2 Complements to the data set

In addition to the data retrieved from FI, several additions to the data set have been made using the database *Factset*. The additions mainly include share price development and market capitalization for each respective company/observation as well as index development. We have used the OMX Stockholm All Share as described in 3.2.3. Furthermore, the quarterly reporting dates of each company have also been retrieved from *Factset* which was used in the filtration stage to clean out transactions that occurred in proximity to the publication of financial reports.

4.3 Limitations to data set

Since the responsibility to report transactions to FI lies on the individual conducting the transaction, the completeness of the data set depends on these regulations being followed. Consequently, the potential issue of human error exists in the reporting process which is

something we noticed occurred quite frequently in the data set retrieved from FI. In some instances, there were misspellings in input data such as the ISIN code or instrument type to which the transaction was referring to. In other cases, the notifier had waited several weeks after the date of the transaction to report and publish the information to FI. As a matter of fact, MAR states that the person discharging managerial responsibilities is obliged to report transactions to FI within three business days (Finansinspektionen, 2016).

Another, more obvious limitation to our data set was the lack of historical data on share prices for transactions in recently listed companies. Given our 120 days estimation window for calculating the estimated return, these transactions were excluded from the analysis.

4.4 Final data sample

After conducting the data selection process, we ended up with a sample of 2,726 transactions. Presented in table 2 and 3 are the distributions of transactions over the dummy variables and year respectively. For each transaction we have extracted data for all the three event windows used in the analysis: [-3; +3], [-1; +1] and [0; +1]. As indicated in table 2 and 3 we observed an even distribution of the transactions over both the dummy variables and over each year. We also observe an even distribution of acquisitions and disposals over the years included in our analysis. Naturally, the number of observations for 2016 and 2022 were lower than other years due to a fractional period of each year being included.

Table 2. Dummy variables

Variable	Description	Total observations
Acquisition	Dummy indicating buy transaction	1,506
Disposal	Dummy indicating sell transaction	1,220
CEO Transactions	Dummy indicating CEO total transactions	544
Board Member Transactions	Dummy indicating Board Member total transactions	1,382
Other position Transactions	Dummy indicating Other position total transactions	800
Value of Transaction < 1 MSEK	Dummy indicating transaction value less than 1 MSEK	878
Value of Transaction 1 - 5 MSEK	Dummy indicating transaction value between 1-5 MSEK	1,059
Value of Transaction > 5 MSEK	Dummy indicating transaction value greater than 5 MSEK	789
Market Cap < 3,000 MSEK	Dummy indicating transaction in company with "small" market cap	935
Market Cap 3,000 - 10,000 MSEK	Dummy indicating transaction in company with "mid-sized" market cap	740
Market Cap > 10,000 MSEK	Dummy indicating transaction in company with "large" market cap	1,051

Table 3. Number of transactions by year

	2016	2017	2018	2019	2020	2021	2022
Acquisitions	42	204	308	239	251	348	114
Disposals	50	189	202	217	254	259	49
Total Transactions	92	393	510	456	505	607	163

5. Empirics and Analysis

In this section of the report, we will present the results of our analysis, starting with descriptive statistics in section 5.1 followed by the statistical analysis in section 5.2. In section 5.3 we elaborate on how our findings relate to previous research.

5.1 Descriptive statistics

For the transactions used in the analysis, we performed a descriptive analysis over the three event windows as described in section 3.2.1. In response to the length of the event window, MacKinlay (1997) mentions that in order to increase the power properties of the event study methodology, one could increase the sample size or decrease the length of the event window. With that in mind, we are careful in drawing any conclusions solely based on results from the longer event windows. In table 4, the minimum and maximum values observed for the entire sample of acquisitions and disposals in event windows $[-3; +3]$ and $[-1; +1]$ indicate that these samples are likely to include “noise”. The maximum values for CAR in these event windows, presented in panel 2 clearly reflect the effect of other events than the disposal of shares from an insider. The aforementioned can also be observed from the diminishing standard deviation for decreasing length of the event window. For the full sample of acquisitions, the standard deviation decreases from 7.59% to 4.36% and for the disposals, the standard deviation decreases from 9.64% to 3.97% between the seven days event window and the two days event window.

Table 4. Descriptive analysis all transactions

Panel 1. Acquisitions			
<i>Event Windows</i>	<i>[-3; +3]</i>	<i>[-1; +1]</i>	<i>[0; +1]</i>
<i>Observations</i>	1,506	1,506	1,506
<i>Minimum</i>	-38.90%	-29.77%	-31.85%
<i>Mean</i>	0.99%	1.13%	0.95%
<i>Median</i>	0.70%	0.63%	0.58%
<i>Maximum</i>	55.15%	37.14%	28.36%
<i>Standard Deviation</i>	7.59%	5.32%	4.36%
Panel 2. Disposals			
<i>Event Windows</i>	<i>[-3; +3]</i>	<i>[-1; +1]</i>	<i>[0; +1]</i>
<i>Observations</i>	1,220	1,220	1,220
<i>Minimum</i>	-86.55%	-33.16%	-24.84%
<i>Mean</i>	-1.22%	-0.72%	-0.75%
<i>Median</i>	-1.26%	-0.72%	-0.68%
<i>Maximum</i>	185.44%	104.71%	24.10%
<i>Standard Deviation</i>	9.64%	5.99%	3.97%

5.2 Statistical analysis

In this section, we provide the results of the statistical analysis performed on our data sample according to the methodology described in section 3.3.

5.2.1 Test on excess returns for total observations

Hypothesis 1: *The abnormal returns from insider transactions equal zero.*

The results from our one-sample t-tests on the total sample of acquisitions and disposals, presented in table 5, provide strong evidence that insider transactions on Nasdaq Stockholm generate significant abnormal returns. Our analysis also provides evidence that abnormal returns generated from acquisitions are greater than for disposals over the narrower event windows of three and two days respectively.

Table 5 indicates that both acquisitions and disposals generate abnormal returns in all three event windows with more than 99% statistical significance. Thus, our results allow us to confidently reject the null hypothesis. The acquisitions in our sample present a CAAR of approximately 1% over all three event windows, with an unambiguous increase in the t-value as the event window narrows. Our analysis of all disposals included in our sample provides a

similar result with CAAR within a 0.04 p.p. interval for the narrow event windows. Similarly to the acquisitions, there is also a clear increase in t-value from event window [-3; +3] to [0; +1], from -4.42 to -6.61.

In a comparison with the results presented in previous studies, we find the results of our study to present somewhat similar conclusions. However, considering significant differences between our study and results provided in previous literature presented in section 2.2, in terms of the time period analysed, geographic scope, event windows used as well as various methodologies in selecting and categorising the data, we will not draw any firm conclusions from the comparison. However, the previous studies provide indications that abnormal returns for disposals are lower than for acquisitions, which our analysis concludes as well. We also carefully note that our abnormal returns appear to be higher than found in previous studies which indicates that the stricter regulations introduced by MAR in 2016 have not reflected in lower abnormal returns. A potential explanation for these results could be derived from the filtration methodology we used by excluding transactions of values less than SEK 500,000. Relating to the signalling theory, one could argue that our analysis selected the transactions with the highest potential signalling effect on the market resulting in greater abnormal returns.

Table 5. Cumulative abnormal returns all transactions

Event Windows	Acquisitions			Disposals		
	CAAR	t-value	p-value	CAAR	t-value	p-value
[-3; +3]	0.99%***	5.07	0.0000	-1.22%***	-4.42	0.0000
[-1; +1]	1.13%***	8.25	0.0000	-0.71%***	-4.18	0.0000
[0; +1]	0.95%***	8.47	0.0000	-0.75%***	-6.61	0.0000
N		1,506			1,220	

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

5.2.2 Test on excess returns by position

Hypothesis 2: *There is no significant difference in abnormal returns following a transaction made by a certain position type.*

As suggested by the results in table 6, the transactions made by CEOs and Board Members generate the highest cumulative abnormal returns for both acquisitions and disposals. This is in line with the findings of the research of Seyhun (1986) which presents evidence that insiders

who are expected to be more knowledgeable within the business are better predictors of the future abnormal returns in the stock price. For acquisitions, our data suggest that abnormal returns are the greatest following an acquisition of a Board Member while for disposals the abnormal returns are greatest following the transaction of a CEO.

Table 7 provides an indication in regard to our second hypothesis. In panel 1 we only find statistically significant differences between the abnormal returns of Board Members and Other positions. For acquisitions over the event windows [-1; +1] and [0; +1] we find that Board Members generate greater abnormal returns than Other Positions with 95% and 90% statistical significance.

For disposals, presented in panel 2 of table 7, our analysis indicates the strongest statistical significance for the difference between CEOs and Other Positions. With more than 95% statistical significance CEOs generate higher abnormal returns over all three event windows. We also find greater than 95% statistical significance in the difference between Board Members and Other Positions over the event windows; [-3; +3] and [-1; +1]. However, for the event window [0; +1] our output presents a p-value of 0.3115 and thus, a possible explanation lies in the potential “noise” for the CAAR recorded in the longer event windows.

For the test on the difference in abnormal returns generated from different positions held within the firm, we can partially reject our null hypothesis. The analysis provides evidence of statistically significant differences in abnormal returns between Board Members and Other positions and CEOs and Other Positions for acquisitions and disposals respectively. We also interpret the results as when a CEO conducts a disposal of shares the market reacts stronger than for a corresponding acquisition of shares by a CEO.

Table 6. Cumulative abnormal returns by position

Panel 1. Acquisitions									
<i>Event Windows</i>	CEO			Board Member			Other Positions		
	<i>CAAR</i>	<i>t-value</i>	<i>p-value</i>	<i>CAAR</i>	<i>t-value</i>	<i>p-value</i>	<i>CAAR</i>	<i>t-value</i>	<i>p-value</i>
<i>[-3; +3]</i>	0.70%*	1.84	0.0671	1.29%***	4.96	0.0000	0.43%	0.91	0.3614
<i>[-1; +1]</i>	0.87%***	2.90	0.0040	1.41%***	7.93	0.0000	0.58%*	1.93	0.0549
<i>[0; +1]</i>	0.84%***	3.77	0.0002	1.11%***	7.36	0.0000	0.58%**	2.29	0.0227
<i>N</i>		360			875			271	

Panel 2. Disposals

Event Windows	CEO			Board Member			Other Positions		
	CAAR	t-value	p-value	CAAR	t-value	p-value	CAAR	t-value	p-value
[-3; +3]	-2.29%***	-4.37	0.0000	-1.84%***	-4.70	0.0000	-0.26%	-0.53	0.5929
[-1; +1]	-1.40%***	-3.85	0.0002	-1.01%***	-3.81	0.0002	-0.20%	-0.72	0.4706
[0; +1]	-1.32%***	-4.82	0.0000	-0.78%***	-3.83	0.0001	-0.53%***	-3.58	0.0004
N		184			507			529	

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 7. Difference in cumulative abnormal returns by position**Panel 1. Acquisitions**

Event Windows	CEO - Board Member			CEO - Other Position			Board Member - Other Positions		
	Δ CAAR	t-value	p-value	Δ CAAR	t-value	p-value	Δ CAAR	t-value	p-value
[-3; +3]	-0.58%	-1.24	0.2166	0.27%	0.45	0.6507	0.86%	1.60	0.1093
[-1; +1]	-0.53%	-1.58	0.1135	0.30%	0.69	0.4935	0.83%**	2.31	0.0210
[0; +1]	-0.27%	-0.97	0.3325	0.26%	0.78	0.4349	0.53%*	1.74	0.0820

Panel 2. Disposals

Event Windows	CEO - Board Member			CEO - Other Position			Board Member - Other Positions		
	Δ CAAR	t-value	p-value	Δ CAAR	t-value	p-value	Δ CAAR	t-value	p-value
[-3; +3]	-0.45%	-0.62	0.5378	-2.03%**	-2.34	0.0196	-1.58%**	-2.55	0.0108
[-1; +1]	-0.38%	-0.78	0.4370	-1.20%**	-2.35	0.0191	-0.82%**	-2.14	0.0328
[0; +1]	-0.54%	-1.45	0.1468	-0.80%***	-2.69	0.0074	-0.25%	-1.01	0.3115

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

5.2.3 Test on excess returns by market cap

Hypothesis 3: *Abnormal returns do not vary significantly between different market values of equity of the firms.*

The analysis shown in table 8 indicates that transactions in small firms with a market capitalization less than SEK 3bn, result in the highest CAAR over all event windows. With a 2.31% CAAR over the event window [-1; +1] for acquisitions and -1.20% CAAR over the same event window for disposals, the analysis shows that transactions in small firms generate higher cumulative abnormal returns than over the whole data sample of all transactions. Panel 1 in table 8 also clearly show a diminishing statistical significance in CAAR by increasing firm

size for acquisitions. Also, for disposals, presented in panel 2, the results are not as clear given the strong statistical significance for abnormal returns in firms with large market cap. However, the overall trend for disposals is still the same as in panel 1, with diminishing abnormal returns for larger firms.

Presented in table 9 are the differences between the subgroups of the dummy variable for firm size. Panel 1 provides indicative evidence that acquisitions in small firms generate greater abnormal returns with a 99% statistical significance. Regarding the disposals, panel 2 indicates a similar result that transactions in small firms generate higher abnormal returns than in large firms with a 95% and 90% significance for the narrower event windows. Thus, our results allow us to reject the null hypothesis.

As mentioned in section 2.2, several studies have concluded that insider trading is most informative in small firms (Seyhun, 1986, 1998; Pascutti, 1996; Lakonishok and Lee, 2001). The results are also intuitively logical, partly due to analyst coverage of smaller firms being less extensive than for the larger firms which makes it more likely for insiders in small firms to have a greater information advantage (Jeng et al., 2003). Findings from other articles support this reasoning by providing evidence of reduced information asymmetry between insiders and investors as the analyst coverage increases (Fishman and Hagerty, 1992; Khanna et al., 1994; Frankel and Li, 2004).

Table 8. Cumulative abnormal returns by market cap

Panel 1. Acquisitions									
<i>Event Windows</i>	Small Market Cap			Mid-sized Market Cap			Large Market Cap		
	<i>CAAR</i>	<i>t-value</i>	<i>p-value</i>	<i>CAAR</i>	<i>t-value</i>	<i>p-value</i>	<i>CAAR</i>	<i>t-value</i>	<i>p-value</i>
<i>[-3; +3]</i>	2.07%***	5.18	0.0000	0.73%*	1.82	0.0695	0.18%	0.84	0.4016
<i>[-1; +1]</i>	2.31%***	8.13	0.0000	0.97%***	3.54	0.0005	0.15%	1.08	0.2799
<i>[0; +1]</i>	1.88%***	7.75	0.0000	0.83%***	3.98	0.0000	0.18%	1.57	0.1163
<i>N</i>		533			395			578	

Panel 2. Disposals

Event Windows	Small Market Cap			Mid-sized Market Cap			Large Market Cap		
	CAAR	t-value	p-value	CAAR	t-value	p-value	CAAR	t-value	p-value
[-3; +3]	-1.66%**	-2.43	0.0154	-1.55%***	-3.32	0.0010	-0.61%**	-2.59	0.0100
[-1; +1]	-1.2%***	-3.76	0.0002	-0.68%	-1.61	0.1080	-0.33%**	-2.06	0.0401
[0; +1]	-0.94%***	-3.82	0.0002	-0.94%***	-4.32	0.0000	-0.45%***	-3.48	0.0005
N		402			345			473	

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 9. Difference in cumulative abnormal returns by market cap**Panel 1. Acquisitions**

Event Windows	Small - Mid-sized			Small - Large			Mid-sized - Large		
	Δ CAAR	t-value	p-value	Δ CAAR	t-value	p-value	Δ CAAR	t-value	p-value
[-3; +3]	1.34%**	2.33	0.0200	1.89%***	4.24	0.0000	0.54%	1.29	0.1975
[-1; +1]	1.34%***	3.30	0.0010	2.16%***	6.96	0.0000	0.82%***	2.88	0.0040
[0; +1]	1.05%***	3.14	0.0017	1.7%***	6.49	0.0000	0.65%***	2.93	0.0034

Panel 2. Disposals

Event Windows	Small - Mid-sized			Small - Large			Mid-sized - Large		
	Δ CAAR	t-value	p-value	Δ CAAR	t-value	p-value	Δ CAAR	t-value	p-value
[-3; +3]	-0.11%	-0.13	0.8996	-1.05%	-1.55	0.1222	-0.94%*	-1.94	0.0525
[-1; +1]	-0.52%	-0.99	0.3229	-0.87%**	-2.54	0.0113	-0.35%	-0.86	0.3898
[0; +1]	0.00%	0.01	0.9892	-0.49%*	-1.84	0.0664	-0.49%**	-2.06	0.0401

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

5.2.4 Test on excess returns by transaction size

Hypothesis 4: *Abnormal returns do not vary significantly between different transaction sizes.*

Our last hypothesis examines the differences in abnormal returns by the size of transactions. Our size categorisation of the transactions shown in table 10, indicates increasing CAAR with the increasing value of the transaction in panel 1. From a CAAR of 0.79% for small transactions to 1.44% CAAR for large transactions in the three days event window. A similar pattern can be observed over all three event windows presented in panel 1 as well as increasing t-value as the transaction value increases. The results for disposals, presented in panel 2 of table 10, provide a somewhat different conclusion. On the contrary, we observe a flat development of

the CAAR as the size of the transaction increases as well as decreasing t-value for the narrower event windows.

The differences in CAAR presented in table 11 provide an ambiguous result for the statistical analysis. Panel 1 provide some indication of a potential statistically significant difference between large and small transactions. However, we only find the difference to be statistically significant with 90% confidence for the two longer event windows. For our narrow, two days event window, no statistical significance can be recorded which makes us doubt the findings of the other two event windows. An examination of the disposals, presented in panel 2, does not even provide the slightest indication of statistically significant differences between the different sizes of transactions. To conclude, our tests for hypothesis 4 provide no evidence allowing us to reject the null hypothesis.

In line with the results from our statistical analysis, Jaffe (1974) found no statistically significant difference between the overall sample and the sample limited to high-value transactions. The results of this study have been cross analysed by Seyhun (1998) who argues that a potential reason for the findings may be since Jaffe (1974) included only the largest firms on NYSE in his sample which has been found to be where the transaction value has the lowest impact.

Table 10. Cumulative abnormal returns by transaction size

Panel 1. Acquisitions									
<i>Event Windows</i>	Small transactions			Mid-sized transactions			Large transactions		
	<i>CAAR</i>	<i>t-value</i>	<i>p-value</i>	<i>CAAR</i>	<i>t-value</i>	<i>p-value</i>	<i>CAAR</i>	<i>t-value</i>	<i>p-value</i>
<i>[-3; +3]</i>	0.65%**	2.04	0.0422	0.95%***	2.85	0.0045	1.64%***	4.39	0.0000
<i>[-1; +1]</i>	0.79%***	3.53	0.0005	1.27%***	5.52	0.0000	1.44%***	5.54	0.0000
<i>[0; +1]</i>	0.78%***	4.41	0.0000	1.05%***	5.38	0.0000	1.06%***	5.01	0.0000
<i>N</i>	564			577			365		

Panel 2. Disposals

Event Windows	Small transactions			Mid-sized transactions			Large transactions		
	CAAR	t-value	p-value	CAAR	t-value	p-value	CAAR	t-value	p-value
[-3; +3]	-1.02%***	-2.69	0.0076	-0.98%*	-1.90	0.0583	-1.65%***	-3.60	0.0004
[-1; +1]	-0.72%***	-2.89	0.0042	-0.69%***	-2.75	0.0062	-0.75%**	-2.08	0.0378
[0; +1]	-0.76%***	-3.96	0.0001	-0.71%***	-3.88	0.0001	-0.78%***	-3.78	0.0020
N		314			482			424	

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 11. Difference in cumulative abnormal returns by transaction size

Panel 1. Acquisitions

Event Windows	Large - Mid-sized			Large - Small			Mid-sized - Small		
	Δ CAAR	t-value	p-value	Δ CAAR	t-value	p-value	Δ CAAR	t-value	p-value
[-3; +3]	0.65%	1.28	0.2015	0.95%*	1.92	0.0547	0.30%	0.65	0.5183
[-1; +1]	0.17%	0.49	0.6265	0.65%*	1.87	0.0619	0.48%	1.49	0.1364
[0; +1]	0.01%	0.04	0.9665	0.28%	1.00	0.3170	0.27%	1.01	0.3125

Panel 2. Disposals

Event Windows	Large - Mid-sized			Large - Small			Mid-sized - Small		
	Δ CAAR	t-value	p-value	Δ CAAR	t-value	p-value	Δ CAAR	t-value	p-value
[-3; +3]	-0.67%	-0.96	0.3392	-0.63%	-1.01	0.3109	0.04%	0.05	0.9599
[-1; +1]	-0.06%	-0.13	0.8928	-0.02%	-0.05	0.9627	0.04%	0.10	0.9228
[0; +1]	-0.07%	-0.27	0.7901	-0.02%	-0.07	0.9454	0.05%	0.19	0.8464

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

5.3 Discussion

Across our four hypotheses, we find that our analysis presents evidence in line with previous research – namely that insider transactions generate abnormal returns in a short perspective. Our research unambiguously provides abnormal returns generated for both acquisitions and disposals across all three event windows. Although strong results were found for abnormal returns in the event window [-3; +3], we reached the conclusion that the narrower event windows; [-1; +1] and [0; +1] are to be seen as more accurate. The differences observed between abnormal returns for acquisitions and disposals relate to the findings of Beneish and Vargus (2002) and Fidrmuc et al. (2013) who argue that there may be many motives for insider

disposals such as portfolio diversification and liquidity needs. In line with these studies, our results presented in table 5 suggest that insider disposals are less informative than acquisitions.

As described in the literature overview many prominent studies are based on data from several decades ago. Consequently, these previous findings might potentially become obsolete over time when the market conditions changes. Furthermore, extant literature has found a potential difference between the immediate market reaction and abnormal returns in a longer perspective. For example, Lakonishok and Lee (2001) suggested that the market initially underreacts to the announcement of insider trades. Therefore, there might be a possibility that the market has incorporated the findings from earlier research and thus currently reacts more strongly, in the immediate term, to the publication of insider transactions.

For the tests on specific variables, we find that our results provide conclusions in line with previous studies. In hypothesis 2 the analysis indicated that the abnormal returns of CEOs and Board members are greater than the ones generated in response to transactions by individuals of other positions. However, the results do not provide a distinct difference between the abnormal returns of CEOs and Board Members. Under the assumption of information hierarchy, our results thereby suggest that superior access to sensitive insider information does not imply greater abnormal returns. This conclusion was also provided by Hillier et al. (2015) who showed evidence that the superior return performance of CEOs and CFOs originates from their better expertise and skills rather than preferential access to insider information in the firm. Another aspect is the role that regulators play when it comes to insider transactions. Jeng et al. (2003) and Fidrmuc et al. (2006) both provide a potential explanation for our observations by stating that CEOs are under strict scrutiny from market regulators and might therefore be more cautious when trading on private information.

In line with previous research, we were able to provide strong statistical significance for greater abnormal returns in small firms as investigated in our third hypothesis. From a theoretical perspective, the hypothesis relates to the concept of information asymmetry, described in section 2.1. With greater coverage from equity analysts and increased publicity in the media, previous studies suggest that private information justifying insider transactions is priced more effectively by the market than for firms with less coverage (Fishman and Hagerty, 1992; Khanna et al., 1994; Frankel and Li, 2004). To summarise, a reasonable argument supporting the evidence of our analysis would be that increased transparency caused by greater analyst

coverage and publicity would suggest that larger firms are closer to the state of perfect information described by Akerlof (1978).

The fourth and final hypothesis on which we investigate the relation to abnormal returns is the size of transactions. We observed statistically significant abnormal returns across all sizes of transactions but are not able to provide any evidence on differences within the categories of the dummy variable. According to the signalling theory, an action that conveys more private information should lead to a larger market reaction. A reasonable assumption would be that larger transactions by insiders symbolise a stronger belief in the future performance of the stock and thus imply greater abnormal returns. However, our results contradict the intuitive effect of greater signalling to the market as the size of transactions increases. The criticism Seyhun (1998) raised in response to the study made by Jaffe (1974) might be relevant also to our study. As we excluded all firms with a market cap below SEK 500m in the filtration stage our analysis might be exposed to similar distortions. One could also argue that our sample does not actually include “small” transactions given our filtration to analyse transactions of a value greater than SEK 500,000.

6. Conclusion

Our study on the share price reaction to insider transactions allows us to confidently draw the conclusion that abnormal returns are generated from both insider acquisitions and disposals. The results provided from our analysis strongly suggest that although stricter regulations have been introduced, insider transactions still generate significant abnormal returns. By studying the reaction in share price from three different variables, we conclude that the position of the insider conducting the transaction is informative for the magnitude of abnormal returns being generated. Furthermore, when looking at the differences in abnormal returns on the basis of firm size, our results allow us to confidently conclude that small firms generate the highest excess returns. Rather surprisingly, our test on differences in abnormal returns by size of the transaction did not provide evidence in line with our intuitive conclusion.

The results for our hypotheses only partially provide an answer to our research question “*Do insider transactions after the implementation of MAR generate abnormal returns in the short perspective and to what extent do certain variables explain differences in abnormal returns?*”.

Our results for the overall sample indicate that transactions made after the introduction of MAR generate higher abnormal returns compared to previous studies. Albeit stricter regulations our data still provide strong evidence of abnormal returns generated for both acquisitions and disposals which leads us to the conclusion that the new regulations have had a limited effect on insider information asymmetry. Furthermore, the results of our overall sample allow us to reject the strong form of the efficient market hypothesis, as insiders can use private information to earn excess returns. However, our study can provide some support for the existence of the semi-strong form of the EMH. Based on our study, we are not able to draw any conclusions on the difference between the weak-form and strong-form theory.

Regarding the second part of our research question, we found the explanatory strength of our variables to be limited. As stated by the information hierarchy hypothesis, trades of insiders closer to the operations are the most informative. However, our study provides dissonant evidence as we are not able to firmly draw significant conclusions between the abnormal returns of CEOs' and Board Members' transactions. The theory of information asymmetry provides support for the conclusions drawn from the excess returns following transactions in smaller firms. With share price reactions relating to the extent of informational advantage possessed by the insider, we can conclude that the concept of information asymmetry provides a better understanding of market reactions. However, our study does not provide evidence of the existence of information asymmetry but presents indications that the market reacts as if so were the case. To summarise, we find our study to provide an explicit answer to the broader question of whether abnormal returns still exist after stricter regulations. However, we conclude that the market's reaction to insider transactions is much more complex than what our thesis claims to investigate. Although our study provides some indication of potential determinants of abnormal return, the market reaction to insider transactions can only be understood from an extensive multivariate perspective.

Aware of the fact that our study contains certain limitations we conclude that the results from a study on the same initial data set could result in different outcomes. The process we used in narrowing down the data set included in the analysis might have been a reason for not finding significant results for some of the hypotheses or somewhat deviating results compared to previous studies. In addition, that same process possibly reduced the number of observations to the extent that it impacted the outcome of our analysis and caused the inconsistency of significance between the different lengths of the event windows. Moreover, the statistical

methodology we used was limited to t-tests for statistical significance which could have been complemented with other methodologies.

To conclude, our study provides strong evidence that abnormal returns following insider transactions still exist in Swedish firms. However, the phenomenon of insider transactions is much more complex than what is analysed in our study. For future research on abnormal returns, we suggest analysing the difference between long- and short-term horizons after the implementation of MAR. As previous studies have found varying results for different time periods, it could be of interest to analyse whether the new regulations have had any impact on these findings. Furthermore, it might be of interest to evaluate if there is any difference in results in EU countries after MAR was introduced. Based on our findings on the relationship between abnormal returns and transaction size we suggest further investigating the reason why the signalling effect does not increase proportionately to the value of the transaction. Since we have only observed the phenomenon quantitatively it might provide additional insight to explore if there are any qualitative aspects or other motives underlying these results.

7. References

7.1 Periodicals

- Akerlof, G.A. (1978). The market for “lemons”: Quality uncertainty and the market mechanism. In *Uncertainty in economics*. Academic Press, 235-251.
- Aussenegg, W., Jelic, R. and Ranzi, R. (2018). Corporate insider trading in Europe. *Journal of International Financial Markets, Institutions and Money*, 54, 27-42.
- Beneish, M.D. and Vargus, M.E. (2002). Insider trading, earnings quality, and accrual mispricing. *The accounting review*, 77(4), 755-791.
- Dardas, K. and Güttler, A. (2011). Are directors’ dealings informative? Evidence from European stock markets. *Financial Markets and Portfolio Management*, 25(2), 111-148.
- Dymke, B.M. and Walter, A. (2008). Insider trading in Germany—Do corporate insiders exploit inside information?. *Business Research*, 1(2), 188-205.
- Eckbo, B. E., and D. C. Smith. (1998). The Conditional Performance of Insider Trades. *Journal of Finance*, 53, 467–498.
- Ellul, A., & Panayides, M. (2018). Do Financial Analysts Restrain Insiders’ Informational Advantage?. *Journal of Financial and Quantitative Analysis*, 53(1), 203-241.
- Fama, Eugene. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work. *Journal of Finance*. 25 (2), 383–417.
- Fidrmuc, J.P., Goergen, M. and Renneboog, L. (2006). Insider trading, news releases, and ownership concentration. *The Journal of Finance*, 61(6), 2931-2973.
- Fidrmuc, J.P., Korczak, A. and Korczak, P. (2013). Why does shareholder protection matter for abnormal returns after reported insider purchases and sales?. *Journal of Banking & Finance*, 37(6), 1915-1935.
- Fishman, M., and K. Hagerty. (1992). Insider Trading and the Efficiency of Stock Prices. *Rand Journal of Economics*, 23, 106–122.

- Fowler, David J., and C. Harvey Rorke. (1984). Insider trading profits in the Canadian equitymarket. Working paper, York University, Canada.
- Frankel, R. and Li, X. (2004). Characteristics of a firm's information environment and the information asymmetry between insiders and outsiders. *Journal of accounting and economics*, 37(2), 229-259.
- Hillier, D., Korczak, A. and Korczak, P. (2015). The impact of personal attributes on corporate insider trading. *Journal of Corporate Finance*, 30, 150-167.
- Huddart, S., Ke, B. and Shi, C. (2007). Jeopardy, non-public information, and insider trading around SEC 10-K and 10-Q filings. *Journal of Accounting and Economics*, 43(1), 3-36.
- Huddart, S.J., Ke, B. (2007). Information asymmetry and cross-sectional variation in insider trading. *Contemporary Accounting Research* 24, 195–232.
- Jaffe, J.F. (1974). Special information and insider trading. *The Journal of Business*, 47(3), 410-428.
- Jeng, L., Metrick, A., Zeckhauser, R. (2003). Estimating the returns to insider trading: a performance-evaluation perspective. *Review of Economics and Statistics* 85, 453–471.
- Kallunki, J.P., Nilsson, H. and Hellström, J. (2009). Why do insiders trade? Evidence based on unique data on Swedish insiders. *Journal of Accounting and Economics*, 48(1), 37-53.
- Kallunki, J., Kallunki, J.P., Nilsson, H. and Puhakka, M. (2018). Do an insider's wealth and income matter in the decision to engage in insider trading?. *Journal of Financial Economics*, 130(1), 135-165.
- Ke, B., Huddart, S. and Petroni, K. (2003). What insiders know about future earnings and how they use it: Evidence from insider trades. *Journal of Accounting and Economics*, 35(3), 315-346.

- Khanna, N.; S. Slezak; and M. Bradley. (1994). Insider Trading, Outside Search and Resource Allocation: Why Firms and Society May Disagree on Insider Trading Restrictions. *Review of Financial Studies*, 7, 575–608.
- Lakonishok, J., Lee, I. (2001). Are insider trades informative? *Review of Financial Studies* 14, 79–111.
- Lin, J.C. and Howe, J.S. (1990). Insider trading in the OTC market. *The Journal of Finance*, 45(4), 1273-1284.
- MacKinlay, A.C., & Campbell J. (1996). The Econometrics of Financial Markets. *Macro Dynamics*, 2, 559-562.
- MacKinlay. (1997). Event Studies in Economics and Finance. *Journal of Economic Literature*, 35(1), 13-39.
- Nilsson, H. (2003). Essays on the value relevance of financial statement information (Doctoral dissertation).
- Ofek, E. and Yermack, D. (2000). Taking stock: Equity-based compensation and the evolution of managerial ownership. *The Journal of Finance*, 55(3), 1367-1384.
- Pascutti, M. J. (1996). Three essays in finance: Informed trading on NASDAQ, contrarian trading by insider, and swap pricing. Harvard University.
- Pope, Peter F., R.C. Morris, and David A. Peel. (1990). Insider trading: Some evidence on market efficiency and directors' share dealings in Great Britain. *Journal of Business, Finance, and Accounting* 17, 359–380.
- Rozeff, M.S. and Zaman, M.A. (1998). Overreaction and insider trading: Evidence from growth and value portfolios. *The Journal of Finance*, 53(2), 701-716.
- Seyhun, N. (1986). Insiders' Profits, Costs of Trading, and Market Efficiency. *Journal of Financial Economics*, 16, 189–212.
- Seyhun, N. (1998). *Investment Intelligence from Insider Trading*. MIT Press, Cambridge, MA.

Wang, W., Shin, Y.C. and Francis, B.B. (2012). Are CFOs' trades more informative than CEOs' trades?. *Journal of Financial and Quantitative Analysis*, 47(4), 743-762.

Zingg, A., Lang, S. and Wytttenbach, D. (2007). Insider trading in the Swiss stock market. *Swiss Journal of Economics and Statistics*, 143(3), 331-362.

7.2 Laws and regulations

Regulation (EU) No 596/2014 on market abuse. EUR-Lex. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32014R0596>

7.3 Internet sources

Dagens Industri. (2021, July). *Pricksäkra insiders storköper på börsen*.
<https://www.di.se/analys/pricksakra-insiders-storkoper-pa-borsen/>

Dagens Industri. (2022, February). *Insynsköpen som saknar signalvärde*.
<https://www.di.se/analys/insynskopen-som-saknar-signalvarde/>

Svenska Dagbladet. (2016, April). *Nya regler från FI för insynshandel*.
<https://www.svd.se/a/rLEal/nya-regler-fran-fi-for-insynshandel>

Finansinspektionen. (2022, January). *PDMR transactions*.
<https://www.fi.se/en/markets/investors/pdmr-transactions/>

Finansinspektionen. (2022, February). *Trading ban*.
<https://www.fi.se/en/markets/investors/pdmr-transactions/trading-ban/>

Finansinspektionen. (2022, January). *Insider lists*.
<https://www.fi.se/en/markets/issuers/inside-information/insider-lists/>

Finansinspektionen. (2016, April). *New rules for insider reporting insider lists*.
<https://www.fi.se/en/published/news/2016/new-rules-for-insider-reporting-and-insider-lists/>

Finansinspektionen. (2022, March). *Market abuse*.
<https://www.fi.se/en/published/statistics/market-abuse/>

Dagens Industri. (2020, October). *Boom för uppdragsanalyser – “kommer fördubbla vår kundbas”*.

<https://www.di.se/nyheter/boom-for-uppdragsanalyser-kommer-fordubbla-var-kundbas/>