

**UNIVERSITY OF VAASA**  
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**INSIDER TRADES' IMPACT ON STOCK RETURNS**

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**ABSTRACT**

The purpose of this study is to examine whether insiders can earn abnormal returns by their trades in the Finnish stock market. Insider trading has been researched for decades and the first studies are from the late 1960s. Insider trading can be considered as one the most profitable anomalies. Insiders' reasons to trade their own companies' stocks might be liquidity needs or they may want to benefit from undervalued market prices. However, insiders might have non-public information and thus be better informed of the company's situation and prospects than other investors.

The theoretical framework contains a review of the previous studies and regulation of insider trading. Also, the difference between legal and illegal insider trading is presented. Insider trading's profitability is an evidence against efficient markets theory. Therefore, the theory is presented in theoretical part. The empirical part consists of the data and methodology which is used in this study. The data which is used in the study contains insiders' transactions in Helsinki OMX from July 2016 to July 2019. This thesis deploys the event study methodology. Abnormal returns are calculated separately for purchases and disposals. Also, the data is further divided into smaller groups based on the firm size and the type of the insider.

The results of this study show that the insiders earned abnormal returns due to their trades. After insiders' purchases, stock prices increased abnormally 1,68% (t-statistics 5,65) in 30 days. The impact was the opposite after insiders' disposals. Stock prices decreased abnormally -2,00% (t-statistics -4,41) in 30 days. The impact on stock returns was higher when insiders from small cap companies purchased or sold their stocks. The type of the insider has also an impact on the stock prices. Overall, insiders earned abnormal returns from July 2016 to July 2019 in the Finnish stock market and the results are mostly the same as in the previous international studies.

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**KEY WORDS:** Insider trading, insider anomaly, event study



## 1. INTRODUCTION

Insiders trade their company's stocks for many different reasons. The natural reason for a disposal can be diversification or liquidity needs. Insiders might also purchase their own company's stocks if they assume the stock is undervalued. However, insiders can trade stocks when they have information edge against other investors.

Insider trading can be divided into two parts: legal insider trading and illegal insider trading. Illegal insider trading occurs when a person uses non-public information of the security for trading. Illegal acts are not only trading the stocks based on non-public information but also tipping such information. The more usual form of insider trading is legal insider trading which occurs when the insider of the company buys or sells the stock in his or her own company. Insider trading in this form is legal if it follows the regulation of insider trading.

Insiders have information that is not publicly available, so it is important to study insider trades. Insiders are better informed about the situation of the company and outsiders should benefit when following what the insiders do. Derived from the efficient market hypothesis, insider trades should not have an impact on stock returns, as in the strong form of the efficient market hypothesis it is assumed that all information is available to everyone.

Insider trading is one of the most researched anomalies. The first researchers are from the late 1960s when Lorie and Niederhoffer (1968) found that insiders outperform the market. Even though insider trading has been researched internationally a lot, in Finland there are not many studies on insider trading. This is one of the main motivators to conduct the study in the Finnish markets.

## 1.2. Purpose of the study

The purpose of the thesis is to examine the impact of insider trades on stock returns. The approach is to examine whether an insider can earn abnormal returns by their trades and whether an investor earn abnormal returns by following insider trades in the NASDAQ OMX Helsinki. The purpose of the study is also to test efficient market hypothesis in the Helsinki stock exchange.

This thesis also examines whether the impact of insider trades is different when the corporate is large cap, mid cap or small cap. Lakonishok & Inmoo (2001) found in their research that insiders' trades' impact on stock returns were not significant except when it comes to purchasing small cap companies' stocks. Furthermore, the type of insider may have impact on stock returns. Tavakoli, Manouchehr, McMillan & McKnight (2012) find in their paper that the type of the insider matters.

## 1.3. Hypotheses and expected results

The null hypothesis is that insider trades do not have impact on stock returns. An insider or an investor does not earn abnormal returns after an insider trade. The alternative hypothesis is that the insider trade has an impact on stock returns. The insider or the investor does earn abnormal returns after insider's purchase, and after insider's sale the abnormal return is below zero.

Many authors that have examined the impact of insider trades have found that insider trading has an impact on stock returns. For example, Foley, Kwan, McInish and Philip (2016) found the difference between discretionary and non-discretionary transactions by insiders. Insiders earned abnormal returns by their trades when the nature of the transaction was discretionary. Also, Tavakoli, McMillan and McKnight (2011) found that insiders have predictive power for the future returns. In this study, the expected results in the

Finnish market are similar to in previous studies. I assume that insiders' trades have impact on stock returns.

#### 1.4. Structure of the study

The structure of the study is two-partial. The first part contains the theoretical matters and the second part consist of empirical part.

In the first section previous literature of insider trading is presented. The literature review contains various previous studies from those which have been published in the 1970's to newer studies. The studies are mainly executed in the markets of the United States. The reason for not presenting more studies from the Finnish market is that there are not many published papers that examine insider trading in the Finnish markets. The second section comprises the efficient market hypothesis (EMH), which was introduced in the 1970 by Eugene F. Fama. In this section, the criticism of the efficient market hypothesis is evaluated as well. The next section contains regulation of insider trading in Finland but also in the United States.

The second part consists of the empirical part. The empirical part starts with introducing the data and the methodology which are used in this study. It consists of the introduction of the data and calculations which are used in this study. In chapter 6, the result of the empirical part is presented. First the descriptive data is shown. It contains the number of trades made by insiders from each company but also how the number varies between the type of the insider. The next chapter of it presents the conclusions of the empirical part. The conclusion chapter closes this study, and the main findings are presented.

## 2. LITERATURE REVIEW

Insider trading and market efficiency have been researched a lot in different aspects. Many studies show that insiders can use privileged information to earn abnormal returns. Some of the studies are presented in this chapter. It can be stated that insiders are the most informed of the situation of their own company. They are not only aware of the upcoming developments, but they have the expertise to evaluate the effects of non-public information to their company's results and therefore the impact on stock returns. It is not a surprise that insider trading has been one of the most profitable anomalies in the past decades. The anomaly has existed for a long period of time. Even in the late 1960s, Lorie and Niederhoffer (1968) found that insiders outperform the market. The efficient market hypotheses were introduced around the same time with this finding.

Jaffe (1974) introduced the zero-investment portfolio based on insider trades. The strategy was to create a zero-investment portfolio which is long in companies with net purchases and short in companies in which an insider has net sales in a given month. He did not find any abnormal returns for the zero investment portfolio and even when he included only transactions which were at least 20,000 dollars, he found no abnormal returns. After narrowing the conditions down, Jaffe found that insiders earned abnormal returns. The criteria for the long portfolio were that there had to be at least 3 insider buyers in a specific company and at least 3 sellers for the short portfolio. With the presented zero-investment portfolio, Jaffe found that insiders earned abnormal returns of 5,07% in the first 8 months after trade.

Lakonishok, Josef & Inmoo Lee (2001) examine insider trades in the United States during 1975-1995. They found that there were not significant stock price movements when an insider reported their trades to the United States Securities and Exchange Commission. However, they found stronger influence of insider trading in small cap stocks. Insider purchases were useful in informative aspect. The authors argue that the reason for it is that insiders might have plenty of reasons to sell but the main reason to buy is to make money. At last, the authors' conclusion is that developing an investment strategy based

on insider trading is complex because insider trading has not significant impact on large stocks and trading in small stocks is expensive.

Gangopadhuay, Yook, Ken & Sarwar & Ghulam (2009) examined insider trades' profitability in volatile markets. The authors chose a period of 2000-2003 as a proxy of volatile markets time. Based on that insiders are known to be contrarian traders; the authors hypothesize that insiders earn abnormal returns from contrarian trading and trading which is based on insider information. They argue that if the stock multiples such as price-to-earnings ratio is high and book-to-market ratio is low, the insiders should net sell the stocks. If insiders have non-public information which is not reflected in the stock price, they could net purchase even though the ratios presented earlier indicate that the stock price is overvalued.

Gangopadhyay et al (2009) found that insiders use unpublished information and earn abnormal return in volatile markets. The effect still holds, even they adjusted for contrarian trading. They report that purchases made by insiders earned 22,5 % higher returns during a year than stocks which insiders had sold. After adding contrarian trading, the spread between purchases and disposals declines to 13,9 %. The results show that insiders trade in contrarian manners but also use unpublished useful information to support their decisions.

Tavakoli et al. (2012) find evidence that insider trading has an impact on stock returns in the NYSE, AMEX, and NASDAQ markets. Their data covers 87 calendar months from January 2000 to March 2007. The period is particularly suitable because in 2000-2007 there was not only recessionary but also growth period in the economy. Although they find evidence that insider trades have predictive power for returns, it is related to the status of the insider.

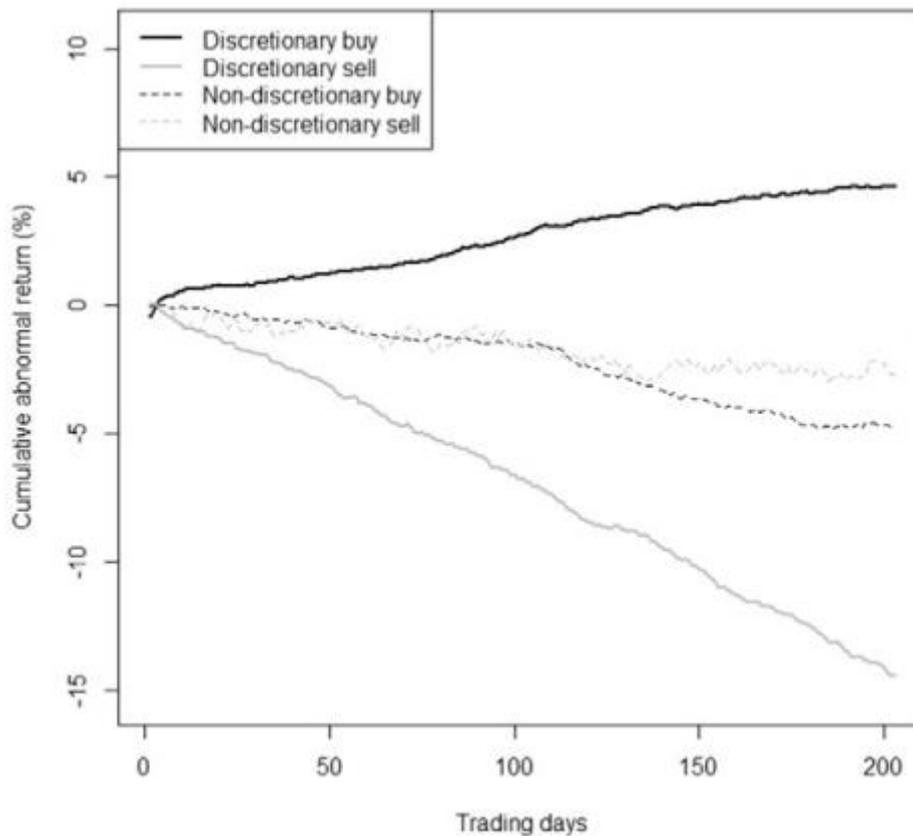
In their regression analysis, Tavakoli et al. (2012) use different ratios to measure the degree of insider transactions. In their first regression analysis, which does not include any other explanatory variables except the type of the insider, it is shown that the transactions of directors and officers have predictive power for the stock's future returns. However,

the transactions of large shareholders and the group other do not have any predictive power. The authors also run their regression with several explanatory variables, such as the dividend yield, the price-earnings ratio, the price-to-book ratio, betas, the equity-to-debt ratio and the movement of short-term interest rates. After controlling their results with alternative variables, they find that the results support first results, and the insider trades of directors and officers have predictive power for future returns. The results of the second regression show that now also the group other, which includes for example lawyers, have predictive power for future returns. Still, group other has statistically insignificant impact on future returns in the first regression. Tavakoli et al (2012) also divide the sample according to the firm size to groups small cap, medium cap, and large cap. They use the same explanatory variables than in the other regression. They find that the predictive power of the directors' trades is the most powerful in medium firms. Concerning small and large firms, the number of directors' transactions has no impact on future returns – however, the number of shares traded, and the value of the transaction has predictive power. The results show that the number of directors' trades matters. Officers' trades have statistically significant impact only on small firms' future returns. The results of the regression indicate that large shareholders' trading has no impact on future returns.

Foley, Kwan, McNich & Philip (2016) classified over 60 000 director transactions in the Australian markets. They sorted the directors' transactions into discretion trades and non-discretion trades. Foley et al (2016) hypothesis was that trades which are discretions are more informed than non-discretions trades and are more profitable. Authors used the market model to calculate abnormal returns. They calculated the normal returns 200 days before the directors' transactions. They decided to use the 200-day event window while the data they used was from January 2005 to December 2014. However, they use other event windows for robustness their results.

Foley et al (2016) found that discretionary trades by insiders of the company were more profitable than non-discretionary trades. The figure 1 shows how discretionary purchases cumulative abnormal returns are much higher than non-discretionary purchases. Insiders earned an average cumulative abnormal return of 4,6% by their purchases. The results are the opposite when the nature of the purchase is non-discretionary. Cumulative abnormal

return was -5% for non-discretionary purchases. The figure 1 shows that the difference between discretionary sales and non-discretionary sales is remarkable. The cumulative abnormal return for discretionary sales was -15% while it was only -3% for non-discretionary sales.



**Figure 1.** Profitability of insider's discretionary and non-discretionary trades (Foley et al 2016).

Foley et al (2016) used different event windows and found that abnormal holds for discretionary transactions. Discretionary transactions outperformed non-discretionary transactions whether the event window was short or long.

In Finland, there are not that many studies regarding insider trading. Kasanen (1999) examines insider trades in different aspects. The purpose of his study was to examine the

shares owned by insiders and whether an insider can earn abnormal return in the Helsinki stock exchange. The research was conducted in 1999 and the data is from 1.8.1996 to 17 months forward. Insiders held only 2 % of HEX stocks on average and only 1 % of the trading volume was caused by insiders. Kasanen (1999: 77) used three different event periods: 5, 15- and 30-days event windows. The relatively short event windows are due to the short data. Kasanen (1999: 77-81) used different methodologies to model abnormal returns. He used for example average adjusted return model, market model in dummy regression and market model residual analysis.

The results show that insiders did not earn abnormal returns during this period. Kasanen (1999: 82-88) did not find causality between insider trades and abnormal returns. He states that modelling abnormal returns has some econometrical difficulties. Therefore, he used different methodologies to model abnormal returns. The results were quite identical with different methodologies.

As a conclusion it can be said that insiders have earned abnormal returns according the previous studies. Previous studies have different aspects but mainly the results show that insiders can time their transactions better than markets on average. The research paper of Kasanen (1999) was the only study in which the results show that insiders did not earn abnormal returns. The above-mentioned paper is the only work which was executed in the Finnish market. The data which is used in this study was in 1996-1997. To examine insider trades in the Finnish market with a newer period is one of the motivations to this study.

### 3. EFFICIENT MARKET HYPOTHESIS

The ideal situation is that security prices would fully reflect all available information at any time. A market which reflects all available information is called efficient market. The inventor of the efficient market hypothesis is Eugene F. Fama who introduced the efficient market hypothesis in 1970. (Fama 1970)

Market efficiency is divided into three information subsets which are the weak form, the semi-strong form, and the strong form. These three forms are based on how the information reflects on the price of a security: (i) in the weak form, prices reflect only information of past stock's prices. In this form prices follow a random walk. (ii) At the second level of market efficiency, prices fulfil the weak form but also other publicly available information. If markets are semi-strong efficient, the stock price should reflect immediately to public information like different announcements such as quarter earnings. (iii) third level is the strong form in which the stock prices should reflect all information. In this circumstance no one can beat the market and earn abnormal return. In the strong form, no one has information that another one does not have.

The efficient market hypothesis has three assumptions. The first of the assumptions is that an investor behaves rationally in the market. It means that investors would value securities to their fundamental value. The price reflection happens immediately when new information of the security appears to the market. The second assumption is that investors' activities are not correlated. If their activities in the market are uncorrelated it leads to a scenario where their trades cancel each other without affecting the price. If this assumption holds, it is not harmless to market efficiency if part of the investors would be irrational. The last assumption is related to the second assumptions. If the investor's activities would be correlated and irrational activities takes place, then the arbitragers eliminate their trades. (Yalcin 2010.)

Market efficiency theory assumes that the market is rational, and the prices of securities reflect their fundamental values. If the market is rational, then there are no mispricing of securities and thus there are no anomalies. However, this theory has been challenged and

the market knows a lot of different anomalies, for example cash dividends anomaly and insider trading. One of the reasons for anomalies to appear are irrational activities and the arbitrage opportunities being limited in the market. (Yalcin 2010.)

### 3.1 Insider trading anomaly

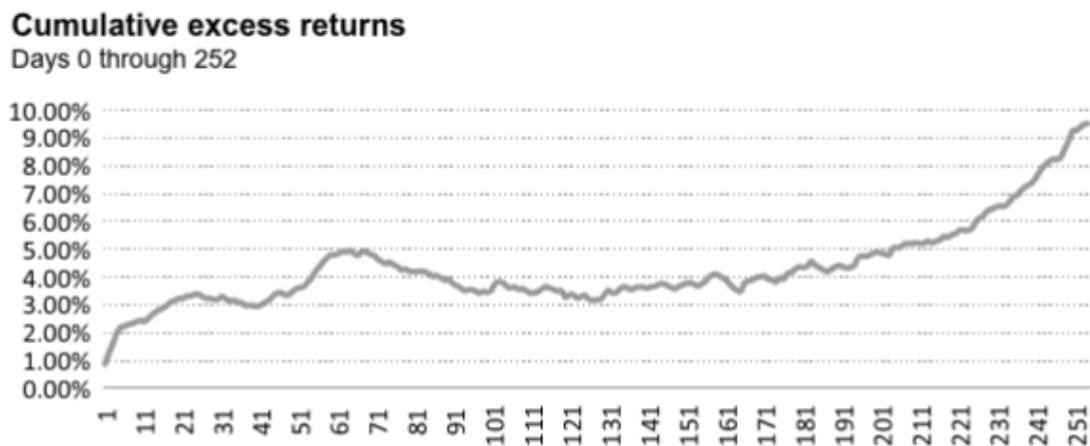
Insider trading can be considered as one of the most profitable anomalies. It has been researched for decades in many different markets and it has generated abnormal returns. Supporters of the efficient market theory argue that anomalies can be found because of data mining or as a result of risky trades. It is hard to argue that anomaly of insider trading would not exist while it has been researched for decades in different time periods covering different nonoverlapping periods. (Zacks 2011: 151-152.) For example, Zacks (2011: 151-152) used a large data period of 1978-2005 to research the profitability of insider trades in their book called “The handbook of equity market anomalies: Translating market inefficiencies into effective investment strategies”. Table 1 shows how insider’s purchases generated 0,35% monthly excess returns against S&P 500.

**Table 1.** Statistics of insider's purchases (Zacks 2011: 151).

	Insider Purchases	S&P 500 Total Return
Average return	1.48%	1.13%
Median monthly return	1.73%	1.35%
Standard deviation	6.21%	4.38%
Worst month	-38.58%	-21.61%
Best month	22.67%	13.53%
Sharpe ratio	0.55	0.50
Correlation with S&P 500	0.75	1.00
No. of positive months	215	212
No. of negative months	121	124

Even though the table 1 shows that insider trade strategy generated abnormal returns on average, the result varies from year to year. In the period of 28 years, the insider trade strategy beat the S&P 500 sixteen times and the S&P 500 outperformed the insider trade strategy twelve times.

Zacks (2011: 154) calculated how abnormal returns are generated in a longer holding period. Figure 2 shows how cumulative excess returns are generated in the 1-year holding period.

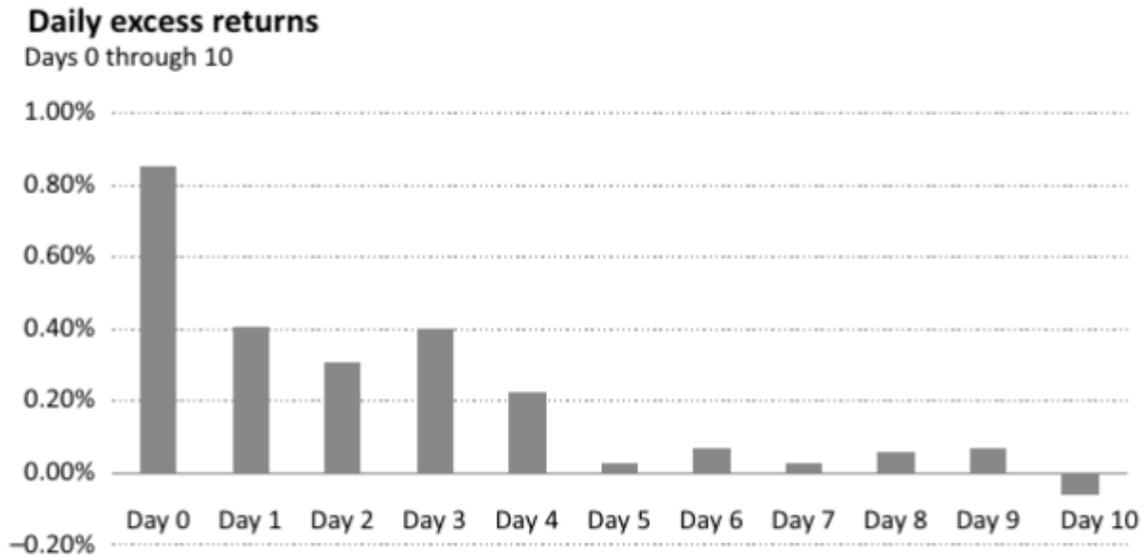


**Figure 2.** Cumulative excess returns (Zacks 2011:154).

The figure 2 shows that the most intensive growing happens within the first month. This indicates the positive reaction of the market after insider's trade after two months from the insider's trade, over half of the annual cumulative excess returns has been generated. However, approximately 170 days after the insider trade, the cumulative excess returns curve starts to increase. According Zacks (2011), this can indicate that the insiders purchased their company's stocks from 6 to 9 months in advance before the favourable events.

Zacks (2011: 155) also presented a figure how abnormal returns are generated in a shorter period. The figure 3 shows a 10-day event window after the insider trade. After day 0 through day 5 most of the abnormal returns are earned in this period. Immediately after the purchase, the insider has earned over 0,8 % abnormal returns. Daily abnormal returns

occur between 0,2% to 0,4 % from day 1 through 4 and after 5 day through 10 day, daily excess returns are close to zero.



**Figure 3.** Daily excess returns (Zacks 2011: 155).

### 3.1.1. Returns between small cap and large cap

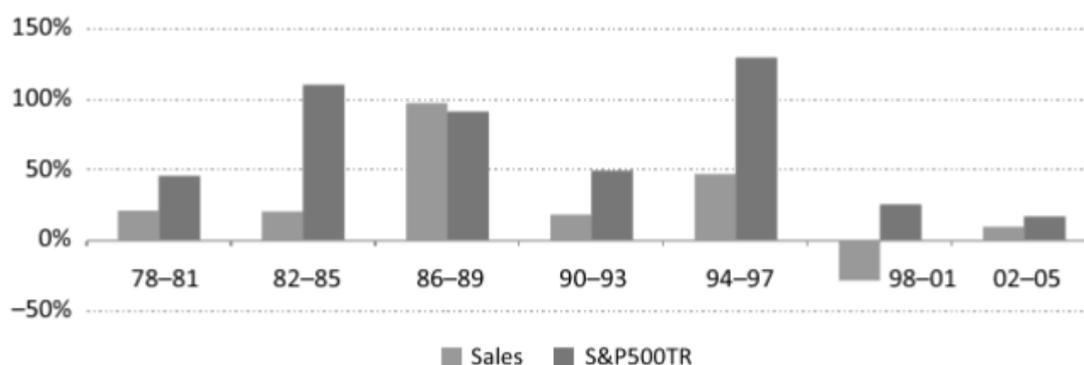
As we know, an insider has an information edge against the market. When the information asymmetry is larger, insiders should theoretically generate higher abnormal returns. Insiders in small cap companies might have a higher information edge because there are usually a smaller number of analysts that are following the companies than large cap companies. According Zacks (2011: 155-156) analysis, insiders earned 50 basis points by their purchases per month more than insiders in large cap companies. While insiders in large cap companies earned monthly 0,41% more than the S&P 500, insiders in small cap companies earned 0,91% more per month than the S&P 500.

### 3.1.2. Insiders' sales

Insiders might have many reasons to sell their stocks. Their motivation to sell their stocks might be liquidity needs or diversification. However, insiders might have non-public information which motivates them to sell their stocks. These reasons could be the declining

earnings of the company in the future or even the possible bankruptcy. Zacks (2011: 159-160.)

Zacks (2011: 159-160) used the period of 1978-2005 and did a short sale portfolio. They used a lot of rules when conducting the portfolio: there must be at least three insiders selling during the prior 3-month period, they eliminated small sell transactions and there must be at least 25,000 shares sold in the 3-month period. They also included only large cap companies because of the difficulties to short sell small size companies' stocks. Also, insiders' purchases were not allowed in the 3-month periods. They did a portfolio under these rules and held the positions for a year. The sales portfolio underperformed the S&P 500 but still the average return was positive. The sales portfolio has average returns of 0,61% per month while S&P 500 returns was 1,13% per month.



**Figure 4.** Insider trading sales portfolio return (Zacks 2011: 159).

As we can see in Figure 4, the period from 1978 to 1997 was a long bull market period so this explains that short strategy has positive returns as well. From 1998 to 2005 sales strategy had negative returns while the S&P 500 had positive returns.

As a conclusion it can be stated that the insider anomaly exists, and evidence of insider trading profitability has been found from 1970 to century of 2010. This section presented insider trading as an anomaly and focused only to one research paper. However, similar

results which Zacks (2011) presented, have been found in other studies which have been presented earlier in section 2 of this study.

As most of the abnormal returns are generated in a couple of days after the insider trade this motivates to keep the event windows short in this study, too.

## 4. REGULATION

In this section the regulation of insider trading is presented. Since the data of this study is about Finnish companies, the regulation of Finland is observed more closely. However, the regulation of United States is represented for comparison purposes. The section also includes the definition of illegal insider trading.

### 4.1. Regulation in Finland

In Finland, listed companies have the obligation of disclosure of periodic information. This information is for example financial statements or annual reports. Along with periodic information, companies have an ongoing disclosure obligation of which purpose is to make sure that all investors have an equal and concurrent access to information. The main purpose of ongoing disclosure obligation is that companies release the insider information. Insider information must be published as soon as possible. (Finanssivalvonta 2017.)

Market Abuse Regulation (MAR), which is a regulation from the European Union, obligates executives and their inner circle of issuer to report transactions related to the shares or debt instruments of that issuer. MAR is a directly applicable regulation, and it replaced the previous Market Abuse Directive 2003/6/EC on 3 July 2016. Obligation to declare transactions concern all transactions when the amount of 5 000 euros is reached in a calendar year. The transactions must be reported within 3 working days from the day the transaction has been executed. The issuer must deliver the information of duties by Market Abuse Regulation article 19 to persons who works in managerial capacity. (Finanssivalvonta 2018)

Market Abuse Regulation also includes regulation of prevention and detection of market abuse. Under Article 16 of MAR market operators and investments companies which are operating in trading markets must put into operation effective arrangements, systems, and

procedures to prevent and discern insider trades, market manipulation and attempts of insider trade or market manipulation. (Finanssivalvonta 2018b.)

#### 4.1.1. Who are the insiders?

Obligation to declare the transactions concerns executives and their inner circle. The definition of the person who is included in the executives is defined in Market Abuse Regulation 3.1 article 25. The definition is following:

1. The member of administration, executive or monitoring.
2. The person from upper level, which is not including to group 1, but have regular access to insider information and who have a mandate to make decisions which belong to administration and these decisions have an impact on community's development and future business activities.

The obligation to declare the transactions also concern an inner circle of executives. The definition of persons who belong to inner circle of executives is defined in Market Abuse Regulation 3.1 article 26 and is following:

1. The spouse or an analogous spouse according to a national legislation.
2. A dependant child.
3. A relative, which has lived at least a year in the same household within a time of transaction's execute time.
4. Juristic person or a partnership.

There are periods when trading is forbidden for insiders and the limits are set by Market Abuse Regulation. Trading is forbidden for insiders, which are identified in section 4.1, 30 days before a release date of quarterly report or annual report. (Finanssivalvonta 2018)

#### 4.2. Regulation in the United States

Insider Trading was regulated at Securities Exchange Act of 1934. It has been amended later and the latest amend is from 2019. Prohibition Act H.R. 2534 is the Act which contains the definition of illegal trading. The Act consist of guidelines for what is considered as non-public information. Part SEC. 16A (a) includes information of prohibition on trading securities when having non-public information. It states that:

*“ It shall be unlawful for any person, directly or indirectly, to purchase, sell, or enter into, or cause the purchase or sale of or entry into, any security, security-based swap, or security-based swap agreement, while aware of material, non-public information relating to such security, security-based swap, or security-based swap agreement, or any non-public information, from whatever source, that has, or would reasonably be expected to have, a material effect on the market price of any such security, security-based swap, or security-based swap agreement, if such person knows, or recklessly disregards, that such information has been obtained wrongfully, or that such purchase or sale would constitute a wrongful use of such information”.*

The second part consist of prohibition against the wrongful communication of certain material which is non-public. It states that:

*“It shall be unlawful for any person whose own purchase or sale of a security, security-based swap, or entry into a security-based swap agreement would violate subsection (a), wrongfully to communicate material, non-public information relating to such security, security-based swap, or security-based swap agreement, or any non-public information, from whatever source, that has, or would reasonably be expected to have, a material effect on the market price of any such security, security-based swap, or security-based swap agreement, to any other person if (1) the other person:*

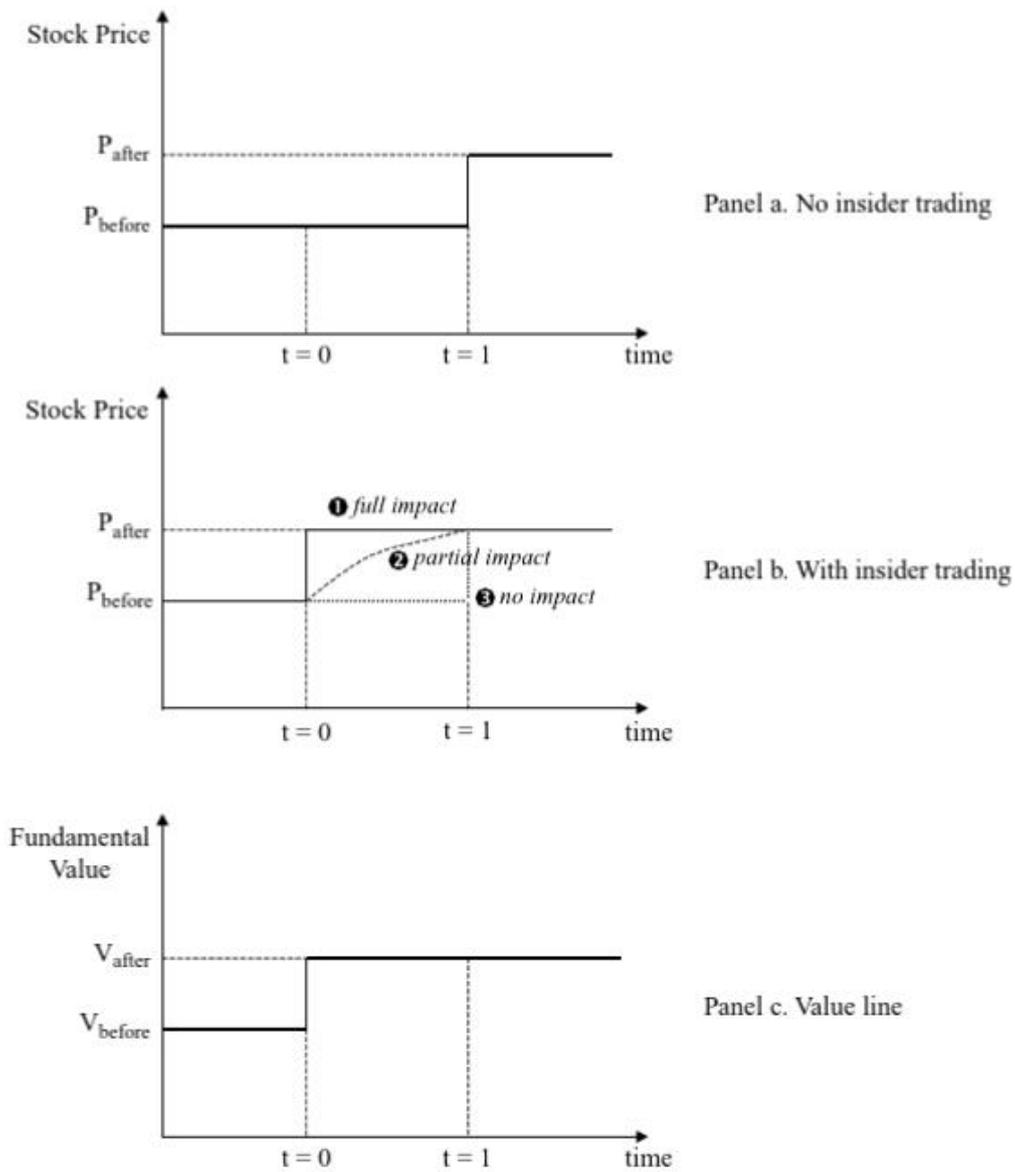
*(a) purchases, sells, or causes the purchase or sale of, any security or security-based swap or enters or causes the entry into any security-based swap agreement, to which such communication relates; or*

*(b) communicates the information to another person who makes or causes such a purchase, sale, or entry while aware of such information; and*

*“2) such a purchase, sale, or entry while aware of such information is reasonably foreseeable.”* (Congress.gov 2019.)

#### 4.3. Illegal insider trading

In this section illegal insider trading is introduced more practically. Illegal insider trade occurs when a person uses non-public information about the security for trading. Illegal acts are not only trading the stocks based on non-public information but also tipping such an information to others. (Seclaw 2018)



**Figure 5.** Insider trading impact on stock prices (Boatright 2010: 202)

Figure 5 shows how illegal insider trade might happen. Time  $t = 0$  is the moment when a price-sensitive event occurs. Time  $t = 1$  is the moment when the announcement is published. In panel c is defined a fundamental value of the company. After a price-sensitive event happens the fundamental value increases at time  $t = 0$  and stays flat after the announcement publication at time  $t = 1$ . Panel a. represent how stock price reacts to event and announcement when illegal insider trading does not occur. A price-sensitive event occurs at time  $t = 0$  but stock price does not react to the event until it is published at

time  $t = 1$ . After the public announcement, the stock price increases to the same level as the fundamental value. In panel b., insider trading is involved. After the price-sensitive event occurs the stock price starts to increase. The reaction happens before the announcement is public. There are two different outcomes how the stock price reflects the fundamental value of the company. If insider trading is allowed the impact would be immediate after the event occurs. The second outcome is more realistic and reflects more how illegal insider trading happens. After time  $t = 0$  stock price starts to increase but more steadily than in the first example. It reaches the fundamental value at time  $t = 1$ . In this scenario the signal of insider trading is not that clear. (Boatright 2010: 202-203)

## 5. DATA AND METHODOLOGY

In this chapter the data and the methodology of this study are presented. The data section includes detailed information of the data which is used in this study. In this section the period which is used in this study is presented but also which transactions are included to the data and which are excluded from the data. The methodology part consists of the methods which are used in this study. After the methodology is presented the possible econometrical issues are explained.

### 5.1. Data

The data of insider trades is available in NASDAQ's webpage. It contains 5530 insider trades during 1.7.2016-1.7.2019. However, the data contains also share-based incentives which are excluded from data. Also, those transactions which comprise under 100 shares are excluded from the data. The clean data without share-based incentives and under 100 shares transactions contains of 1849 insider trades. The original exported data did not include all the information of the trades, such as the number of the traded shares, whether the transaction is a purchase or a disposal, nor the status of the insider. However, the size of the trade and the status of the insider can be found in NASDAQ's webpage, but the information must be imported manually.

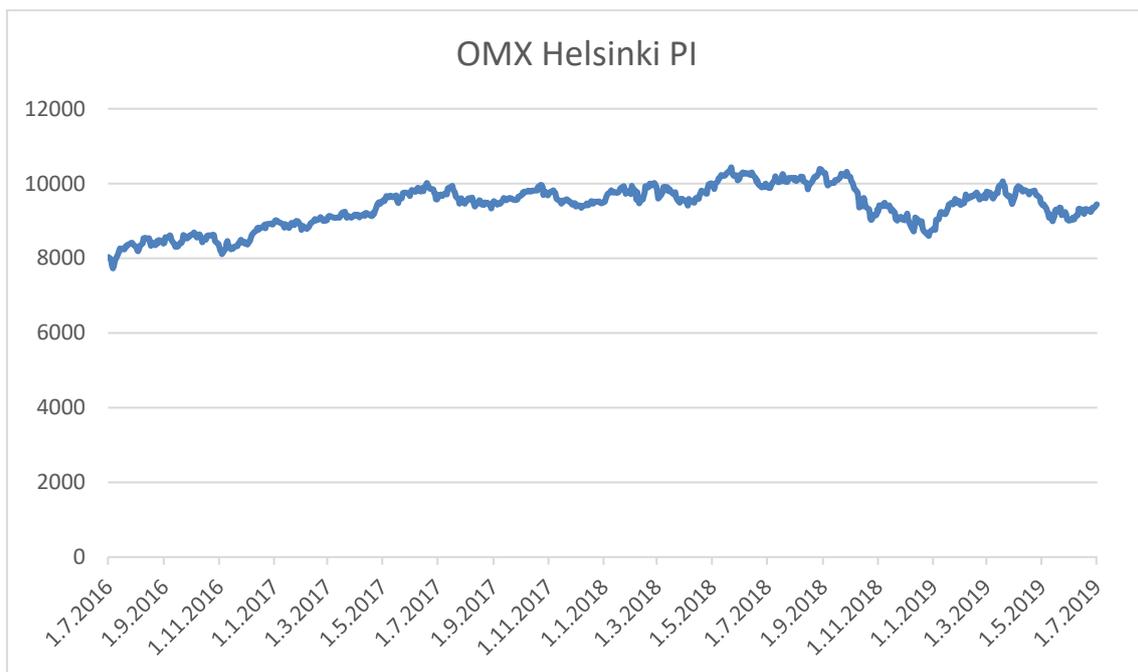
The companies which are listed in OMX Helsinki during the selected period are excluded from the data. In 2016 there were 6 listings and in 2017 the number of the new listings were 7. Also, the companies which have left from OMX Helsinki are excluded from the data. Therefore, the number of companies which are used in this study is 117. Historical stock prices are collected from Yahoo finance and the data also contains the benchmark which is the OMX Helsinki PI.

The data is be cut into the different fractions. Insiders are classified to the three groups based on their status: 1) a member of the administration, management, or supervising body of the entity 2) a senior executive who has a regular access to inside information 3)

Chief Executive Officers. The data is also divided into sections based on the size of the company. The companies are divided into three groups: small-cap, mid-cap, and large-cap. In this study the same distribution is used than how Nasdaq divides the companies. (Nasdaq 2020).

#### 5.1.1. Benchmark index

The benchmark index which is used in this study is the OMX Helsinki PI (OMXHPI). The index is adjusted for dividends and splits. The index contains the companies which are listed in the main list. The benchmark index presents the market return and is used in the market model methodology.



**Figure 6.** OMX Helsinki Price Index during 1.7.2016-1.7.2019.

Figure 6 shows OMX Helsinki Index price development in period 1.7.2016-1.7.2019. The curve of the OMXHPI price was upward in this period and the price increased 17,5% in this period. However, the period contains also couple of drops at the index price.

## 5.2. Methodology

The event study is the methodology which is to be used in this study. When examining the security price movements around a specific event, the event study methodology is the common approach (Binder 1998). Event study begins with a definition of the event. The event might be for example a change of chief executive officer or a publication of a remarkable trade from the company. The nature of the event defines the event window that should be used. Some events' reactions for stock prices happen immediately and for some events' the impacts happen in longer intervals for stock prices. For example, mergers or profit warnings are the kind of events in which the impact appears usually fast on the stock price. In these kinds of events the event window should be short. The nature of the event might be also that it is not immediately reflected on the stock price. One of this kind of events is insider trades. When examining the abnormal returns after insider trades, the event window should be longer because the impact on stock price is not immediate. These kind of event studies are more problematic because when the event window lengthens there might be more factors which could have impact on returns. (Kasanen 1999: 60-61.)

The event study can be divided in different time sections. The event notation is T. For the period before the event it is T-1 and for the period after the event it is T+1.

### 5.2.1. Estimation window

After the event is known the estimation window is the period before the specific event, and it is common that the estimation window is not overlapping with the event window (MacKinlay 1977). Estimation window is the period where the normal return of the stock is calculated.

The decided estimation window in this study is 195 days. It has been set to start 200 days before the event (T-200) and ends 5 days before the event (T-5). Estimation window T-1 is then T-200; T-5.

### 5.2.2. Event window

The event window is the period around the specific event. The event window is the time when we assume that the specific event has an effect to the stock returns (Kasanen 1999: 60-61). In other studies where the event study is used as the methodology the event window is usually T-1; T+1. The reason for using the event window so that it begins before the event is that the information might be leaked before the specific event occurs. When examining the effect of insider trades on returns the possible impact is assumed to be after the event in this study.

Three different event windows are used in this study: 5 days, 10 days, and 30 days. The reason for relatively short event windows is that the reliability of the event study could decrease because other factors may have an effect for possible abnormal returns of the stock. (Kasanen 1999: 60-61)

### 5.2.3. Normal returns

There are several ways to execute an event study, but the most common way is to measure securities mean and cumulative mean abnormal return around the period of an event. In this study the approach is similar to Fama, Fisher, Jensen And Roll (1969) where they examine the stock split announcements' impact on stock returns, but daily stock returns are used in this study instead of monthly returns. The first step is to control normal returns which are calculated with the market model:

$$(1) \quad R_{it} = \alpha + \beta_i R_{mt} + \mu_{it}$$

Where dependent variable  $R_{it}$  is normal return in day t to stock i. As the control variable in this model is stock market index  $\beta_i R_{mt}$ . The residual  $\mu_{it}$  is an estimator of the abnormal return. A residual  $\mu_{it}$  is the part of the return which market return cannot explain.

### 5.2.4. Calculating abnormal returns

To calculate abnormal returns the following equation is used:

$$(2) \quad AR_{it} = R_{it} - \alpha - \beta_i R_{mt}$$

$R_{it}$  = the return on security  $i$  on time  $t$

$\alpha_i$  = a regression constant OLS-estimator, which assumed to be constant over the time.

$\beta_i$  = covariance between the stock return and the market return. Assumed to be constant over the time.

$R_{mt}$  = the return on the Nasdaq OMX Helsinki PI in time  $t$ .

$AR_{it}$  = the abnormal return on security  $i$  on time  $t$

After the abnormal returns are calculated the average cumulative abnormal returns are calculated with the following equation:

$$(3) \quad \overline{CAR}_{it} = \sum_{i=1}^n \frac{CAR_{it}}{n}$$

Where the  $\overline{CAR}_{it}$  is the average abnormal return. The number of trading day is notified as  $n$ .

The null hypothesis  $H_0$  is that the average abnormal return in event window period is zero. If insiders' trades have no impact on stock returns the average abnormal return should be zero. The alternative hypotheses are that the average abnormal return is above zero after insider's purchase and after insider's disposal the average abnormal return is below zero. Therefore, equations are following:

$$(4) \quad \begin{aligned} H_0: AR_{it} &= 0 \\ H_1: AR_{it} &> 0 \\ H_2: AR_{it} &< 0 \end{aligned}$$

After the results of the abnormal returns are calculated, the results must be tested. The result is tested by t-test of two-sample assuming unequal variances. The equation of t-test is following:

$$(5) \quad t = \frac{\overline{CAR}_{it}}{S/\sqrt{n}} \sim t(n-1)$$

Where the  $\overline{CAR}_{it}$  is the average cumulative abnormal return on stock in day i. S is a standard deviation and notation n is number of trading days.

### 5.3. Possible problems with using market model and estimating abnormal returns

When the market model was chosen as a methodology in this study, certain assumptions must be done. In this section the assumptions and possible issues are explained. The possible issues might corrupt the results or cause problems when testing the results.

#### 5.3.1. Problems with normality of abnormal returns

When using residuals of the market model as a proxy of abnormal returns we must do assumptions. One of the assumptions is that abnormal returns are normally distributed (Kasanen 1999: 72).

$$(6) \quad AR_{it} \sim N(0, \sigma^2)$$

According to Brown and Warner (1985), stock returns are not normally distributed whether they are measured as daily, weekly, or monthly. However, daily returns deviated the most from normal distribution. If daily returns are not normally distributed, it indicates that daily abnormal returns are not normally distributed either (Kasanen 1999: 72-

73). According Kasanen (1999), the distribution might be skewed and have high kurtosis. Therefore, the results might be unreliable when using residuals of the market model.

The sum of the residuals of the market model and averages are more normally distributed. According Kasanen (1999), even the 5 days sum of residuals are more normally distributed than individual residuals. Skewness and kurtosis decreased from 2,11 and 16,98 to -0,16 and -0,48, respectively, when Kasanen (1999: 72-73) used sum of 5 days residuals instead of daily residuals. The research of Brown and Warner (1985) supports this: They found that even daily returns are non-normally distributed, it has no impact on event study methodologies because as the number of sample securities increases the mean abnormal return converges to close to normality.

### 5.3.2. Heteroskedasticity and autocorrelation of abnormal returns

Heteroskedasticity occurs when the error terms' variance varies highly and systematically when variable  $x$  changes. Heteroskedasticity is not harmful for regression factor but it might have impact on statistical significance. (Kvantimotv 2003)

The variability of returns variance causes heteroskedasticity to market model's error terms and might have an issue when calculating abnormal returns' statistical significance. The problem occurs if variance increases around to the event. The statistical significance test might show too favourable results and it leads to rejection of the null hypotheses too easily. It is common that in event studies, the following assumption is made:

$$(7) \quad \text{Var } u_i = \sigma^2$$

The assumption means that the variance of residuals stays constant over the time. Therefore, the variance of residuals can be used to test the statistical significance of abnormal returns. (Kasanen 1999: 73-74)

One of the possible issues of modelling abnormal returns is autocorrelation. This issue is regarding to non-normality of residuals. The residuals are not normally distributed, but

they are correlated. This can be a problem of reliability of the research. (Kasanen 1999: 74)

### 5.3.3. Problems with benchmark index

One assumption which is made when using the market model is that  $\beta$  coefficient is constant. According Kasanen (1999: 74-75), using the changing  $\beta$ -estimation, it could improve the market model's ability to reduce the variance of residual. However, there is no clear evidence of its usefulness in event studies. He used both  $\beta$ -estimations and found that there was no difference whether he used changing  $\beta$ -estimation which was constant over time.

When calculating  $\beta$ -estimations, the benchmark index needs to be decided because  $\beta$ -estimations of the stocks are calculated according to the benchmark index. The benchmark portfolio should lie in mean-variance efficient frontier. If the decided benchmark portfolio OMX Helsinki PI does not lie in the mean-variance efficient frontier, this might cause issues when using the market model to calculate abnormal returns.

## 6. RESULTS

In this section the descriptive data and the results of empirical part are presented. The descriptive data sections consist of information of the data used in this thesis. Then the results of the profitability of insiders' trades are presented. This section contains the results of the total sample and then the data is cut into smaller samples based on the firm size and type of insider.

### 6.1 Descriptive data

Insiders made total of 1849 transactions which are suitable in this thesis in 1.7.2016-1.7.2019. Transactions which are excluded from the data are presented in the data section. Total of 117 companies' insiders' trades are included in this thesis.

Insider trades are divided to purchases and disposals. The purchase day is determined when insiders of the company net purchased in a specific day and disposal day when the insiders sell more than buy. In the period 1.7.2016-1.7.2019 there are a total of 754 purchase days and 376 disposal days. Therefore, the total trading days are 1130. Nokia Corporation has the most active insiders. They made 101 transactions. However, the transactions were mainly made in the same days when there are only 16 purchase days and 7 disposal days. Even though share-based incentives and other derivative products are excluded from the data, it is interesting that the total of 16 companies' insiders made 0 transactions.

All three company size groups had more purchase days than selling days. Small cap companies' insiders have 220 purchase days and 100 disposal days. Mid cap companies have 240 purchase days and 169 disposal days. Large cap companies have the greatest number of purchase days with 294 purchase days while their insiders sold holdings only in 107 days. The more detailed information is shown in appendix 1.

**Table 2.** Descriptive statistics

<b>Type of insider</b>	Small cap	Mid cap	Large cap	Total trading days
<b><u>Purchases</u></b>				
Board member	150	113	193	456
Other senior management	20	55	48	123
Chief executive officer	50	72	53	175
<b><u>Disposals</u></b>				
Board member	61	51	15	127
Other senior management	23	99	87	209
Chief executive officer	16	19	5	40

Table 2 shows how insiders' purchase and disposal trading days varies between the type of insider. Insiders are divided into the three groups: board members, other senior management, and chief executive officers. In table 2 the insiders are divided into groups also based on the size of the company.

Table 2 shows that the most active group for purchases was board members. Board members purchased in 456 different days while the most inactive group was other senior management with 123 purchase trading days. Chief executive officers were relatively active group with 175 purchase trading days. The number of chief executive officers trading days is quite high if considering the amount of chief executive officers compared to board members and other senior management in the companies. The reasons for chief executive officers' relatively large purchase trading days amount might be that they have the most interest to show their trust to their companies' performance by purchasing stocks of the company they are managing. For disposal trading days the other senior management group was the most active group with 209 disposal trading days. The group was the only

group which had more disposal days than purchase days. Chief executive officers had the smallest number of disposal days in every firm-size groups. Chief executive officers in mid-cap firms had 19 disposal days while chief executive officers had only 5 disposal days.

## 6.2. Profitability of insiders' trades

In this section, the profitability of insiders' trades is presented. The results in all tables are given in average daily abnormal returns. First the data is divided into purchases and disposals but later in this section the data is divided into smaller parts. The sample is divided based on the size of the firm and type of insider.

### 6.2.1. Total sample

**Table 3.** Insider trades profitability for total sample.

Event period	Average daily abnormal return for purchases	Average daily abnormal return for disposals
5 days	0,11%*** (3,29)	-0,12%*** (-2,81)
10 days	0,08%*** (4,19)	-0,06%** (-2,09)
30 days	0,06%*** (5,65)	-0,07%*** (-4,41)
Observations	754	376

T-statistics are presented in parentheses. \*\*\*, \*\*, \* indicate statistical significance at 1%, 5% & 10% level, respectively.

In the table 3, average daily abnormal returns are presented for the whole sample in different event periods which are 5 days, 10 days, and 30 days. The whole sample is divided for purchases and disposals. Observations for purchases are 754 and 376 for disposals.

Table 3 shows that in every event period the stocks prices rise abnormally for purchases. Daily average abnormal for purchases in 5 days event period is 0,11% (t-statistics 3,29). Table 3 shows that when the event period rises, the average daily abnormal return declines. For the 10 days event period the daily average abnormal return is 0,08% (t-statistics 4,19) and for 30 days event period 0,06% (t-statistics 5,65). However, the t-statistics seem to grow the longer the period is. All abnormal returns in every event period are statistically significant at 99% confidence level.

For disposal stock prices decrease in every event periods. For 5 days event period the abnormal return is -0,12% and its statistically significant at 99% confidence level. When the period lengthens abnormal returns decrease so it seems to be quite the same pattern in average daily abnormal returns for disposals than average daily abnormal return for purchases. For 10 days event period stock prices decrease -0,06% (t-statistics -2,09) and it is statistically significant at 95 % confidence level. For 30 days event period the average daily abnormal return is -0,07% (t-statistics -4,41) and it is statistically significant at 99% confidence level.

Results indicate that insiders have earned abnormal returns whether they bought or sold their companies' stocks. Abnormal returns hold even the event period grows.

### 6.2.2 Firm size

In this section the data is divided based on the market size of the company. Table 4 shows how firm size matters to profitability of insiders' transactions. Firms are divided into small-cap, mid-cap and large-cap. There are three different event windows presented in table 4: 5 days, 10 days, and 30 days.

**Table 4.** Firm size.

Event window	Small cap	Mid cap	Large cap
<b>Purchases</b>			
5 days	0,23%*** (2,73)	0,05% (0,88)	0,07%* (1,86)
10 days	0,13%*** 2,90)	0,04% (1,15)	0,08%*** (3,14)
30 days	0,10%*** (4,70)	0,04%** (2,33)	0,04%*** (2,73)
Observations	220	240	294
<b>Disposals</b>			
5 days	-0,32%*** (-2,89)	-0,05% (-0,78)	-0,04% (-0,90)
10 days	-0,23%*** (-3,30)	0,02% (0,60)	-0,02% (-0,60)
30 days	-0,15%*** (-3,99)	-0,02% (-1,04)	-0,06%*** (-2,75)
Observations	100	169	107

T-statistics are presented in parentheses. \*\*\*, \*\*, \* indicate statistical significance at 1%, 5% & 10% level, respectively.

Small cap firms' insiders earned abnormal returns by their purchases. When the event window is 5 days insiders earned abnormal daily return 0,23% (t-statistics 2,73). Average abnormal return decreases when the length of the event window grows. After 10 days daily abnormal return was 0,13% (t-statistics 2,90) and after 30 days insiders earned 0,10% (t-statistics 4,70) daily on average. In every event window the returns are statistically significant at 99% confidence level.

After small cap firms' insiders' disposals stock prices tend to decrease whether the event window is 5 days, 10 days or 30 days. Stock prices decreased -0,32% (t-statistics -2,89) when the event window was set to 5 days. Abnormal returns appear even when the event window's length increases to 10 days or 30 days. After 10 days from the transaction the daily average abnormal return was -0,23% (t-statistics -3,30) and after 30 days it is still -0,15% (t-statistics -3,99). Abnormal returns are statistically significant at 99% confidence level despite the lengthening of the event period. However, statistical significance increases when the event period is longer.

When comparing to small cap companies' insiders' trades, the results are different when an insider in the mid cap companies purchases. They earned abnormal returns  $r$  in every event window but only in 30 days event window the abnormal daily return was statistically significant. They earned 0,04% (t-statistics 2,33) in 30 days event period. The results for disposals are interesting. Abnormal returns are not statistically significant but still in 5 days event period stock prices decreased by -0,05% (t-statistics -0,78). In 10 days, abnormal return was 0,02% (t-statistics 0,60) so the sign is wrong. After 30 days the sign turns back to minus and abnormal return was -0,02% (t-statistics-1,04).

Table 4 shows that insiders from large cap companies earned abnormal return by their trades. In event period of 5 days, daily abnormal earnings for insiders were 0,07% (t-statistics 1,86). Abnormal returns are statistically significant at 90% confidence level. Abnormal returns for large cap insiders' trades hold even when the length of the event period grow. After 10 days from the trade, insider earned daily 0,08% (t-statistics 3,14) abnormal returns. Abnormal returns appear even the length of the event window is 30 days. Insiders earned 0,04% (t-statistics 2,73) and abnormal returns are statistically significant at 99% confidence level. After insiders' disposals stock prices tend to decrease. After 5 days, stock prices had abnormally decreased daily -0,04% and -0,02% after 10 days. However, the daily abnormal returns are not statistically significant. After 30 days from the insider's trade abnormal return increases to -0,06% (t-statistics -2,75) and it is statistically significant at 99% confidence level.

In table 4 we can notice that firm size has an impact on insider's abnormal returns. Table 5 shows that trades made by insiders from small cap companies was the group who earned the most abnormal returns in period 1.7.2016-1.7.2019. They earned remarkably abnormal returns whether they purchased or sold their stocks. Abnormal returns were all statistically significant at 99% confidence level. Insider's at mid cap and large cap companies earned abnormal returns as well, but much less than small cap companies' insiders. Also, the results are not statistically significant at all event windows.

### 6.2.3 Type of the insider

In table 5, average daily abnormal returns for purchases and disposals are presented. In this table the sample is divided by the type of the insider. Insiders are divided into three groups: Board members, other senior management, and chief executive officers.

**Table 5.** Type of insider.

<b>Type of insider</b>	Avg. daily abnormal return for purchases	Avg. daily abnormal return for disposals
<b>Board member</b>		
5 days	0,10%*** (2,62)	-0,08% (-0,99)
10 days	0,08%*** (3,65)	-0,01% (-0,27)
30 days	0,08%*** (6,10)	-0,06%* (-1,87)
Observations	456	127
<b>Other senior management</b>		
5 days	0,05% (0,68)	-0,11%** (-2,16)
10 days	0,05% (1,12)	-0,06%* (-1,67)
30 days	0,04% (1,47)	-0,06%*** (-3,24)
Observations	123	209
<b>Chief executive officer</b>		
5 days	0,18%** (1,98)	-0,26%** (-2,07)
10 days	0,10%** (2,00)	-0,20%*** (-2,84)
30 days	0,02% (0,83)	-0,13%*** (-3,14)
Observations	175	40

T-statistics are presented in parentheses. \*\*\*, \*\*, \* indicate statistical significance at 1%, 5% & 10% level, respectively.

Table 5 shows that board members earned abnormal returns for purchases whether the event window was 5 days, 10 days, or 30 days. Board members earned daily abnormal returns 0,10% (t-statistics 2,62) in 5 days event period. For longer event periods the abnormal returns still hold. For 10 days and 30 days event periods the average abnormal daily return was 0,08% with t-statistics 3,65 and 6,10, respectively. For the disposals that board members did, the average daily abnormal return was -0,08% (t-statistics -0,99) when the event period was 5 days. However, the abnormal return is not statistically significant. In event period of 10 days the abnormal return decreases to -0,01% (t-statistics -0,27). Only statistically significant with 90% confidence level is board members' disposals when event window is 30 days. Average daily abnormal return is -0,06% (t-statistics -1,87).

Table 5 shows that the group of other senior management earned daily abnormal returns after 5, 10 and 30 days after their purchases. Abnormal returns were 0,05%, 0,05% and 0,04%, respectively. However, none of the abnormal returns were statistically significant. Other senior management were more active to sell their stocks than buy. Observation for purchases was 123 and for disposal it was 209. After 5 days, when other senior management sold their stocks the stocks' prices decreased daily on average by -0,11% (t-statistics -2,16). The same result happened after 10 days but the daily average abnormal return decreased to -0,06% (t-statistics -1,67). Daily abnormal return stays in -0,06% in 30 days event period and it is highly statistically significant (t-statistics -3,24).

Chief executive officers were the group which earned the most abnormal returns. Table 5 shows that, in 5 days event period chief executive officers earned daily abnormal returns 0,18% (t-statistics 1,98) and abnormal returns was statistically significant at 95% confidence level. Daily abnormal return seems to decrease when event period grows. In 10 days event period the daily abnormal return has decreased to 0,10%. However, statistical significance still holds. After chief executive officers sell their stocks, the stock prices decrease significantly. Daily abnormal returns are markable despite the event period length. After chief executive officer's disposal, the daily average abnormal return in 5

days event period is -0,26% (t-statistics -2,07). Abnormal returns are statistically significant at 95% confidence level. Abnormal returns remain even if the event period is longer. 10 days after the chief executive officer's disposal the average daily abnormal return for the period was -0,20% (t-statistics -2,84). Abnormal returns are statistically significant at 99% confidence level. Daily abnormal returns decrease a little when the length of the period is 30 days. The daily abnormal return is -0,13 (t-statistics -3,14) on average and it is statistically significant at 99% confidence level.

Overall, the results show clearly that insiders earned abnormal returns regardless of their status in the company or how long the event period was. Mainly all abnormal returns were statistically significant except board members' disposals and other senior managements' purchases. Chief executive officers' disposals were the most profitable – however it should be noted that the number of observations was only 40.

## 6.2.4. Type of insider and firm size

**Table 6.** Profitability of CEO's transactions.

Event window	Small cap	Mid cap	Large cap
<b>Purchases</b>			
5 days	0,44%	0,09%	0,07%
	(1,61)	(0,99)	(0,65)
10 days	0,15%	0,08%	0,08%
	(1,11)	(1,36)	(1,13)
30 days	0,05%	0,03%	-0,04%
	(1,09)	(1,04)	(-1,10)
Observations	50	72	53
<b>Disposals</b>			
5 days	-0,39%*	-0,17%	-0,19%
	(-1,80)	(-0,87)	(-1,83)
10 days	-0,24%*	-0,21%**	0,01%
	(-1,86)	(-2,30)	(0,05)
30 days	-0,27%***	-0,09%	0,13%
	(-5,60)	(-1,49)	(0,89)
Observations	16	19	5

T-statistics are presented in parentheses. \*\*\*, \*\*, \* indicate statistical significance at 1%, 5% & 10% level, respectively.

In table 6, the sample is divided into chief executive managers' transactions and it is also divided based on the firm size.

Table 6 shows that small cap companies' chief executive officers' transactions were the most profitable. They earned 0,44% (t-statistics 1,61) abnormal returns daily by their purchases when the event window was 5 days. When the event period is lengthened to 10 days the daily abnormal returns decreased to 0,15 % (t-statistics 1,11). After 30 days from the purchase, a small cap company chief executive officer has earned 0,05% (t-statistics 1,09) daily abnormal returns. Even though the chief executive officers at small cap companies earned abnormal returns by their purchases, abnormal returns were not statistically significant. The results are stronger after small cap companies' chief executive officers' disposals. After 5 days from the disposal, stock prices have decreased abnormally -0,39% (t-statistics -1,80). The result is quite the same after 10 days from the disposal. Stock prices have abnormally decreased -0,24% (t-statistics -1,86). In both event windows, abnormal returns are statistically significant at 90% confidence level. When setting the event window to 30 days, the stock prices decreased abnormally -0,27% (t-statistics-5,60) per day after chief executive officers' trades. Daily abnormal returns are statistically significant at 99% confidence level.

Chief executive officers in mid cap companies made purchases in 72 different days and sold their stocks in 19 different days. They earned abnormal returns after their purchases whether the event window was set to 5 days, 10 days, or 30 days from the transaction. Daily abnormal returns were 0,09% (t-statistics 0,99), 0,08% (t-statistics 1,36) and 0,03% (t-statistics 1,04), respectively. However, the abnormal returns were not statistically significant.

After the disposal of a chief executive officer in a mid-cap company, the stock prices decrease abnormally. 5 days from the disposal, the stock prices have daily decreased abnormally -0,17% (t-statistics -0,87). 10 days from the disposal, the effect is stronger. The stock prices have daily decreased abnormally -0,21% (t-statistics -2,30). In the event window of 30 days the abnormal return was -0,09% (t-statistics -1,49). Abnormal returns were statistically significant only when the event window was set to 10 days.

The result was different after large cap companies' chief executive officers' transactions. In shorter event windows they earned abnormal returns after their purchases. They earned daily abnormal return of 0,07% (t-statistics 0,65) when the event window was 5 days and 0,08% (t-statistics 1,13) in 10 days period. The abnormal returns are not statistically significant. After 30 days from the purchase, chief executive officers' returns turned to negative and was -0,04% (t-statistics 1,10). However, neither in 30 days event window the abnormal returns were not statistically significant. The results are quite similar after chief executive officers' disposal. In the shorter event window, the stock prices decrease but when setting the event period to 30 days, the abnormal return turns to positive and the stock prices increase daily 0,13% (t-statistics 0,89). All the results are statistically insignificant.

Overall, the chief executive officers earned abnormal returns by their purchases regardless of the size of the company they manage. Chief executive officers' in small cap companies' purchases were significantly the most profitable. However, none of the abnormal returns are statistically significant. Chief executive officers' disposals in small cap companies had an impact on stock returns. Stock prices decreased significantly after their disposals. Abnormal returns were statistically significant, especially when event window was 30 days. The issue when analysing the results of chief executive officers' disposals is the small number of observations. For example, large cap companies' chief executive officers had only 5 disposal days, so the results are not reliable.

**Table 7.** Profitability of other senior management's transactions.

<b>Event window</b>	<b>Small cap</b>	<b>Mid cap</b>	<b>Large cap</b>
<b>Purchases</b>			
5 days	0,18% (0,85)	0,12% (1,10)	-0,08% (-0,61)
10 days	0,12% (1,32)	0,06% (0,86)	0,01% (0,14)
30 days	0,05% (0,73)	0,06%* (1,91)	-0,00% (-0,00)
Observations	20	55	48
<b>Disposals</b>			
5 days	-0,47%* (-1,75)	-0,11% (-1,42)	-0,03% (-0,46)
10 days	-0,34%** (-2,25)	-0,04% (-0,88)	0,01% (0,16)
30 days	-0,06% (-0,76)	-0,05%* (-1,75)	-0,07%*** (-3,12)
Observations	23	99	87

T-statistics are presented in parentheses. \*\*\*, \*\*, \* indicate statistical significance at 1%, 5% & 10% level, respectively.

In table 7, the transactions made by other senior management are presented. They are divided into three groups based on firm size. Other senior management was the only group that had more disposal days than purchase days when the data is divided by the type of insider.

Other senior management in small cap companies was quite inactive in period 1.7.2016-1.7.2019. They had only 20 purchase days and 23 disposal days. The stock prices increased abnormally whether the event window was set to 5 days, 10 days, or 30 days. The

other senior management earned abnormally 0,18% (t-statistics 0,85) daily when the event window was set to 5 days. After 10 days and 30 days, the other senior management earned daily abnormal return of 0,12% (t-statistics 1,32) and 0,05% (t-statistics 0,73), respectively. None of the abnormal returns were statistically significant in any event window. After the other senior management's disposals, the stock prices seem to abnormally decrease. When the event window is set to 5 days, the stock prices decreased abnormally -0,47% (t-statistics -1,75) per day. The abnormal returns are statistically significant at 90% confidence level. After 10 days from the other senior management's disposal, the stock prices have still decreased abnormally -0,34% (t-statistics 2,25) daily and the abnormal returns are statistically significant at 95% confidence level. After 30 days from the disposal, the effect is smaller and the daily abnormal returns decreased to -0,06 (t-statistics -0,76) and it is statistically insignificant.

Mid cap companies' other senior management were the most active group measured in purchase days and disposal days. They net purchased in 55 days and net sold their stocks in 99 days. Table 7 shows that they earned abnormal returns 0,12% (t-statistics 1,10) daily when the event window was set to 5 days. Abnormal returns are also earned 0,06% daily by the other senior management after longer periods from the purchase. Abnormal returns are statistically significant at 90% confidence level only when the event window is 30 days. With other event windows, abnormal returns are statistically insignificant. The result is quite similar when the other senior management sold their stocks. The abnormal return occurs after the other senior management's disposal and it is strongest after the longer event period. The stock prices decreased abnormally -0,11% daily in 5 days event period. The abnormal returns are not statistically significant. After 30 days from the disposal the stock prices abnormally decreased -0,05% (t-statistics -1,75) on average. The abnormal returns are statistically significant at 90 % confidence level.

Table 7 shows that the other senior management in the large cap companies was more active to sell their stocks than buy. They net purchased in 48 different days and sold their stocks in 87 different days. After the other senior management's purchase, the stock prices seem to decrease abnormally -0,08% after 5 days from the transaction. After a longer

period, the profitability of their trades turns to breakeven. Therefore, it can be suggested that the other senior management in the large cap companies did not earn abnormal returns by their purchases. 5 days from the disposal made by large cap companies' other senior management, the stock prices decreased by -0,03% (t-statistics -0,46). After 10 days, the profitability of the transaction changed to almost breakeven. The stock prices turn to downtrend when the event window is 30 days. The stock prices decreased abnormally -0,07% (t-statistics -3,12). The abnormal returns are statistically significant at 99 % confidence level.

As a conclusion, the other senior management in the small cap and mid cap companies earned abnormal returns by their purchases but returns were not statistically significant. The purchases made by the other senior management in the large cap companies had no impact on stock returns. After the disposal, the stock prices decreased regardless of the size of the company. However, table 7 shows that the abnormal returns are the largest in shorter event periods when the other senior management in small caps sells their stocks. Then again, when the other senior management in mid cap or large cap companies sells their stocks the impact on stock returns is the strongest after longer event periods.

**Table 8.** Profitability of board members' transactions.

<b>Event window</b>	<b>Small cap</b>	<b>Mid cap</b>	<b>Large cap</b>
<b>Purchases</b>			
5 days	0,17%** (2,10)	-0,01% (-0,16)	0,11%*** (2,70)
10 days	0,12%*** (2,66)	-0,00% (-0,07)	0,10%*** (3,47)
30 days	0,11%*** (4,98)	0,03% (1,25)	-0,00% (-0,00)
Observations	150	113	193
<b>Disposals</b>			
5 days	-0,24%* (-1,73)	0,13% (1,44)	-0,10% (-0,81)
10 days	-0,18%* (-1,97)	0,23%*** (3,80)	-0,18%** (-2,23)
30 days	-0,15%*** (-2,97)	0,06%* (1,88)	-0,04% (-0,79)
Observations	61	51	15

T-statistics are presented in parentheses. \*\*\*, \*\*, \* indicate statistical significance at 1%, 5% & 10% level, respectively.

Table 8 contains the results of board members' transactions' impact on stock returns. In this table they are divided by the size of the firm. Board members were more active to buy stocks than sell regardless of the size of the company.

The board members in small cap companies earned abnormal returns after their purchases. In the period of 5 days, they earned 0,17% (t-statistics 2,10) abnormal returns per day. The abnormal returns are statistically significant at 95 % confidence level. After 10 days from the purchase, the daily abnormal return was 0,12% (t-statistics 2,66) daily on average. The abnormal returns exist even if the event period is set to 30 days. On average, the

board members in small cap companies earned 0,11% (t-statistics 4,98) daily abnormal returns. The abnormal returns were statistically significant at 99 % confidence level. The same result can be seen after board members' disposal. The stock prices decreased daily abnormally -0,24 % (t-statistics -1,73) in 5 days event period. The stock prices kept decreasing after 10 days from the transaction of the insider and was -0,18% (t-statistics -1,97). The abnormal returns are statistically significant at 90 % confidence level in both event windows. After 30 days from the disposal, the impact is even stronger. The stock prices decreased abnormally -0,15 % (t-statistics -2,97) per day and it is statistically significant at 99 % confidence level.

Overall, it can be stated that the board members in small cap companies successfully timed their transactions in period of 1.7.2016-1.7.2019. They earned abnormal returns after their transactions whether they purchased or sold the stocks. The abnormal returns are the largest when the event window is set to 30 days.

Board members in mid cap companies net purchased in 113 trading days while they net sold their stocks in 51 different trading days. Their purchases had no impact on stock returns. The board members in mid cap companies did not earn abnormal returns by their purchases. Results for the board members in mid cap companies' disposals are interesting. After their disposals, the stock prices increased daily 0,13 % (t-statistics 1,44) after 5 days. Their abnormal losses are even greater after 10 days. The stock prices increased abnormally 0,23% (t-statistics 3,80) per day. The results in the 10 days event window is statistically significant at 99 % confidence level. The results of the transactions made by the board members in the mid cap companies differs a lot from the results of the other groups.

Table 8 shows that the board members of large cap companies were the most active group to buy their companies' stocks. The group had 193 purchase days while they sold their stocks only in 15 different trading days. After 5 days from the purchase, the board members earned abnormal returns 0,11% (t-statistics 2,70) per day. The abnormal returns are statistically significant at 99% confidence level. The profitability of the purchases

increased when the event window is set to 10 days. They earned daily abnormal returns of 0,10% (t-statistics 3,47) on average. The result is statistically significant at 99% confidence level. After 30 days from the purchase, the abnormal returns disappear and the profitability of the transaction turns to zero.

Table 8 shows that after a board member's disposal, the stock prices abnormally start to decrease. When the event window is set to 5 days, the stock prices decreased daily -0,10% (t-statistics -0,81). However, the result is statistically insignificant. The stock prices continue to decrease when the event window is longer and after 10 days from the disposal by the board member the decrease is -0,18% (t-statistics -2,23) per day. The result is statistically significant at 95 % confidence level. However, after 30 days the daily abnormal return decreased to -0,04% (t-statistics -0,79) and is statistically insignificant.

**Table 9.** Main findings in subsamples.

<b>Even window</b>	Small cap purchases	Small cap disposals	CEO's disposals	Board member's purchases	Small cap CEO's disposals
5 days	1,15%*** (2,83)	-1,59%*** (-2,88)	-1,30%** (-2,07)	0,50%*** (2,62)	
10 days	1,29%*** (2,90)	-2,29%*** (-3,30)	-1,96%*** (-2,84)	0,80%*** (3,65)	
30 days	2,84%*** (4,70)	-4,57%*** (-3,99)	-4,02%*** (-3,14)	2,30%*** (6,09)	-8,10%*** (-5,59)
Observations	220	100	40	456	16

T-statistics are presented in parentheses. \*\*\*, \*\*, \* indicate statistical significance at 1%, 5% & 10% level, respectively.

Table 9 consists of main findings from regressions where the data was divided based on firm-size or the type of the insider. Insiders from the small cap companies earned 1,15% cumulative abnormal returns after 5 days from the purchase. In 30 day event window, the stock prices had cumulatively increased abnormally 2,84% after insider's purchase. The impact is even higher after the disposal of the insider. Stock prices decreased cumulatively -1,59% after 5 days from the disposal. Abnormal returns holds when the event window is set to longer window. After 10 days from the disposal, the cumulative abnormal return was -2,29% and -4,57% in 30 days after the disposal. The results are statistically significant at 99% confidence level.

The type of the insider seems to have an effect on stock returns. Table 9 shows that after a board member's purchase, the stock prices cumulatively increased abnormally 2,30% in 30 days. After a CEO's disposal the impact on stock prices is remarkable. The stock prices decrease -4,02% in 30 days after the CEO's disposal. Even higher impact occurs when the CEO of a small cap company makes a disposal. The stock prices decreased on average over -8% cumulatively in 30 days after the CEO's disposal. However, the number of observations was only 16 so the result can be considered more directive than reliable.

As a conclusion, it can be said that the results vary between the groups. It matters whether the board member is in a small cap, mid cap, or large company. By following the board members of small cap companies, an investor can earn abnormal returns. The investor can earn abnormal returns by following board member from large cap companies, but abnormal returns seem to decrease when the time frame is longer. By following mid cap companies' board members' transactions, the investor could not earn abnormal returns in 1.7.2016-1.7.2019.

## 7. CONCLUSIONS

The purpose of the study was to examine whether insiders can earn abnormal returns by their trades and whether an investor can earn abnormal returns by following the insiders. The results of prior studies show that insiders have earned abnormal returns by their trades. Most of the previous researches on insider trading are international and there is only one published study in the Finnish market that is from 1999. As the results of the international studies show that insiders have earned abnormal returns, the motivation to examine the Finnish market in a newer period increase. The data of this study includes 117 companies which are listed in Helsinki OMX. The period of time is 1.7.2016-1.7.2019.

The null hypothesis of the study is that insider trades have no impact on stock returns. Whether insiders purchase or sell the stocks of their own company, insiders cannot earn abnormal returns by their trades. The alternative hypotheses are that insiders' trades have impact on stock returns. Insiders earn abnormal returns after purchase and after insiders' sale, the abnormal return is below zero.

$$(8) \quad \begin{aligned} H_0: AR_{it} &= 0 \\ H_1: AR_{it} &> 0 \\ H_2: AR_{it} &< 0 \end{aligned}$$

The results show that insiders earned abnormal returns by their trades in Helsinki OMX in period of 1.7.2016-1.7.2019. Therefore,  $H_0$  can be rejected and hypotheses  $H_1$  and  $H_2$  are accepted for the total sample.

The results for total sample show that insiders earned remarkable abnormal returns by their trades. The abnormal returns were tested with different event windows and no matter

what the length of the event window was or the nature of the transaction, the abnormal returns were statistically significant at 99% confidence level. Only insiders' disposals with 10 days event window were statistically significant at 95% confidence level. Insider's earned cumulative abnormal returns 0,55% in 5 days after the purchase, 0,80% after 10 days from the purchase and when the event window was set to 30 days, insiders earned 1,68% cumulative abnormal returns by their purchase. After insiders' disposal, the stock returns turned to negative. After 5 days from the insider's disposal, the cumulative abnormal return was -0,59%. When the event window was set to 10 days, the cumulative abnormal return was -0,57%. Stock prices continued to decrease and in 30 days event window the cumulative abnormal return was -2,00%.

In this study, the sample is divided to smaller groups based on the size of the company or the type of the insider. Companies were divided to the three different groups: small cap, mid cap and large cap. The distribution is grounded on the market capitalisation of the companies. Also, the insiders were divided to the three groups which are board members, other senior management, and chief executive officers.

Lakonishok et al (2001) find that trades made by an insider from small cap companies had higher impact on stock prices. The same findings can be seen in this study. In 30 day event window, the stock prices had cumulatively increased abnormally 2,84% after insider's purchase. The impact is even higher after the disposal of the insider. Stock prices decreased cumulatively -4,57% in 30 days after the disposal. The results are statistically significant at 99% confidence level.

The type of the insider seems to influence to stock returns. After the board member's purchase, the stock prices cumulatively increased abnormally 2,30% (t-statistics 6,09) in 30 days. After a CEO's disposal the impact on stock prices is remarkable. The stock prices decrease -4,02% in 30 days after the CEO's disposal. Even higher impact occurs when the CEO of a small cap company makes a disposal. The stock prices decreased on average over -8% cumulatively in 30 days after the CEO's disposal. However, the number of observations was only 16 so the result can be considered more directive than reliable. Chief executive officers' trades' impact on stock returns in the Finnish markets would be

interesting to examine with a larger number of observations. This study does not explain the reason for insiders' abnormal returns. The natural reason might be that other investors follow what insiders do and therefore give pressure for stock prices to increase or decrease, whether an insider purchase or sell, respectively. On the other hand, an insider might have non-public information that firm's performance is going to enhance or weaken and that gives the movement pressure for the stock prices. For future research, a more fundamental approach would be interesting in which it is examined how companies' fundamentals change after an insider's transaction in longer periods.

As a conclusion, insiders earned abnormal returns during 1.7.2016-1.7.2019, thus the null hypothesis is rejected, and the alternative hypotheses are accepted. The results show that the firm size and the type of the insider has an impact on the stock price. The results also indicate that the Finnish stock market is not efficient while insiders can earn abnormal returns by their trades.

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## APPENDICES

## Appendix 1. Insiders' transactions.

Company	Market cap	Purchase-day	Disposal-day	Trading days	Trades made
Afarak Group	Mid Cap	0	8	8	8
Ahlstrom-Munksjö Oyj	Large Cap	7	0	7	10
Aktia Bank Plc	Mid Cap	11	25	36	98
Alma Media Corp.	Mid Cap	9	1	10	27
Apetit Oyj	Small Cap	3	1	4	5
Asiakastieto Group	Mid Cap	1	0	1	2
Aspo Plc	Mid Cap	4	6	10	12
Aspocomp Group Plc	Small Cap	3	2	5	6
Atria Plc	Mid Cap	5	0	5	5
Bank of Åland Plc A	Mid Cap	3	1	4	4
Bank of Åland Plc B	Mid Cap	17	0	17	18
Basware Oyj	Mid Cap	10	3	13	22
Biohit Oyj	Small Cap	1	9	10	15
Bittium Oyj	Mid Cap	1	1	2	2
Capman Plc	Mid Cap	11	2	13	15
Cargotec Oyj	Large Cap	7	2	9	9
Caverion Oyj	Mid Cap	33	1	34	36
Citycon Oyj	Large Cap	72	0	72	79
Componenta Corp.	Small Cap	1	0	1	1
Consti Plc	Small Cap	3	7	10	11
Cramo Oyj	Mid Cap	24	0	24	36
Digia Plc	Small Cap	7	0	7	8
Digitalist Group Plc	Small Cap	2	0	2	4
Dovre Group Plc	Small Cap	16	6	22	26
Efore Oyj	Small Cap	8	1	9	10
Elecster Oyj	Small Cap	0	0	0	0
Elisa Oyj	Large Cap	3	9	12	31
Eq Oyj	Mid Cap	5	5	10	26
Etteplan Oyj	Mid Cap	0	25	25	30
Evli Bank Oyj	Mid Cap	7	7	14	22
Exel Composites Plc	Small Cap	8	0	8	9
F-secure Corp.	Mid Cap	8	3	11	11
Finnair Oyj	Mid Cap	3	1	4	4
Fiskars Corp.	Large Cap	3	0	3	4
Fortum Corp.	Large Cap	1	1	2	2
Glaston Corp.	Small Cap	3	0	3	3
HKScan Oyj	Mid Cap	3	0	3	3

Honkarakenne Oyj	Small Cap	8	0	8	11
Huhtamäki Oyj	Large Cap	5	22	27	29
Ilkka-Yhtymä Oyj	Small Cap	1	0	1	2
Incap Corp.	Small Cap	0	10	10	23
Innofactor Oyj	Small Cap	9	0	9	10
Investors House Oy	Small Cap	4	4	8	20
Kemira Oyj	Large Cap	8	1	9	9
Keskisuomalainen Oyj	Small Cap	6	0	6	6
Kesko Corp. A	Large Cap	1	0	1	2
Kesko Corp. B	Large Cap	1	1	2	2
Kesla Oyj	Small Cap	0	0	0	0
Kone Oyj	Large Cap	19	9	28	35
Konecranes Abp	Large Cap	15	4	19	71
Lassila & Tikanoja Plc	Mid Cap	2	0	2	2
Lehto Group Oyj	Mid Cap	7	2	9	16
Marimekko Oyj	Mid Cap	7	0	7	27
Martela Oyj	Small Cap	1	0	1	1
Metso Oyj	Large Cap	3	1	4	4
Metsä Board Oyj B	Large Cap	1	0	1	1
Metsä Board Oyj A	Large Cap	0	0	0	0
Neo Industrial Oyj	Small Cap	6	8	14	14
Neste Corp.	Large Cap	6	25	31	37
Nixu Oyj	Small Cap	1	0	1	1
Noho Partners Oyj	Mid Cap	0	0	0	0
Nokia Corp.	Large Cap	16	7	23	101
Nokian Tyres	Large Cap	2	1	3	3
Nordea	Large Cap	3	0	3	4
Nurminen Logistics Plc	Small Cap	1	0	1	11
Olvi Plc A	Mid Cap	2	6	8	9
Oriola Oyj A	Mid Cap	0	0	0	0
Oriola Oyj B	Mid Cap	16	0	16	69
Orion Corp. A	Large Cap	3	0	3	4
Orion Corp. B	Large Cap	2	13	15	33
Outokumpu Oyj	Large Cap	32	1	33	35
Outotec Oyj	Mid Cap	12	0	12	69
Ovaro Kiinteistösijoitus Oyj	Small Cap	31	22	53	75
Panostaja Oyj	Small Cap	5	0	5	23
Pihlajalaina Oyj	Mid Cap	2	1	3	9
Plc Uutechhinc Group Oyj	Small Cap	1	0	1	3
Ponsse Oyj	Mid Cap	5	1	6	10
Punamusta Media	Small Cap	1	0	1	6
QPR Software Oyj	Small Cap	0	0	0	0
Raisio Plc	Mid Cap	7	1	8	8

Rapala VMC Corp.	Small Cap	8	0	8	15
Raute Corp.	Small Cap	0	7	7	21
Revenio Group	Mid Cap	4	29	33	37
Saga Furs Oyj	Small Cap	0	0	0	0
Sampo Plc	Large Cap	5	6	11	35
Sanoma Corp.	Large Cap	48	0	48	48
Scanfil Oyj	Mid Cap	5	16	21	24
Sievi Capital Oyj	Small Cap	0	0	0	0
Siili Solutions Oyj	Small Cap	8	9	17	26
Solteq Oyj	Small Cap	47	1	48	51
Soprano Oyj	Small Cap	0	0	0	0
SRV Group	Small Cap	0	1	1	1
SSH Communications Security Oyj	Small Cap	4	2	6	8
Stockmann Plc A	Small Cap	0	0	0	0
Stockmann Plc B	Small Cap	2	2	4	11
Stora Enso Oyj A	Large Cap	0	0	0	0
Stora Enso Oyj B	Large Cap	9	2	11	11
Suominen Oyj	Small Cap	5	0	5	5
Taaleri Plc	Mid Cap	3	3	6	7
Talenom Oyj	Mid Cap	1	14	15	29
Tecnotree Corp.	Small Cap	2	1	3	3
Teleste Oyj	Small Cap	3	3	6	6
Telia Company Ab	Large Cap	0	0	0	0
Tieto Corp.	Large Cap	0	0	0	0
Tikkurila Oyj	Mid Cap	0	0	0	0
Trainers' house Group Oyj	Small Cap	0	0	0	0
Tulikivi Oyj	Small Cap	0	0	0	0
UPM-Kymmene Corp.	Large Cap	3	1	4	5
Uponor Oyj	Mid Cap	8	1	9	9
Vaisala Oyj	Mid Cap	1	6	7	7
Valmet Oyj	Large Cap	2	1	3	3
Valoe Oyj	Small Cap	0	2	2	2
Viking line Abp	Mid Cap	3	0	3	5
Wulff Group	Small Cap	6	1	7	13
Wärtsilä	Large Cap	13	0	13	46
YIT Corp.	Large Cap	4	0	4	6
Yleiselektroniikka Oyj	Small Cap	5	1	6	6
<b>TOTAL</b>		<b>754</b>	<b>376</b>	<b>1130</b>	<b>1849</b>