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Abnormal Returns in Insider Trading –
A study on the efficiency of the Swedish stock market and insider trading legislation

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Abstract
The purpose of this paper is to study the efficiency of the Swedish stock market and its insider trading legislation. This is done by measuring both the occurrence and timing of abnormal returns among corporate insiders. In addition, we also study if there are differences in abnormal returns between insiders in companies of different sizes, between purchase- and sale transactions and between different types of insiders. The results show that all types of insiders, in all company sizes and for both purchase- and sale transactions receive positive abnormal returns in the year following their transactions. The levels of abnormal returns vary but are all significant, both statistically and economically. Furthermore, the results show that there is no difference between purchase- and sale transactions, but that there are some differences between companies of different sizes as well as between different types of insiders.

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Insider definition

In this paper, insiders are defined as: Individuals within, or in close connection to, a company that *may* possess information not known by the general public. Examples include, but are not limited to, CEO, CFO, CRO, Vice President, board members, resigned executives and to above mentioned connected family members (spouse and children). In July, 2016, the term used by Finansinspektionen, the Swedish regulatory authority, was changed from *Insider* (Insynsperson) to *Individual in management position* (Person i ledande ställning).

1. Introduction

Insider trading is a subject that has been of debate for many decades. The earliest legislation can be traced back to the U.S. in the 1930s, when the Securities and Exchange Commission (SEC) were created and given the task to regulate insider trading (Rhett Clark, 2014). Ever since, the subject has been of constant interest in academic circles, and has occasionally been elevated to be discussed in the general media, often in close connection to different scandals. Examples of such scandals include an incident in 2007 when a Compliance Officer at Morgan Stanley leaked non-public information regarding planned mergers to three hedge fund managers at Bear Sterns (The New York Times, 2007-05-08) and a situation in 1988 when George Soros bought shares in Société Générale, a decision which was based on non-public information regarding that the bank were subject of an acquisition (The Guardian, 2002-11-07). Despite strict regulations aimed at eliminating events such as those mentioned above, there is a high risk that these types of scandals will continue to surface, which will keep the subject of insider trading a topic for debate, both among scholars and the broader general public.

Before going any further, an important distinction needs to be made. Both of the two aforementioned situations are examples of *illegal* insider trading, where individuals act on information asymmetries in the market, i.e. take advantage of information not known by the rest of the market. At the other side of the spectrum is *legal* insider trading, where insiders simply purchase or divest shares in their own companies based on public information, i.e. *not* taking advantage of information asymmetries. It may, however, be difficult to assess whether or not a purchase or divestment of shares has been made based on insider information or not. In other words, it is often not a binary situation, but rather a continuous scale, where not all information is explicit, but can also be implicit. This implies that insiders that do *not* act on any non-public information still may possess an edge regarding the company stock and its value. This information is based on the tacit knowledge acquired through the individual's professional position at the company. Without possessing any *explicit* knowledge regarding future revenue figures, earnings etc., an *implicit* understanding of the industry, macroeconomic factors' effect on supply and demand and other tacit knowledge that could be gained only by working in the company can be used in the decisions of whether or not to purchase or divest stocks in the company. Along with this, there is also a risk that investment decisions by insiders may be based on *explicit* non-public information, but never discovered. In other words, *illegal* insider transactions may fly under the radar and be categorized as *legal* insider transactions, as it is difficult to prove what type of information a single individual possesses at a single point in time.

Swedish legislation regarding insider trading (SFS 2005:377) is extensive and penalties include up to four years' imprisonment for investors purchasing or selling stocks based on non-public information. In 2016, a new amendment (596/2014/EU [MAR]) was added. The main changes include a shortening of the reporting period from five to three days after the transaction and an inclusion of more types of accounts. Enforcement levels are relatively high and in 2016, Finansinspektionen handed 218 cases of suspected insider trading over to the prosecutors.

In the strongest form of the efficient market hypothesis, defined by Fama (1970), no group of investors (such as insiders) would be able to earn any abnormal stock returns as all information, both public and non-public, available would be reflected into the current stock prices. This paper will analyze the Stockholm Stock Exchange (Nasdaq OMX), and sets out to test whether or not there are differences in the level of abnormal returns earned between insiders at companies of different sizes and if any sub-group of insiders, for example CEOs, make better transactions than other sub-groups of insiders. It will also test if there, in terms of abnormal returns, are differences between purchase- and sale transactions and when the potential abnormal returns occur in time. These topics, then, will help to assess the level of efficiency, both at market level and in terms of the current insider trading legislation. Our research questions are the following:

1. Do all groups of insiders earn abnormal returns and if so, is there a difference in abnormal returns between the groups?
2. Does both purchase and sale transactions made by insiders yield abnormal returns and if so, is there a difference in abnormal returns between them?
3. Do insiders in companies of all sizes earn abnormal returns and if so, is there a difference in abnormal returns between insiders in companies of different sizes?
4. How are potential abnormal returns distributed in the year following an insider transaction?

This paper's topic of research, as outlined above, can only provide insights into some of the characteristics of potential abnormal returns among insiders but it does *not* shed any light on what the underlying reasons for the results might be. For example, *if* insiders earn risk-adjusted abnormal returns, this paper will not provide answers as to whether this is a result of insiders' higher level of tacit knowledge regarding a company's operations or if it is a result of insiders taking advantage of explicit non-public information, i.e. *illegal* insider trading. Furthermore, this paper will not investigate the possibilities for outside investors to earn risk-adjusted abnormal returns by replicating insider transactions, an otherwise common approach to insider trading research. Despite these limitations in terms of scope, this paper will still provide valuable insights into the

efficiency of the market, and especially the efficiency of the current insider trading legislation on the Swedish stock market. This should be of societal interest as legislation inefficiencies are costly. Even though the direct costs might be limited, there are important indirect costs to consider as inefficient insider trading legislations lead to an erosion of investors' trust in the financial markets (Thompson, 1999) and by extension to an increased cost of capital (Bhattacharya & Daouk, 2002). Investors having trust in the financial markets is also important due to the market's role in capital allocation. In other words, inefficient legislations may lead to an eroded trust for the financial markets, which over time increases the cost of capital and harm the capital allocation among companies, creating contagious effects on many parts of society.

This paper is organized as follows: Section two contains previous research and is followed by section three describing the data sample and the statistical methods being used to answer our research questions. Section four contains the results and is followed by section five where the results are analyzed in relation to previous research and our research questions. Section six concludes the paper and gives suggestions for future research.

2. Previous Research

This section will begin with a quick review of previous research on market efficiency, followed by previous research on insider trading legislations and the different arguments in favor of or against regulating insider trading. This is in order to provide a background of our topic and to illustrate the broader context in which it is placed and why it is of societal interest to analyze. Finally, previous research more closely related to the specific topic of this paper will be analyzed.

2.1. Market Efficiency

Research on the efficiencies of stock markets goes back several decades. It is difficult to name a specific point in time when this subject was first introduced into academia, but Roberts (1967) was the first paper to use the expression "*Efficient market hypothesis*" (EMH) and to divide the market into strong and weak forms (Sewell, 2011). Roberts (1967) provided some foundation for Fama, Fisher, Jensen & Roll (1969) and Fama (1970, 1991) who defined an efficient market as "*a market in which prices always fully reflect available information*" and identified three levels of market efficiency:

(1) *Strong.* At this level, all relevant information, including non-public information, is quickly and accurately reflected into the price of a stock.

(2) *Semi-strong*. All relevant public information is quickly and accurately reflected into the price of a stock.
(3) *Weak*. In the weakest form, the only information reflected into the price of a stock is the historical information of previous stock prices.

It is also noted that the *Strong* level is extreme and that one should not expect it to be an exact description of the real market, but instead it should be viewed as a form of benchmark against which one can judge deviations. Using the framework above, our paper can indicate what level of efficiency the Swedish stock market is currently at. If our paper can provide evidence of risk-adjusted abnormal returns among insiders, we can conclude that the market is not efficient in the *Strong* form. If our tests instead show that insiders do *not* earn any risk-adjusted abnormal returns, it will indicate that either the market is efficient in the *Strong* form, or that insiders are "honest", in the sense that they do not take advantage of non-public information in their transactions. This, then, would imply that the current insider trading legislation is rather effective. Fama's (1970) framework will also be useful in investigating potential differences between companies with different market capitalizations. When the above mentioned framework is discussed in literature, it is generally discussed in terms of entire markets, for example the U.S. stock market or the Swedish stock market, but never in terms of that the level of efficiency may differ *within* a certain market. Could there be a case where the largest companies in a market are subject to (at least some degree of) the Strong level of efficiency, while the smallest companies are more inefficiently priced?

Since Roberts (1967), Fama et al. (1969) and Fama (1970, 1991) was released, many papers have criticized the theory, especially with regards to the assumptions made. The EMH builds on the assumption that individual investors are rational and that any deviations from this individual rationality are independent between investors. This implies some type of *collective rationality* where one investor's deviations is cancelled out by another investor's deviations (Pesaran, 2005). A large body of research, mainly in the area of psychology and behavioral finance, however, shows that investors are subject to behavioral biases, for example loss aversion, herding, overreaction and simple regret (Lo in Blume & Durlauf, 2007). Investors' risk aversion is for example not constant but instead, investors seem to be risk averse when choosing between positive outcomes (profits) and risk-seeking when choosing between negative outcomes (losses) (Kahneman & Tversky, 1979). Another example is the boom and bust of the Internet bubble, which can be described as a result of psychological contagion, or herding (Shiller, 2000, cited in Malkiel, 2003). These findings, that investors are, to some degree, irrational, can then be used to question the underlying assumptions

of the EMH. Another critique of the EMH has been that it does not take into account transaction- or information-gathering costs. Grossman & Stiglitz (1980) argue for a model in which there is an "*equilibrium degree of disequilibrium*". Put simply, they argue that there has to exist some degree of inefficiency (profit opportunities) in a market to compensate investors for the time and effort put into gathering information. If stock prices were to fully reflect all available information, no investors would have incentives to gather and analyze information as that information already would be reflected into the current stock prices. It is argued that prices therefore are at a level which compensate the investor who has gathered the information. If the research undergone by the investor indicate that a stock is undervalued, the investor will purchase the stock, bidding up its price until it is "correctly" priced, earning an abnormal return. This abnormal return would then be the result of the normal return plus a compensation for the new information gathered, creating a higher return than for any other investors buying the stock at the new "correct" price. Finally, Scholes (1972) and Bernard & Thomas (1989), among others, found indications of drifting stock prices after new information was made available in the market. This, then, implies that the EMH does not hold up as it requires available information to be quickly reflected into the stock price, instead of gradually. Despite the different critiques against the EMH, it is still a widely used theory today, some 50 years after its birth.

2.2. Should insider trading even be regulated?

Through an extensive survey, Bhattacharya & Daouk (2002) concluded that 103 countries worldwide had some kind of stock market in 1998, and 87 of these countries also had insider trading legislations. It was also concluded that enforcements of these legislations – in the paper measured as prosecutions – had taken place in 38 of the 103 countries. In other words, in the late 1990s, a relatively large proportion of countries with stock markets also had insider trading legislations, but only a relatively small part of them actually enforced the legislations, evidenced through the few countries with actual prosecution cases. Despite the large proportion of countries with insider trading legislations, previous research offers an inconclusive picture regarding whether or not insider trading should be regulated or not.

Arguments against the regulation of insider trading can be found in Manne (1966), where mainly two arguments are put forth. Firstly, insider trading can be an efficient tool for compensating entrepreneurs for their innovation. Manne (1966) argues: "*It [insider trading] readily allows corporate entrepreneurs to market their innovations.... [T]his is not a direct marketing of the idea but rather a "sale" of information about an innovation. Thus, although we do not allow entrepreneurs a direct proprietary interest in their ideas, we can allow recovery for their ideas by permitting them to exploit information about the existence of the ideas*

in a market primarily based on information". The idea is that if insiders were allowed to trade on non-public information, it would give them greater incentives to create additional information of value for the company, which would be beneficial both to the company and society. Secondly, it is argued that the stock would be priced closer to the price that would be the case if the non-public information instead *was* known by the public, which would be beneficial as stock prices (as well as other security prices) would be more accurate. Using the levels of market efficiency put forth four years later in Fama (1970), this second argument by Manne (1966) would result in the EMH going from Semi-strong to, or at least approaching, Strong as not only all public information, but also non-public information, would be reflected in stock prices.

An argument in favor of insider trading legislations is that it reduces the cost of capital, more specifically the cost of equity. Bhattacharya & Daouk (2002) measured this through regression analysis where *realized* equity returns were used as a proxy for *expected* equity returns (=the cost of equity). The results showed a decrease in the cost of equity by five percent after controlling for risk, liquidity and other shareholder rights. Noteworthy is also the fact that it seems to be the *enforcement* of the insider trading legislation that reduces the cost of equity, instead of the insider trading legislation itself. Painter (1999) also recognizes the different, both positive and negative, effects that insider transactions based on non-public information have on a company's cost of equity. It is argued, however, that this effect on the cost of equity will be individual to all companies and that one option in terms of legislation is that each individual company determines whether or not it will restrict insider transactions. In other words, it is argued by Painter (1999) that insider trading restrictions should be imposed at company-level, by each company itself, rather than at market level, by the authorities.

Manne's (1966) argument for viewing insider trading as an efficient compensation tool for entrepreneurs within companies is criticized by Thompson (1999) who argue that the compensation plans for executives within companies has changed dramatically since the time of Manne's (1966) paper. Thompson (1999) refer to Balkcom & Brossy (1997) and their findings regarding how payment schemes over time have gone further in aligning executives' interests with those of the shareholders. In such an environment where executives and shareholders have aligning interests, then, the need for insider trading as a tool for incentivizing entrepreneurial actions is decreased. One benefit of having other types of entrepreneurial compensation, such as for example options, is that these are less likely to reward the wrong people or incentivize the wrong behavior (Thompson, 1999). If insider trading instead were being used as an incentive for entrepreneurial actions within a company, it might give entrepreneurs the wrong incentives as it not only awards

success but also failures as the entrepreneur (the insider) would be able to short-sell stocks in connection to failed projects (Painter, 1999 and Macey, 1999). Other types of incentivizing forms of payments are more easily tailored to only reward on the upside, better aligning the insiders' interests with those of the external shareholders. Kronman (1978) also criticize the use of insider trading as a way of compensating entrepreneurs as it is argued that the insiders that create the insider opportunity, for example scientists in a pharmaceutical company, seldom are the ones that later capitalize on the non-public information. This would then discard the argument of insider trading as a compensation tool as it compensates the "wrong" insiders.

Haddock & Macey (1987) argue by referring to among others Copeland & Galai (1983) that market makers profit when trading with outsiders as the counterparty, but loses when trading against insiders, as the insiders possess information regarding the shares that the market maker does not. This could then be solved by quoting higher bid-ask spreads towards insiders, but as insiders can trade anonymously through third parties, the market makers cannot know which transactions are being done against insiders. Market makers will therefore quote higher bid-ask spreads towards all investors, both insiders and outsiders, thereby increasing the transaction costs for outsiders. This however, must then be set in relation to the reduced wage levels for insiders when they are allowed to trade on non-public information. If the savings from the reduced wage levels are higher than the increased transaction costs from the widening bid-ask spread, shareholders benefit from insider trading. Since institutional investors, due to the flow of funds and the cost of having idle cash, generally make more transactions than most private investors, institutional investors pay a higher price for insider trading than private investors.

Haddock & Macey (1987), too, propose that the regulation of insider trading could be settled through private contracts between the insiders and the shareholders, instead of through externally imposed legislations. If investors know that insider trading is taking place in a company, they will adapt by lowering their bid on shares so that the implied cost of equity increases. In other words, much like Painter (1999), a more market-based approach to regulation is proposed.

Furthermore, it is argued that diversified shareholders, engaged in buy and hold-strategies, should be indifferent to allowing or regulating insider trading as they would sometimes gain and sometimes lose on such regulations. This is explained by the illustration in Figure 1, with the left one illustrating a positive event (Scenario A) and the right one illustrating a negative event (Scenario B). Shareholders would in Scenario A prefer a deregulation of insider trading if they were to sell shares between the date of the event and the announcement date as that would result in them receiving a higher price for the shares. In Scenario B, however, allowing for insider trading would result in the

shareholders selling between the event date and the announcement date to receive a lower price, thereby preferring insider regulations. In other words, *ex ante*, shareholders can be expected to sometimes gain and sometimes lose on the regulation of insider trading.

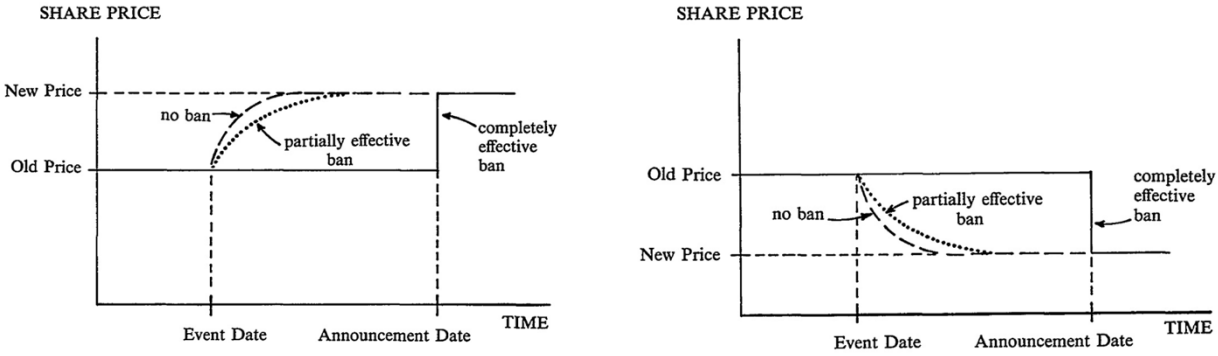

Figure 1: The effects of insider trading regulations, Haddock & Macey (1987)

To conclude, insider trading regulations continues to be a topic that divides scholars into two camps. Papers that argue against regulations argue that it can be a good compensation tool that incentivizes insiders and lowers the wage levels, increase the pricing efficiency in the market and finally that it should be up to each individual company to decide if, and to which extent, insider trading should be allowed or banned. This could then be regulated through private contracts, just as is the case with many other agreements between the owners (shareholders) and the employees (insiders). At the other side of the spectrum are papers arguing in favor of regulating insider trading. Their main arguments evolve around an increased cost of equity and increased transaction costs associated with allowing insider trading, as well as that it may reward both the wrong insiders and the wrong kind of behavior.

Despite previous papers' inconclusive picture regarding the positive and negative aspects of insider trading, the view of the authorities is less two-fold as evidenced by the result of Bhattacharya & Daouk (2002), showing that, at the turn of the century, most countries with a stock market also had insider trading legislations.

2. 3. Does any transaction type yield higher abnormal returns than the other?

The topic of whether insider purchases or sales are most informative has garnered much discussion. It is not uncommon for insiders to be heavily invested in their own companies due to option purchase programs. It is thus natural that insiders would attempt to sell shares to diversify their portfolio. Sales are also commonly motivated by liquidity reasons. Consequently, a sale transaction does not necessarily infer that the insider believes the stock of the company to be overvalued.

A purchase transaction, however, would intuitively be a stronger signal and is more likely to be considered a sign that the insider believes the shares of the company to be undervalued. Previous papers are inconclusive as to whether insiders earn greater abnormal returns when purchasing compared to selling shares. Givoly & Palmon (1985), studying the U.S. market, found that the cumulative abnormal return (CAR) for sales was higher than for purchases in longer time periods after the transactions. However, when looking at the first two months immediately after a sale transaction, the CAR was approximately zero. A more recent study, also studying the U.S. market, by Lakonishok & Lee (2001) obtained a positive CAR both for purchases (0.59%) and for sales (0.17%), though both results were statistically insignificant.

Betzer & Theissen (2009) show results of CARs at 6% for purchase transactions and 5% for sale transactions in the German market between 2002 and 2004. Bajo and Petracci (2006), studying the Italian market between 1998 and 2002, on the other hand, found that insider transactions resulted in CARs of 3.18% for purchases and 3.67% for sales ten days after the event. Another finding was that the size of the insiders' previous holdings in the company matters. Insiders with holdings of 30-50% have little to no CARs following purchases but experience significant negative CARs following sales. For insiders that own more than 50% of the company, CARs are larger for both purchases and sales.

To conclude, previous research is inconclusive with regards to which transaction type yields the highest level of abnormal returns. However, it appears that the CARs are smaller in magnitude and less significant for studies in the U.S. compared to Europe. Considering that insiders in Germany are not prohibited to trade in advance of major news, this result is not surprising. Similarly, the high CARs for insiders in Italy is reasonable given how the results were mainly driven by insiders with large holdings in the companies.

2. 4. Is there a correlation between company size and abnormal returns?

In terms of whether or not there is a difference in abnormal returns when insiders trade in small or large companies, intuition would lead one to believe that transactions in small companies would be more profitable compared to larger companies. The rationale is that larger companies are usually more closely followed by analysts, thereby making them more correctly priced, and insiders in relatively smaller companies might be able to "get away" with more than in larger companies. Furthermore, a larger company will typically also have a more dispersed shareholder ownership structure. The probability of trading against insiders is thus usually larger in smaller companies. This might put the outside investor at a disadvantage compared to the insider who often possesses superior information or at least has a better assessment of the company's business and its future.

Empirics supporting the view that insider trading is most informative in relatively smaller companies include Seyhun (1986, 1998), Pascutti (1996) and Lakonishok & Lee (2001). The smaller the company, the easier it is for an insider to have a better understanding of all relevant information. In larger companies, with several international divisions, an insider might have superior information in one area but given the size and complexity of the company operations, it is more difficult to estimate future stock price movements. The theory that it is easier to earn abnormal returns in small companies is so strong and dominant that some research specifically decide to *only* look at small cap companies (Givoly & Palmon 1985, Heinkel & Kraus 1987). The latter paper studies new and small companies on the Vancouver Stock Exchange, a stock exchange with a reputation of being speculative and where large price fluctuations are the norm. The authors argue that the stock price fluctuations on the Vancouver Stock Exchange are to a large extent the result of rumors and news. Holding an insider position would thus be a great advantage compared to being an outside investor. Surprisingly, the result shows that insiders on the exchange *do not* earn abnormal returns compared to outsiders.

Seyhun (1986) investigated insider trading in the U.S. from 1975 to 1981, with data consisting of both small and large companies and concluded that in small companies, insiders made more than twice as many purchases as sales. The relationship was reversed in large companies, where there were only about six purchases for every ten sales. Size of the company thus seems to affect the trading pattern of insiders. Adjusting for this, it was ultimately found that insiders in small companies make *substantially* more profitable deals compared to insiders in larger companies. Not *only* did they make more profitable deals ex- post, insiders in small companies were also inclined to trade larger stock volumes when they possessed valuable information.

Jeng, Metrick & Zeckhauser (2003) analyzed U.S. insider transactions over a large time period, 1975 to 1996, and found that insiders in small cap companies did not earn significantly higher abnormal returns compared to large cap companies. In accordance with Rozeff & Zaman (1998) and Jenter (2005), the paper also found that insiders were more likely to purchase value stocks and sell growth stocks. However, this effect was *much* stronger for purchases than sales.

Degryse, de Jong & Lefebvre (2013) studied insider trading for *top executives* and *other insiders* in the Dutch market, one of the markets with the longest history of insider trading legislations, between 1999 and 2008. They separated the companies into three categories: small cap, mid cap and large cap. Results showed that *top executives* earned much larger abnormal returns in small companies compared to large ones in the following 30 trading days. On the other hand, sales by *top executives* in small companies did not impact the share price to a large degree. Again, this result speaks in

favor of insider purchases having a higher information value compared to sales.

To conclude, based on intuition, insiders in small companies should have higher abnormal returns compared to those in larger companies due to less analyst coverage and it being easier to accurately assess the company's future business prospects in a smaller and less complex company. However, previous literature is inconclusive. More *recent* research tends to suggest that insiders in small companies do not earn larger abnormal returns while *older* papers come to different conclusions. A possible explanation could be that analyst coverage among smaller companies has increased over time, resulting in that even the smallest companies are now thoroughly analyzed and therefore more "correctly" priced, resulting in a decreased advantage for insiders in smaller companies, compared to earlier.

2. 5. Do some groups of insiders outperform others?

The bulk of papers on insider trading tend to lump all insiders together as a homogenous group, making the assumption that all insiders within a single company possess the same information. It would however also be of interest to see if some group of insiders outperform other groups. Seyhun (1986) studied the American market from 1975 to 1981 and grouped insiders into five different groups, depending on their position at the company. The results showed a statistically significant difference in abnormal returns between the different groups of insiders, where insiders more closely related to the daily operations and decision making of the company traded on more valuable information. These results are similar to those of Degryse et al. (2013), who compared trades from *top executives* to those of *other insiders* between 1999 and 2008 among Dutch listed companies. Just as shown by Seyhun (1986), different insider groups earn different abnormal returns, evidenced by *top executives'* 3.4% abnormal return in the 30 trading days following a purchase transaction, compared to only 0.9% for *other insiders*. Noteworthy, however, is that although *top executives* earn higher abnormal returns after purchase transactions, *other insiders* time their transactions considerably better. The authors, however, cannot distinguish if this is due to the fact that *top executives* lack timing ability or that they are restricted in terms of when they can trade. Jeng et al. (2003), studying the U.S. market between 1975 and 1996, receive results showing that there is no difference between different types of insiders in terms of abnormal returns. Insiders were grouped as *Top executives*, *Officers* or *Directors* but no significant differences between these three categories of insiders could be found.

Wang, Shin & Francis (2012) takes a different approach by only studying purchase transactions of CEOs and CFOs between the years 1992 and 2002. The results show that over a 12-month period, CFOs earn CARs of 7.41%, compared to CARs of only 2.41% among CEOs. By studying the

subsequent earnings announcements, it is concluded that CFO trades to a higher degree is followed by positive earnings surprises, compared to those of CEOs. This, then, shows that CFOs to a higher degree perform their trades based on future quarterly earnings reports, which seems logical as CFOs are the ones in the best position to assess a company's financial situation. However, it is concluded that not all of CFOs' outperformance in comparison to CEOs can be explained by them taking advantage of future earnings surprises.

Givoly & Palmon (1985) do not distinguish between different types of insiders, but their paper can still be valuable in this discussion, as it studies what is *causing* the abnormal return among insiders - *foreknowledge about future earnings* or *the signaling effect of an insider transaction*. 68 American companies were studied in the period 1973 to 1975 and results showed that only a small part of the CAR among insiders could be tied to foreknowledge about future earnings, leading them to draw the conclusion that some of the CAR is explained by the signaling effect caused when the market bids up the price of a stock following the announcement of an insider purchase. This is an important effect to take into consideration when interpreting the results of the other studies. The study of Givoly & Palmon (1985), then, tells us that if one group of insiders outperform another group, it may not necessarily be because that group of insiders possess better information about future earnings, and by extension future stock prices, but rather, it may be because that group's signaling value in the market is higher. For instance, the *top executives* in Degryse et al. (2013) may base their transactions on the same information as other insiders, but if the market believes that top executives are better informed than other insiders, the signaling effect may make the share price increase, creating a self-fulfilling prophecy.

There is however room for criticism regarding the methodology used in Givoly & Palmon (1985) as the entire study is based on Wall Street Journal news articles, which are subjectively labeled as *positive*, *negative* or *neutral*. Having only three categories to label news regarding a company, the categorization may become "boxy" as the three categories do not contain a continuous scale. "Slightly positive" news is categorized together with "extremely positive" news, although it, in reality, may be closer to "neutral". Despite this drawback in methodology, Givoly & Palmon (1985) shed important light on the underlying *reasons* for abnormal returns among insiders, which is useful when studying if some insiders perform better than others. The results of Givoly & Palmon (1985) is also strengthened through the fact that Sivakumar & Waymire (1994) reached similar results in another time period (1984-1989) and by using a different methodology. By comparing actual earnings announcement to that of analyst's forecasts, Sivakumar & Waymire (1994) measured "earnings surprises" and studied their relations to the transactions of insiders. The results show

that insiders are not likely to base their transactions on foreknowledge of upcoming earnings surprises, but rather on more generic factors, such as a more profound understanding and knowledge of the industry and the company's operations, that make insider trading profitable. This, then, seem to go against for example Wang et al. (2012) and its result showing how CFOs base their trades on upcoming earnings surprises.

To conclude this section, previous research is relatively inconclusive with regards as to whether different insiders outperform others. It is difficult to assess what is the reason behind these different results but possible reasons can be the usage of different time periods and markets (i.e. different legislations) along with different methods of measuring outperformance. It is also difficult to distinguish if some groups of insiders do more informed trades or if that group has a higher signaling effect in the market, creating a self-fulfilling prophecy.

2. 6. When, and for how long, does the abnormal return occur?

In terms of when the insiders' abnormal returns occur, previous research paints a relatively consistent picture. In Seyhun's (1986) study of the American market, the first 100 trading days, approximately five months, offered a CAR of 2.35% on average (both buy and sell transactions), while day 101 to day 300, i.e. month six until month 15, only offered an abnormal return of 0.8%. Jeng et al. (2003) showed a CAR of around 6% during the first 100 trading days, where 25% of the abnormal return is accrued within only the first five days, and half is accrued within the first month. When analyzing a longer time period, no abnormal return could be found between month six and three years. In other words, the study shows that all abnormal return is achieved within the first six months and half of it already within the first month. Wang et al. (2012), studying abnormal performance between 1992 and 2002, uses an evaluation method of 12 months, and find that for CEOs, all outperformance occurs within the first three months, with the following nine months having insignificant or even marginally negative abnormal returns. For CFOs, the abnormal return is somewhat more persistent and occurs within the first nine months, although the bulk of the abnormal returns occur in the first three months, similar to that of CEOs. These results are not surprising considering the research discussed in the previous section, concluding that CFOs to some degree base their trades on foreknowledge about future earnings. It is then natural to see that most of the abnormal return is accrued early, gradually decreasing over time, similarly as what can be expected of the CFOs' knowledge regarding earnings further into the future. Givoly & Palmon (1985), studying American companies between 1973 and 1975, saw a CAR of 1.1% already in the first nine days, consistent with their other findings that a large part of the abnormal return can be assigned to the announcement of an insider purchase. Analyzing a longer time period, it is

concluded that the CAR is 8% in the first eight months, and only 8.6% for the first year, showing that most of the abnormal return occurs in the first eight months. Givoly & Palmon (1985) uses this relatively long period of abnormal return to draw the conclusion that most insider transactions are not based on the foreknowledge of the upcoming earnings reports, but rather on more long-term factors.

Degryse et al. (2013), studying Dutch companies between 1999 and 2008, uses a shorter time period of only 30 trading days, equivalent to approximately one and a half month. The abnormal returns are however presented on a daily basis, showing us how the short-term abnormal returns are distributed day by day. For purchase transactions, the abnormal return is evenly distributed in these 30 trading days, expressed by a linear CAR. The CAR for sale transactions, however, takes the form of a different pattern, where the CAR is linear up until day ten. Between day ten and day 20, the line instead flattens out, representing no change in CAR during these days, followed by a linear increase in CAR between day 20 and day 30.

To summarize, previous research provides conclusive evidence regarding the timing of insiders' abnormal returns. Most of the abnormal return seem to occur relatively early, showed by the high abnormal returns occurring already within a few days in Givoly & Palmon (1985), Jeng et al. (2003) and Degryse et al. (2013) and within the first month and the first quarter in Jeng et al. (2003) and Wang et al. (2012). Furthermore, most abnormal returns seem to diminish and approach zero after six to nine months (Seyhun 1986, Wang et al. 2012, Givoly & Palmon 1985). In other words, the abnormal returns occur early, within the first few months, followed by a flattening curve that flattens out almost completely after nine months, showing low abnormal returns beyond that point in time.

2. 7. Summary of previous research

Previous research on differences in insiders' abnormal returns between companies of different sizes and different transaction types seem to be inconclusive. On the other hand, regarding the timing aspect and the differences between different groups of insiders, previous papers are more conclusive, and the results indicate that there is a tendency for some groups of insiders to outperform other groups of insiders and that the abnormal returns, for all insiders occurs relatively early and then slowly diminish after six to nine months.

In terms of the areas where previous papers paint an inconclusive picture, it is difficult to say why as it can be a result of many different factors, such as the time period studied, the jurisdiction in which the study took place or the usage of different methods. In terms of the inconclusiveness

regarding whether or not purchase- or sale transactions are most profitable among insiders, one possible factor to explain the different results could be different compensation cultures in different countries. Some countries may have a tradition of ordinary salary compensation, i.e. cash, while others have a tradition of compensating employees using options or shares, thereby creating a need for employees to sell shares for liquidity reasons, and by extension lowering the informational value of sale transactions.

Turning instead to the question of when the abnormal returns occur, the area where previous research were most conclusive, it is easier to explain why these studies reaches the same conclusions. Despite the fact that some insiders may possess non-public information as well as a profound understanding of the operations and the industry in which a company operates, there is still a limitation to how far into the future it is possible to see, insider or not. The inability among insiders to see long into the future is also consistent across borders, legislations and over time. In other words, no matter in which country an insider resides, which legislations he or she is prohibited by and during which time period he or she is active, there is, and will probably always be, a limit to how far into the future it is possible to see.

3. Data and Methodology

3.1 Data and Sample Characteristics

The data used in this study is based on companies at the Stockholm Stock Exchange, NASDAQ OMX, between 2007 and 2015. Other Swedish markets, such as First-North and Aktietorget, have been excluded as insider transactions at these markets did not have to be disclosed in the same way prior to 2016. Insider transactions are public information available online at Finansinspektionen, the Swedish regulatory authority. However, some of the earlier data was obtained in Excel format through Finansinspektionen via e-mail due to not being available at the online data-base. All data on reported insider transactions are information provided to Finansinspektionen from the insiders themselves. The original data set, with all insider transactions taking place at the Stockholm Stock Exchange between 2007 and 2015 contained 89 550 insider transactions. Several adjustments were made, including eliminating transactions on financial instruments other than common stocks, such as preferred shares, options and convertible bonds. In addition, transactions such as option exercises and gifts were excluded in order to only capture transactions where an insider made an active decision. Finally, transactions lacking data points were excluded, resulting in the final sample having 21 892 transactions, of which 15 763 were purchases and 6 129 were sales. Table 1 shows how the insider transactions were distributed throughout the chosen time period. As can be seen, the transactions were relatively evenly distributed during the years, apart from a drop in activity in

2009, likely as a consequence of the financial crisis. Table 2, displays the number of transactions made by the various types of insiders: CEOs, Board members and Others. The largest purchase transaction is 3.95 billion SEK and the largest sale transaction is 4.68 billion SEK. The median transaction size is approximately 191 000 SEK.

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015
Purchases	1475	1764	1015	1542	1993	1744	1688	2256	2286
Sales	710	398	478	832	580	620	713	776	1022

Table 1: Number of transactions for each year

Position	CEO	Board Member	Other
Transactions	1763	6247	13882

Table 2: Number of transactions per insider category

Data on the risk-free rate, for this paper the Swedish 3-month treasury bills, have been collected from Statistics Sweden. The original data shows the yearly interest rate for every month, and has therefore been recalculated into monthly interest rates. Financial information on companies, i.e. share prices, dividend amounts, ex-dividend dates, and number of shares outstanding were obtained from Compustat through Wharton Research Data Services. Numerous consistency checks were performed to ensure the accuracy of the data. Overall, insiders made transactions in 286 different companies within our criteria. The Swedish Fama & French factors for the 3-factor model were obtained from the data library of AQR, a global investment management firm. Index data, more specifically that of OMX Stockholm All-Share Gross Index (OMXSGI), was acquired from the NASDAQ website.

The original data set contained 341 different insider position categories. Due to the fact that some of the categories were similar to each other, some had too few observations, and some insiders were categorized into several positions (for example Board Member *and* CEO), the categories of insider positions were manually edited. The original 341 different positions were instead re-categorized into three; CEOs, Board Members and Others. If an insider for example was labelled as CEO and Board Member originally, the insider was placed in the CEO category, as that intuitively should be the position of the two that have the highest possibility of providing the insider with potential abnormal returns. Similarly, if an insider was labelled as CEO of a subsidiary and Board Member of the parent company, the insider was re-labelled as Board Member as that

position should be the one that provides the insider with the largest potential abnormal returns of the two. The category of Others includes positions such as Deputy CEOs, Subsidiary CEOs, R&D Officers, Consultants, Large Shareholders, Head of Subdivisions and so on. Noteworthy is that there is no CFO category. This is due to the fact that CFOs seem to categorize themselves into Others ("Annan befattning") instead of the more specific CFO category. CEOs correspond to eight percent (1 763 transactions), Board Members 29 percent (6 247 transactions) and Others 63 percent (13 882 transactions).

Finally, the data has been divided into quartiles based on company market cap. Dividing the data into deciles would have been preferable as that would result in more detailed results. However, due to the fact that the data contains less transactions from companies with smaller market caps than companies with larger market caps, dividing the data into deciles would result in the smallest decile having very few observations. By instead dividing the data into quartiles, each quartile has a sufficient number of observations for our statistical tests to function well.

3.2. Methodology

3. 2. 1. Adjusting for Dividends

When comparing individual stock returns to the reference index, it is important to be consistent regarding dividends. The problem with comparing stock prices, which does not entail how large dividends have been paid out, to a reference index that also excludes dividends is that the dividend yield will differ between individual stocks and the reference index. Companies with higher dividend yields (lower dividend yields) than the market average will in such a case seem to underperform (outperform) although that is not the actual case. In other words, the results will be distorted due to the market mechanism of decreasing stock prices when dividends are separated from the stock. To avoid this distortion, we have instead added back the monetary value of dividends to the ex-dividend dates for each share and then used a reference index that assumes reinvested dividends, Nasdaq OMXSGI. This eliminates the problem of the reference index and individual stocks having different dividend yields.

3. 2. 2. Adjusting for the Risk-free Rate

With a *constant* risk-free rate, regression analysis can be performed using the total returns from individual stocks and the reference index. However, as the risk-free rate has not been constant during the time period investigated, the risk-free rate has been excluded both from the estimated returns and the actual returns, thereby comparing the estimated equity risk-premium to the actual equity risk-premium and mitigating the effects of changes in the risk-free rate. In practice, this was

done by subtracting the monthly interest rate of Swedish 3-month treasury bills from both estimated and actual returns.

3. 2. 3. Winsorizing

In order for extreme values to not distort the results, an adjustment of these values needs to be made. A standard approach, also used in this paper, to this issue is to winsorize the data at 1% and 99%, resulting in that the one percent most extreme values in both tails of the distribution instead assumes values corresponding to the values of the 1st and 99th percentile.

3. 2. 4. Test of Normality

We tested our data for normality using both a Shapiro-Wilk test and a Q-Q (Quartile-Quantile) plot on our abnormal returns. According to Field (2009), the former test is biased by sample size and might reject the null hypothesis of a normal distribution in any large sample. Considering that our sample is large with 21 892 insider transactions, it might not be prudent to rely fully on this test alone. Under these circumstances, the Shapiro-Wilk test is generally supplemented with a

Q-Q plot, which is why we also run this test. The reason why we do not *just* do a Q-Q plot is because the Q-Q plot is a graphical test. These tests are more subjective by nature, and interpretations are therefore more difficult to make.

Variable	Observations	z-value	p-value
Abnormal Returns	262 878	24.078	0.0000

Table 3. Test of normal distribution in abnormal returns using a Shapiro-Wilk test.

As can be seen from the test output above in Table 3, the Shapiro-Wilk test rejects the null hypothesis that the sample comes from a population which has a normal distribution. The question as to whether the distribution truly is non-gaussian or if our large sample size affected the results remains. Figure 2 shows a Q-Q plot on our abnormal returns. If all data points are on the diagonal line, our sample is perfectly normally distributed. The distribution appears to be symmetric in shape and follow the normal distribution around the mean but with fatter tails. Nevertheless, the fact that the two tests indicate that the distribution is not normal is not necessarily a problem. This study is mostly interested in the cumulative abnormal returns over the entire time period, rather than the abnormal returns on particular event dates. It is possible to assume a normal distribution if the central limit theorem is satisfied. The theorem states that a sum of N independent random variables, with identical distributions and finite variance, will be approximately normal (Lindeberg, 1922). Also, the distribution will gradually converge to a normal distribution as N increases. The

sample is usually considered large enough if N ≥ 30. Furthermore, even though our chosen tests are all parametric, they are robust to violations of the normality assumption. Körner & Wahlgren (2015) explain that a perfectly normal distribution is an ideal state for the t-test but in practical applications this assumption is rarely, or almost never, satisfied. Despite this, the method works well as long as the data is not too skewed and has too many extreme outliers. Considering that our sample is large, not skewed and the fact that we have winsorized the extreme values at the 1% and 99% level, these circumstances do not pose a problem.

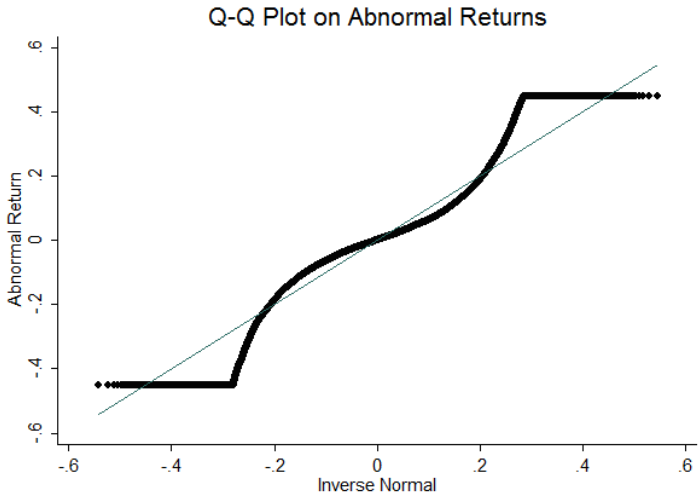

Figure 2: Graphical illustration of the normality of abnormal returns

3. 2. 5. Event Study and Abnormal Returns

The hypothesis of whether insiders earn abnormal returns or not is tested using the event study methodology originated by Fama et al. (1969). The event is the insider transaction, i.e. a purchase or a sale of a share. We use the actual trading dates, as opposed to reported dates of the transaction since we want to measure the potential abnormal returns for the insiders themselves, rather than potential abnormal returns for outsiders replicating insiders.

The event window is set to the day of the transaction (0) to one year after the event , which roughly translates to 250 trading days (+250). The determination of the event window requires a trade off. On the one hand, the length should as accurately as possible reflect the average holding period of the insiders. Although a one-year holding period might be somewhat on the lower side, the event study methodology has inherent problems with very long event windows since the regression model becomes increasingly uncertain the further into the future one looks. Furthermore, while most event windows in previous literature include a few days before the event to capture pre-event reaction from information leakage (MacKinlay, 1997), ours does not. An insider transaction, is

different from more traditional events in event studies, e.g. Merger & Acquisition announcements. Information leakage is less likely to occur in our study since fewer individuals are involved and due to the fact that the insiders themselves have no incentives to leak information about their future transactions. Thus, there is no need to include a pre-event window.

The estimation window is set to one year before the event, which translates to approximately 250 trading days, (-250) up until the day before the transaction day (-1). Granted, it is more common to use a shorter estimation window of 120 trading days in event studies. However, those studies typically only look at a few days around the event to one month after the event. Considering that our study has a longer event window, it is reasonable to also have a longer estimation window in order to better estimate the betas. An estimation window of 120 trading days would not only introduce more volatility, it would also fail to capture seasonality effects of the underlying share. Some of our companies are highly cyclical so, depending on the timing of the transaction, the estimated betas would be different with a 120 trading days estimation window. With an estimation window between (-250) and (-1), we eliminate all yearly seasonality from distorting the results. As the Fama & French factors are monthly, we have set the final day of our event window to coincide with the last day of a month, resulting in some event windows being shorter than others. If an insider transaction takes place at the 15th in a certain month, it will have an event window of 11.5 months. Our data shows that the transactions are evenly distributed througout the days of a month.

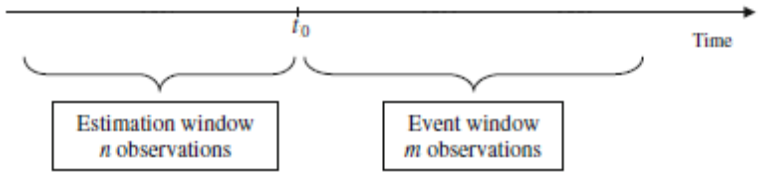

Figure 3: Graphical explanation of the event study

We follow a Stata event study methodology from Princeton University in the calculation of the expected returns. As predictive model for the expected rate of return, we use the Market Model. The parameters are estimated using OLS regression with robust standard errors in order to correct for heteroskedasticity between transactions. Our chosen benchmark index used in this study for the market return is the value-weighted OMX Stockholm All-share Gross Index (OMXSGI). It is calculated in Swedish Kronor and dividends are re-invested in the index. As the observations to a large degree lack the exact transaction prices, we have assumed that all transactions are made at the closing price of the transaction day. This will sometimes overstate and sometimes understate the real transaction price, but will on average be correct as any deviations will be random. The

abnormal return is defined as the actual return less the expected return. Individual abnormal returns are calculated as:

$$\mathbf{AR_{it} = R_{it} - E(R_{it})}$$

Where: AR_{it} = The abnormal return for insider transaction *i* in period *t*;
R_{it} = The actual return for insider transaction *i* in period *t*;
$E(R_{it})$ = The expected return for insider transaction *i* in period *t*.

In order to estimate the expected return without the distortion of changes in the risk-free interest rate, we calculate the expected risk premium for transaction *i* in period *t* with the 3-factor model using time series regression:

$$\boldsymbol{E(R_{i,t}) - Rf = \alpha + \beta_m(R_{m,t} - Rf) + \beta_s(SMB)_t + \beta_h(HML_t) + \varepsilon}$$

Where: $E(R_{i,t})$ = The expected return on asset i

Rf = The risk-free interest rate

α = Intercept

$R_{m,t}$ = Market return

SMB = The return of the size factor

HML = The return on the Book-to-Market factor

β_m, β_s and β_h = The Betas of the three independent variables

ε = Error term

The rationale behind the 3-factor model is that the Beta in the traditional 1-factor model is not able to explain enough of the risk of the underlying share. According to Fama & French (1992), the inclusion of two additional risk factors led to regressions with higher R^2 values, i.e. the model is able to explain where more of the variation in the stock price returns comes from. The two factors include: a) the size of the firm, and (b) the Book-to-Market ratio. The researchers observed that small companies and companies with low book-to-market ratios outperformed the market on a regular basis. Considering that extra return is not free and comes with a greater risk, this tendency should be accounted for to improve the model. The three different Betas are estimated by running

time series regressions. This study uses monthly Fama & French factors for the Swedish market compiled and calculated by AQR, a capital management firm. The portfolio construction follows Fama & French (1992, 1993 and 1996).

3. 2. 6. Cumulative Abnormal Returns

In order to determine the magnitude and direction of the abnormal returns over the entire event window, we calculated transaction specific cumulative abnormal returns and cumulative average abnormal returns for the whole sample (CARs). The latter is our main variable and what our results are based on. The sum of the average abnormal returns is the cumulative abnormal return:

$$\boldsymbol{CAR_{qs} = \sum_{t=q}^{s} AAR_t}$$

Where: CAR_{qs} = The cumulative AAR from event month *q* to event month *s*;
AAR_t = The average abnormal return in period *t*.

3. 2. 7. T-tests

To measure the statistical significance of the CARs, we perform a t-test with White standard errors. This is better than a standard t-test since it adjusts for heteroskedasticity in the explanatory variables. Performing the t-test does not require the abnormal returns to be normally distributed (Körner & Wahlgren, 2015 and Nyquist, 2017). The formula for calculating the t-value is as follows:

$$\boldsymbol{t = \frac{\bar{x} - \mu_0}{s/\sqrt{n}}}$$

Where: $\bar{x}$ = Sample mean
μ_0 = Population mean if null hypothesis is true
s = Standard deviation in the sample
n = Number of observations in the sample

In our case, the resulting t-values can be interpreted as the difference between the sample means and 0, expressed in numbers of standard deviations. The higher the t-values, the more standard deviations separate the sample means from 0, thereby increasing the probability that the sample mean is statistically different from 0. Conversely, lower t-values indicate that the potential difference between the sample mean and 0 may be a coincidence. For a two-sided t-test, the result

is statistically significant at the 5% level if the t-value is larger than 1.96 or smaller than -1.96. This is illustraded in Figure below:

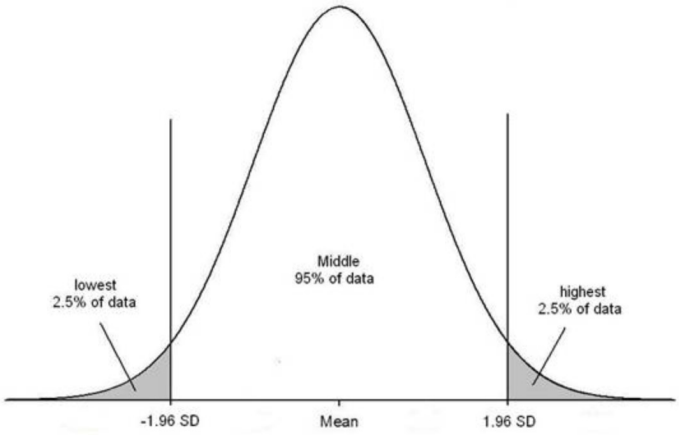

Figure 4: Normal Distribution Curve with cut-off points at the 5% significance level.
Source: Critical Numbers Group, Sheffield University

3. 2. 8. ANOVA

A one-way analysis of variance (henceforth referred to as ANOVA) test was conducted in order to determine if there were any general differences in the means of the sub-samples. While a t-test can be used to compare differences in two groups, a one-way ANOVA test can be used to compare differences in two or more groups. For consistency, the ANOVA test was also used to check if there were a significant difference in abnormal returns between purchase- and sale transactions. The test procedure uses the variances of the sub-samples to make inferences about the means. The test is a so-called "omnibus" test statistic and can only tell if there is a significant difference in means between any of the groups, not which groups differ and by how much. The ANOVA test is similar to other statistical tests in how it is used to calculate a test statistic, F-ratio, which can be used to find the probability, p-value, of the occurrence of a given event, i.e. the probability of obtaining the sampled data given the null hypothesis being true. One benefit of the ANOVA test is that it is relatively robust to violations in the normality assumption (Kuzma, 1998) and it is considered a robust technique. It does however require equal sample sizes, but STATA automatically adjusts for this, making it possible to perform on our data.

If: **H_0: All means are equal.**

H_1: At least one mean is different from the rest.

Then receiving a p-value < 5%, means that *at least* one group is significantly different from the rest at a 5% significance level.

$$\boldsymbol{F = \frac{between - group\ variability}{within - group\ variability} = \frac{MSR}{MSE}}$$

Between-group variability is calculated as follows:

$$\boldsymbol{\sum_{i=1}^{K} n_i\ (\overline{Y}_{i.} - \overline{Y})^2/(K-1)}$$

Where: $\overline{Y}_{i.}$ = Sample mean in the i[th] group

$\overline{Y}$ = Overall mean of the data

n_i = Number of observations in the i[th] group

K = Number of groups

The square root of the within-group variability, a measure called root MSE, is widely used as a measurement of accuracy. It calculates the average distance between the observed data points to the regression model. A more accurate model will have a lower value as the model fit will be higher. The unit for MSE is the squared unit for whatever is on the vertical axis, while root MSE has the same unit as what is on the vertical axis, making it an easier measure to interpret. Within-group variability is calculated as follows:

$$\boldsymbol{\sum_{i=1}^{K} \sum_{j=1}^{n_i} (Y_{ij} - \overline{Y_{i.}})^2/(N-K)}$$

Where: Y_{ij} = The j[th] observation in the i[th] out of K groups

N = Overall sample size

If the null hypothesis is true, then the ratio will be close to one as the numerator and the denominator are approximately equal. A large F-ratio implies that there is more variability between particular sub-samples, e.g. between size quartiles, than there is within a particular size quartile. As the ratio increases, one becomes more confident in rejecting the null hypothesis, i.e. that there is no difference, in favor of the alternative hypothesis that there is a difference. The critical value

where the cut-off lies varies depending on significance level, degrees of freedom relating to number of observations and degrees of freedom relating to number of groups.

3. 2. 9. Tukey-Kramer Test

When measuring potential differences in abnormal returns between our sub-samples, an ordinary t-test is not sufficient as we have more than two sub-samples. An adjustment for this problem was made by Tukey (1953), who created a similar test but which functions better when the number of sub-samples are more than two. This test, however, assumes that the sub-sample sizes are equal, which is not the case in our data. As our sub-samples consist of a different number of observations, we therefore use the so-called Tukey-Kramer test (Kramer, 1956), which is a Tukey test adjusted for different sample sizes. The test is also known as the Honest Statistical Difference Test, and the formula is as follows:

$$\boldsymbol{HSD = q\sqrt{\frac{MSE}{2}\left(\frac{1}{n_1}+\frac{1}{n_2}\right)}}$$

Where: HSD = Honest Statistical Difference
q = Critical value of the studentized range distribution
MSE = Mean Square Error
n_1 and n_2 = Sample size for each sample, respectively

4. Results

Our main tests are based on the 3-factor model with a 250 trading days estimation window. In addition, we have also tested to change the model to the 1-factor model and changed the estimation window to 120 trading days. These tests are however only done in order to see how our results are affected by changes in expected return models and number of estimation days. Therefore, the results of the 3-factor model with a 250 trading days estimation window are presented in black in all tables, highlighting that these are our main results, while the results of the adjusted tests are presented in grey. Unless stated otherwise, all results discussed are attributable to the 3-factor model with an estimation window of 250 trading days.

4. 1. T-tests

4. 1. 1. Abnormal Returns for Different Transaction Types

	3-factor model 250 trading days estimation window		1-factor model 250 trading days estimation window		3-factor model 120 trading days estimation window	
Transaction type	**Purchases**	**Sales**	**Purchases**	**Sales**	**Purchases**	**Sales**
CAR (mean)	7.9%	8.0%	7.1%	6.9%	14.1%	7.6%
CAR (median)	5.5%	5.2%	4.6%	3.1%	10.1%	1.8%
t-value	17.38	10.44	17.03	9.24	13.81	4.11
Observations	15763	6129	15763	6129	15763	6129

Table 5: Abnormal returns for different transaction types

In terms of different transaction types, the results show that both purchase- and sale transactions yield positive abnormal returns, with 7.9% CAR (5.5% median) for purchase transactions and 8.0% CAR (5.2% median) for sale transactions. The results for sale transactions have been multiplied with (-1) in order to receive the absolute value. This implies that insiders selling shares are avoiding an average subsequent abnormal decrease in stock prices of 8.0%, while insiders purchasing stocks are reaping the effects of an average subsequent abnormal increase in stock prices of 7.9% following a purchase. T-values for both transaction types are high at 17.38 and 10.44 for purchase and sale transactions, respectively, showing that both transaction types yield abnormal returns significantly separated from 0. With the 1-factor model, mean CARs are lower, but t-values are similar. When utilizing a shorter estimation window, 120 trading days, the CAR for purchase transactions increases substantially, while remaining similar for sale transactions. The t-value for sale transactions decreases, although it is still high enough for the results to be statistically significant. These are the results in graphical terms:

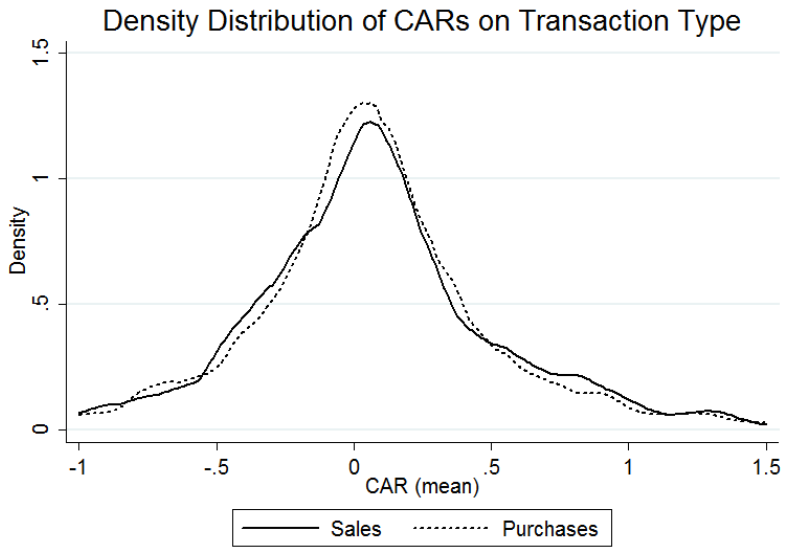

Figure 5: Kernel distribution of CARs between purchase- and sale transactions using the 3-factor model and a 250 trading days estimation window

4. 1. 2. Abnormal Returns Among Different Insider Groups

	3-factor model 250 trading days estimation window			1-factor model 250 trading days estimation window			3-factor model 120 trading days estimation window		
Position	**CEOs**	**Board Members**	**Others**	CEOs	Board Members	Others	CEOs	Board Members	Others
CAR (mean)	20.2%	9.6%	5.7%	15.9%	9.2%	5.0%	17.9%	14.1%	10.8%
CAR (median)	12.1%	5.6%	4.5%	10.1%	4.9%	3.2%	11.7%	9.3%	7.5%
t-value	12.96	11.69	12.91	11.17	12.03	11.66	5.47	7.59	10.07
Observations	1763	6247	13 882	1763	6247	13 882	1763	6247	13 882

Table 4: Abnormal returns for CEOs, Board Members and Others

The results of our study show that all three groups of insiders do earn abnormal returns, with CEOs at the top, earning a 20.2% CAR (12.1% median) in the year following a transaction, Board Members second earning 9.6% (5.6% median) and Others at 5.7% (4.5% median). The t-value for all three groups varies between 11.69 and 12.96, showing that all of the results are statistically significant and robust. Using instead the 1-factor model, both mean and median CARs are lower but t-values are similar to those of the 3-factor model. Shortening the estimation window down to 120 days, some CARs increases while other decreases. T-values are however consistently lower

compared to when using an estimation window of 250 trading days. Graphically, the results are as follows:

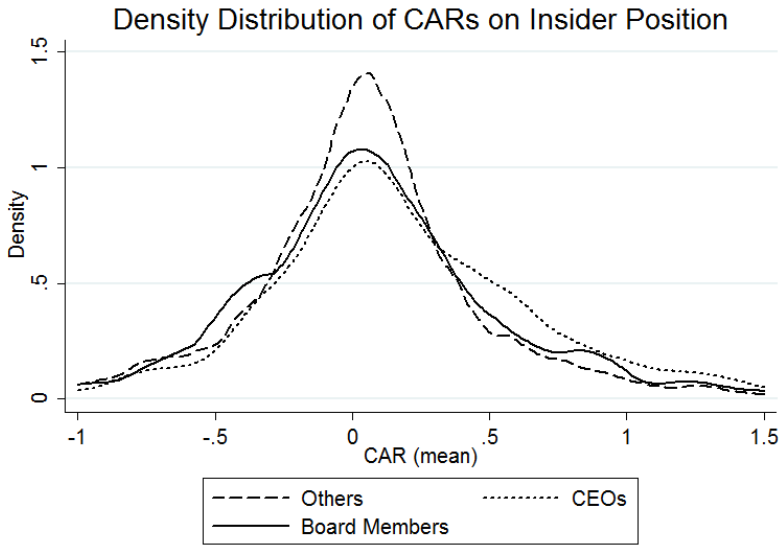

Figure 6: Kernel distribution of CARs between different insider positions using the 3-factor model and a 250 trading days estimation window

4. 1. 3. Abnormal Returns for Insiders in Companies of Different Sizes

	3-factor model 250 trading days estimation window				1-factor model 250 trading days estimation window				3-factor model 120 trading days estimation window			
Size quartiles	**1**	**2**	**3**	**4**	1	2	3	4	1	2	3	4
CAR (mean)	18.9%	5.6%	7.9%	5.9%	14.7%	6.2%	7.5%	5.0%	19.1%	19.4%	20.8%	2.8%
CAR (median)	12.0%	6.3%	6.8%	3.7%	10.3%	5.1%	5.2%	2.3%	15.1%	13.5%	14.3%	4.6%
t-value	12.99	5.04	9.58	12.38	11.26	6.30	9.36	11.89	5.60	8.17	10.78	2.72
Observations	2 777	4 109	5 278	9 728	2 777	4 109	5 278	9 728	2 777	4 109	5 278	9 728

Table 6: Abnormal returns for insiders in companies of different sizes

The results show that insiders in all company sizes do earn abnormal returns, and that the results are both statistically and economically significant. Insiders in Quartile 1, i.e. insiders in companies with the smallest market cap, earn 18.9% (12.0% median) CARs. The remaining quartiles show lower CARs with the second at 5.6% (6.3% median), the third at 7.9% (6.8% median) and the fourth at 5.9% (3.7% median). Mean values are generally higher than the median values, indicating that there are some extreme values driving up the mean. With the 1-factor model, both mean CARs, median CARs and t-values are similar to those of the 3-factor model. Using a 120 trading days estimation window results in generally higher CARs, both in terms of means and medians. A graphical illustration of the CARs are provided below, in Figure 7:

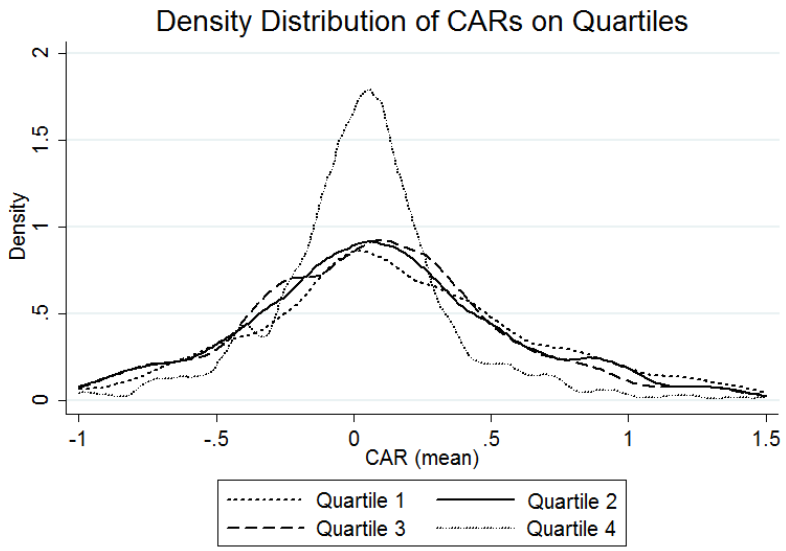

Figure 7: Kernel distribution of CARs between size quartiles using the 3-factor model and a 250 trading days estimation window

4. 2. One-way ANOVA Tests

	3-factor model 250 trading days estimation window		1-factor model 250 trading days estimation window		3-factor model 120 trading days estimation window	
Tests	**F ratio**	**Root MSE**	F ratio	Root MSE	F ratio	Root MSE
Positions	54.56**	0.57	38.52**	0.54	3.05*	1.33
Size quartiles	40.73**	0.57	23.85**	0.54	29.95**	1.33
Transaction type	0.02	0.57	0.07	0.54	10.53**	1.33

* Results are significant at the 5% level

** Results are significant at the 1% level

Table 7: Results of the One-way ANOVA test

Table 7 above, detailing the one-way ANOVA tests, shows that there is a difference between the sub-sample means in all cases except two. Specifically, there *is not* a significant difference between purchases and sales with the 3-factor model and 250 trading days estimation window. These results persist also with the 1-factor model. The p-values are higher than 5% and thus, the test fails to reject the null hypothesis of the sub-samples coming from a population with the same means and there is no reason to go forward with the Tukey-Kramer test for transaction types. With the 3-factor model and 120 trading days estimation window, the results show that there *is* a significant difference between purchases and sales even at the 1% significance level.

4. 3. Tukey Tests

4. 3. 1. Differences in Abnormal Returns Among Different Insider Groups

	$\bar{x}i-\bar{x}j$	Critical q q(α,r,dfW)	Standardized error	95% Confidence interval for μi−μj		q-value	Sign. 5%	Sign. 1%
CEOs - Others	0,1451	3.31	0,0102	0,1114	0,1786	14,2480	Yes	Yes
CEOs – Board Members	0,1052	3.31	0,0109	0,0692	0,1411	9,6866	Yes	Yes
Board Members - Others	0,0450	3.31	0,0061	0,0247	0,0653	7,3316	Yes	Yes

Table 8: 3-factor model with a 250 trading days estimation window

	$\bar{x}i-\bar{x}j$	Critical q q(α,r,dfW)	Standardized error	95% Confidence interval for μi−μj		q-value	Sign. 5%	Sign. 1%
CEOs - Others	0,1092	3.31	0,0097	0,0772	0,1412	11,2977	Yes	Yes
CEOs – Board Members	0,0675	3.31	0,0103	0,0333	0,1016	6,5438	Yes	Yes
Board Members - Others	0,0417	3.31	0,0058	0,0225	0,0610	7,1656	Yes	Yes

Table 9: 1-factor model with a 250 trading days estimation window

	$\bar{x}i-\bar{x}j$	Critical q q(α,r,dfW)	Standardized error	95% Confidence interval for μi−μj		q-value	Sign. 5%	Sign. 1%
CEOs - Others	0.0717	3.31	0.0238	-0.0072	0.1505	3.0067	No	No
CEOs – Board Members	0.0385	3.31	0.0254	-0.0456	0.1227	1.5157	No	No
Board Members - Others	0.0331	3.31	0.0144	-0.0144	0.0807	2.3067	No	No

Table 10: 3-factor model with a 120 trading days estimation window

Using a 250 trading days estimation window, both the 3-factor and the 1-factor model show that there are differences in abnormal returns *between* all groups of insiders. However, decreasing the estimation window to 120 trading days result in that there is no significant difference between the groups at the 5% level.

4. 3. 2. Differences in Abnormal Returns Between Insiders in Companies of Different Sizes

	$\bar{x}i-\bar{x}j$	Critical q q(α,r,dfW)	Standardized error	95% Confidence interval for μi−μj		q-value	Sign. 5%	Sign. 1%
Q1 – Q2	0.1329	3.63	0.0099	0.0970	0.1688	13.44	Yes	Yes
Q1 – Q3	0.1092	3.63	0.0094	0.0750	0.1435	11.58	Yes	Yes
Q1 – Q4	0.1299	3.63	0.0087	0.0985	0.1614	15.00	Yes	Yes
Q2 – Q3	-0.0236	3.63	0.0084	-0.0540	0.0068	-2.82	No	No
Q2 – Q4	-0.0029	3.63	0.0075	-0.0301	0.0243	-0.39	No	No
Q3 – Q4	0.0207	3.63	0.0069	-0.0043	0.0457	3.01	No	No

Table 11: 3-factor model with a 250 trading days estimation window

	$\bar{x}i-\bar{x}j$	Critical q q(α,r,dfW)	Standardized error	95% Confidence interval for μi−μj		q-value	Sign. 5%	Sign. 1%
Q1 – Q2	0.0852	3.63	0.0094	0.0511	0.1193	9.07	Yes	Yes
Q1 – Q3	0.0716	3.63	0.0090	0.0390	0.1041	7.99	Yes	Yes
Q1 – Q4	0.0974	3.63	0.0082	0.0675	0.1272	11.83	Yes	Yes
Q2 – Q3	-0.0136	3.63	0.0080	-0.0425	0.0153	-1.71	No	No
Q2 – Q4	0.0122	3.63	0.0071	-0.0136	0.0380	1.71	No	No
Q3 – Q4	0.0258	3.63	0.0065	0.0021	0.0495	3.94	Yes	No

Table 12: 1-factor model with a 250 trading days estimation window

	$\bar{x}i-\bar{x}j$	Critical q q(α,r,dfW)	Standardized error	95% Confidence interval for μi−μj		q-value	Sign. 5%	Sign. 1%
Q1 – Q2	-0.0031	3.63	0.0231	-0.0870	0.0808	-0.13	No	No
Q1 – Q3	-0.0167	3.63	0.0221	-0.0968	0.0634	-0.76	No	No
Q1 – Q4	0.01629	3.63	0.0202	0.0894	0.2364	8.05	Yes	Yes
Q2 – Q3	-0.0136	3.63	0.0196	-0.0847	0.0574	-0.70	No	No
Q2 – Q4	0.1660	3.63	0.0175	0.1024	0.2295	9,48	Yes	Yes
Q3 – Q4	0.1796	3.63	0.0161	0.1212	0.2380	11.17	Yes	Yes

Table 13: 3-factor model with a 120 trading days estimation window

As shown in Table 11 and Table 12, the first quartile, i.e. companies with the smallest market caps, are statistically different from the other quartiles, both at the 5% and 1% levels. Using instead a 120 trading days estimation window (Table 13), the fourth quartile, the largest companies, stands out from the other quartiles. In both models and with both a 250 trading days and a 120 trading days estimation window, there is no difference between the second and the third quartile.

4. 4. Timing of Abnormal Returns

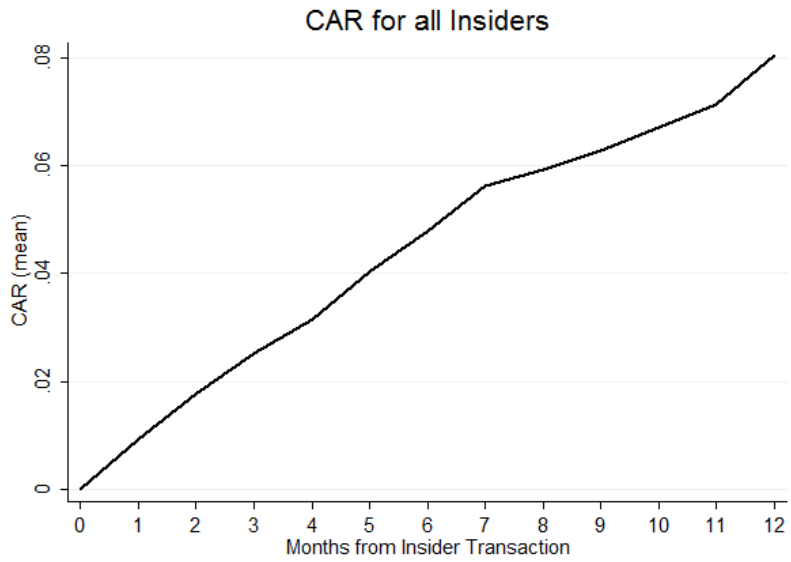

Figure 8: The timing of abnormal returns among insiders on an aggregated level

The timing of abnormal returns on an aggregated level is evenly distributed over the year following a transaction. No period shows a decrease in CAR.

4. 5. Overall Results

Overall, we can conclude that all types of insiders, in all company sizes and for all transaction types do earn abnormal returns on their transactions. The results are both statistically and economically significant. This is true when using both the 1-factor model and the 3-factor model as well as a 120 days and a 250 days estimation window. The t-values varies between the different models and the length of the estimation window but are nonetheless high across the entire board. The fact that the different models and estimation windows show results pointing in the same direction, and that all are statistically significant, shows the robustness of our results and reduces the risk that the figures are merely the result of using a specific model or length of the estimation window. Noteworthy is also that median values are generally lower than mean values, showing that there are some extreme values driving up the means. On an aggregated level, CARs occur evenly throughout the year following a transaction. In addition, the results indicate that there is

no difference in abnormal returns between purchase- and sale transactions, that there is a difference in abnormal returns between different insider positions and finally that insiders in the smallest companies are separated from others in terms of abnormal returns. As Fama & French's 3-factor model together with an estimation window of 250 trading days is our main model, these figures are the ones that will be analyzed and used in later sections of the paper, unless stated otherwise.

5. Analysis

5. 1. Transaction Types

All our models and lengths of the estimation window show that both purchase- and sale transactions yield positive abnormal returns. These results are significant, both statistically and economically. The result of the ANOVA test shows that there is no significant difference between the two transaction types, except when utilizing a 120 trading days estimation window. When doing so, the CAR for purchase transactions also increases substantially. This leads us to conclude that our findings indicate no significant difference between the two transaction types, but that the result is sensitive to the length of the estimation window. Overall, median CARs are lower, showing that there are some extreme positive values driving up the mean CARs. The non-existent difference between the two transaction types go against our *ex ante* expectation of purchase transactions having higher CARs due to the higher signaling effect.

The results are different than those of Lakonishok & Lee (2001) where no statistically significant abnormal returns could be found for none of the transaction types. Also Bajo and Petracci (2006), studying the Italian market between 1998 and 2002 reached different results as it was found that purchase- and sale transactions resulted in CARs of 3.18% and 3.67% respectively ten days after the transactions, although it is difficult to directly compare their study directly with ours due to the difference in time frames. Overall, previous research on the differences in abnormal returns between purchase and sale transactions is inconsistent, which makes it difficult to compare our results to it. Although our intuition might have led us to expect higher abnormal returns among purchase transactions, the actual findings are still believable as the higher signaling value of purchase transactions should be fairly low.

5. 2 Different Groups of Insiders

All groups of insiders earn abnormal returns, no matter if using the 1-factor or 3-factor model or a 120 trading days or 250 trading days estimation window. In all three scenarios and for all three

groups of insiders, the median values are lower, showing that the positive extreme values mentioned earlier are not attributable to a single group of insiders, but rather all of them. This is well illustrated in Figure 6, where especially CEOs display a relatively flat right tail in the distribution curve, corresponding to many observations far to the right. In terms of differences between the groups, both the 1-factor model and 3-factor model with a 250 trading days estimation window show that all three groups are separated from each other, while also here the model using a 120 trading days estimation window show different results, suggesting that it is sensitive to the length of the estimation window. The difference in abnormal returns among different groups of insiders in our study follows the general pattern in previous research, for example Seyhun (1986). As in Seyhun (1986), the closer to the decision making an insider is, the higher the abnormal returns are, evidenced through the 20.2% CARs for CEOs, 9.6% CARs for Board Members and 5.7% CARs for others, as well as the results of the Tukey test, showing that there is a statistical difference between the groups. Although our study analyzes the abnormal returns for a longer time period, the results are also similar to those of Degrysse et al. (2013) where Top Executives earned 3.4 percent compared to 0.9 percent for Other Insiders in the month following a transaction. As our study does not contain a category for CFOs, it is difficult to compare the results to those of Wang et al. (2012) directly, but on a more general basis the results are similar as both studies indicate differences in abnormal returns among different types of insiders. In addition to the results being similar to the results of previous papers, they are also intuitively easy to grasp.

In terms of the underlying reasons for the CEO outperformance in particular as well as the general differences between all groups, there may be several explanatory factors to consider. Different insiders may, due to their position at the company, be differently equipped to analyze and utilize public information. In addition, these different positions may also provide the insiders with different information, where some positions are more likely to possess knowledge about non-public information regarding future earnings. Finally, the signaling value may differ substantially where a CEO transaction should intuitively have the highest signaling value.

5. 3. Different Size Quartiles

With regards to our results showing how insiders at companies of different sizes yields different CARs, these figures are consistent with a large body of previous research, for example Seyhun (1986, 1998), Pascutti (1996) and Lakonishok & Lee (2001). It is also a result that is intuitively easy to understand as larger companies are more complex, making it more difficult for a single insider to grasp the entirety of the operations, as well as the fact that larger companies have larger analyst

coverage, both domestic and international. The smallest companies in our sample do not have any analyst coverage and are not discussed in the media, which increases the possibility that the stocks are mispriced, thereby increasing insiders' edge. Interestingly, as only the first quartile is statistically separated from the other quartiles in terms of abnormal returns, there seem to be no reverse *linear* relation between company size and levels of abnormal returns. Even though insiders in companies of all sizes generate abnormal returns on their trades, insiders in the first quartile earn significantly higher abnormal returns, while the abnormal returns generated in the other quartiles cannot be said to statistically differ from each other, except for the fourth quartile when using a 120 trading days estimation window. If we assume that insiders in smaller companies are equally "honest" as other insiders, in terms of not utilizing knowledge of explicit non-public information, and that the signaling value of an insider transaction is the same for all company sizes, the result suggests that the pricing efficiency increases substantially when companies move from the first quartile to the second quartile. This could be explained by analyst and media coverage as well as a generally higher liquidity, making the companies in the second, third and fourth quartiles targets for institutional investors, such as mutual funds. The lack of statistical difference between quartile two, three and four in our main tests suggests that the pricing efficiency only increases up to a certain degree along with increased analyst coverage, but that the effect, after a certain point, diminishes. In other words, when there already is some analyst coverage, pricing efficiency seem to not increase if more analysts start to cover the company.

An alternative reason behind the substantially higher abnormal returns for companies in quartile 1 could also be that insiders in these companies to a higher degree base their transactions on explicit non-public information. With less media- and analyst coverage, the risk of receiving public attention for a questionable trade is reduced and even if it is still recognized by the public, the media coverage will be less intense as the insiders in smaller companies generally are less known by the public, resulting in less spectacular headlines. We find it unlikely that the higher abnormal returns among insiders in smaller companies are the result of a higher signaling value as we intuitively do not see why this should be the case.

5. 4. Timing of Abnormal Returns

The timing of the abnormal returns is where our findings differ the most from previous research. The bulk of previous papers show that most of the abnormal returns occur in the first six to nine months after a transaction and that they are economically insignificant after this time period. In other words, the curve of the abnormal returns flattens out, suggesting that the abnormal returns

are restricted to a certain time period and thereafter are reduced substantially until they finally disappear. Our findings *do not* display a similar pattern. Instead, the abnormal returns are relatively evenly distributed in the year following a transaction. This is then different from the bulk of previous papers in mainly two ways. Firstly, the abnormal returns in our findings do not display the same flattening of the curve the further away from the transaction date time goes. It is however possible, and maybe also probable, that such a flattening in the level of abnormal returns could have been observed by studying a longer event window. Perhaps the curve is flattening out outside of our time frame so that by studying 1.5 years or 2 years instead, this would be visible.

Secondly, observing the initial part of the curve, we also see that there is no larger increase in the beginning of the event window than in the following period. Many previous papers have seen a sharp increase in the first days and weeks after a transaction, and Givoly & Palmon (1985) came to the conclusion that parts of the abnormal returns could be attributable to the signaling effect, thereby creating a self-fulfilling prophecy where stock prices increase (decrease) *because* an insider have made a purchase (sale) transaction. Such a situation would suggest that the first month in our findings would have a sharper increase in the level of abnormal returns than the following months, which is not the case. Of course, the abnormal returns observed in our results could still be the result of the signaling effect, although this is incorporated into the stock price gradually and evenly throughout the entire year, although this intuitively seems very unlikely. It is always difficult to assess how fast such information would be incorporated into the market, but if the market would be efficient in the semi-strong form, it would be incorporated immediately after the announcement date. Although previous research, such as Scholes (1972) and Bernard & Thomas (1989), show that some information is not immediately incorporated into the price of a stock, a fair assumption is still that this type of rather simple information, that of an insider transaction, should be incorporated within the first month. But as this seems to not be the case here, we can conclude that the signaling effect is not the main driver of abnormal returns for insider transactions.

5. 5. General Analysis

Analyzing our results from a more holistic perspective, we can conclude that the market is not efficient in what Fama (1970, 1991) would label the Strong form, as that would mean that no insiders would earn any abnormal return, which is clearly not the case. However, it is difficult to assess whether insiders are basing their transaction decisions on explicit non-public information, i.e. breaking the law although flying under the radar, or if they utilize a more profound understanding of the intangible parts of the operations, such as industry development, knowledge

of business cycles etc. The latter would imply that the market would not even be effective in the Semi-strong form (Fama, 1970, 1991), as it would prove that not all public information is quickly embedded into the stock prices. This does intuitively seem far-fetched, especially with regards to the relatively high levels of abnormal returns among insiders. Surely being involved in daily operations, having experience of the industry and knowing the "intangibles" could result in insiders earning *some* abnormal returns, but the abnormal return levels indicated by our results would mean that insiders are *highly* rewarded for incorporating this intangible information into their transaction decisions. It seems more likely that the high abnormal returns are the result of (1) the signaling value or (2) insiders, on an aggregated level, actually taking advantage of explicit non-public information. As we previously have concluded, we do not believe that the signaling value is the driver of abnormal returns in our study, which leads us to conclude that insiders on an aggregated level do take advantage of non-public information. This would then imply that the current Swedish insider trading legislation, or the enforcement of it, is ineffective.

Based on our results, and under the assumption that the signaling value is low and the market is somewhat efficient in the Semi-strong form, insiders are utilizing non-public information in their transaction decisions, which explicitly go against Swedish insider trading legislation (§ 2 in SFS 2005:377). There will always be difficulties in creating general legislations that are made to regulate specific situations. This means that the legislation has to be broad and vague in order to cover many different possible scenarios. However, § 2 in SFS 2005:377 is relatively straightforward in terms of what information that is allowed to trade on and what is not. The problem, therefore seem to not lie in the formulation of the legislation in itself, but rather in the ineffective enforcement of the legislation. The main problem therefore, we believe, is the inherent difficulty in proving what explicit information an insider has possessed at a single point in time. Our paper does not provide insights into what information insiders are basing their transaction decisions on, but it strongly indicate that insiders *are* using non-public information when doing transactions.

In terms of previous proposals to regulate insider trading on an individual company basis, suggested by for example Haddock & Macey (1987) and Painter (1999), rather than holistic societal regulations, the results of our study does not speak in favor of such a proposition. In practice, such a change in legislation, where parts of the responsibility would be transferred from the authorities on to individual companies, would impose additional costs on the individual companies. As our findings suggest that the occurrence of abnormal returns among insiders is larger in relatively smaller companies than in larger ones, the costs would be unevenly distributed and in many cases

go against each individual company's ability to take on additional costs. Companies in Quartile 1 have market caps of below one billion SEK, and imposing more responsibilities in terms of insider trading regulation on to these companies would be a significant financial burden. In other words, the smallest companies, where the need for regulation and surveillance is needed the most, would be constrained in their ability to pay for such services. Conversely, the largest companies who would have no problem of bearing the additional costs does not need the regulations to the same degree. Also, such a proposition would result in the losses of economies of scale in the regulation. Having one single authority handling these issues saves resources and should be a better solution in terms of pooling experience and know-how.

One might also discuss if there is a need for the current legislation to perhaps be rewritten slightly in some aspects. Today, there is a mismatch between the reporting rules and the insider trading rules. Specifically, the accepted delay for a quarterly or semi-annual report and the time insiders are forbidden to trade on the very same report. Companies are allowed a two-month delay between the end of the fiscal period and the date the report must be finished (Bolagsverket). For example, if the fiscal quarter were to end at the end of April, the company would have until the end of June to complete the report. Consider then the scenario when a company finishes most of the work already during the next month but delays the publishing of the report until the very last minute, perhaps to work on fixing and ensuring the accuracy of some minor details. In such a case, the individuals working on the report or individuals possessing knowledge of the content would have inside information *more than* one month prior to the release of the report. In these cases, insiders would evade the law of no trading one month prior to the release of a report. Of course, the current legislation is still valid and would still hit these insiders through the general rule, i.e. it is forbidden for insiders to trade on non-public information. However, violations of this rule are very difficult to prove as it is the duty and responsibility of Finansinspektionen to prove, without a reasonable doubt, that the insider possessed non-public information at the time of the transaction.

It may be possible to prosecute the people working *directly* on the report, if they were to make a trade before the release of the report, but how does Finansinspektionen stop others at the company from trading more than a month prior the release of the report? Perhaps there is a need to shorten this time period from the current two months to instead one month, or increase the time period in which it is illegal to trade before a release. To put it bluntly, the current regulatory environment almost creates these opportunities for certain insiders on a regular basis. At the very least, the rules would be more consistent with a two-month period for both rather than the mismatch that exists

today. It is also worth to discuss whether insiders should truly be allowed to continue trading the very minute the report is released, as is allowed today. If one believes that the market is efficient in the Semi-strong form, new public information is absorbed *immediately* into the price of a stock. Of course this is not the case in reality as outside investors need time to read the report and perhaps digest and reflect on it for some time. When the current legislation was being decided upon and discussed by various instances, Ekobrottsmyndigheten, the Swedish Economic Crime Authority, suggested that insiders should be allowed to trade at the earliest on the day following the report for the above stated reason. This would limit the cases where insiders are among the earliest traders after the publication of a report. They are then possibly trading on inside information and are granted a "safety net" because they are almost untouchable by the current law. Ultimately, the legislators decided against it.

The legislation needs to be balanced in the sense that it helps to maintain trust in the stock market but at the same time not be too restricting. We believe that with too restrictive legislations, insiders would be more hesitant to buy shares in their own company. Although insider trading can lead to information asymmetry and an unfair playing ground in the worst cases, it is also something desirable from a societal perspective. Employees, customers, investors and other stakeholders *want* insiders to have some skin in the game, and owning company stock is a great way of aligning employees' and owners' interests. It is therefore important to find a reasonable trade-off between regulating too much and having too loose regulations.

6. Conclusions and Proposals for Future Research

Our main findings are that all types of insiders, in all company sizes and for both purchase- and sale transactions do earn risk-adjusted abnormal returns, which are significant, both statistically and economically. Furthermore, there is no difference in abnormal returns between purchase- and sale transactions, but there are differences between different groups of insiders, with CEOs earning the highest abnormal returns. Finally, insiders in smaller companies do earn higher abnormal returns than insiders in larger companies and the aggregated abnormal returns are evenly distributed in the year following a transaction.

Assuming that our model is correctly adjusting for risk, there may be three reasons explaining the abnormal returns: (1) The signaling effect, (2) The market being non-efficient in the Semi-strong form, or (3) Insiders taking advantage of non-public information. The *high levels* of abnormal returns, as well as the *even distribution* of them throughout the year following a transaction leads us

to conclude that market inefficiency and the signaling effect are *not* the main drivers of abnormal returns in the Swedish stock market. Therefore, we believe that insiders on an aggregated level *do* utilize non-public information in their transaction decisions.

Based on this, we conclude that the current insider trading legislation and its enforcement is ineffective and needs to be improved in order to reduce the abnormal returns among insiders. One concrete way that our findings can help to improve the enforcement of the current legislation is by highlighting the fact that CEOs and insiders in smaller companies stands out from the crowd in terms of earning abnormal returns. Therefore, more resources, in the form of for example spot checks, should be directed towards these areas.

Finally, our findings do not speak in favor of previous suggestions to regulate insider trading on an individual company basis, as it would result in heavy financial burdens on the companies in most need of regulating insider trading.

Proposals for future research

This paper has provided insights into the occurrence and details of abnormal returns among insiders at the Stockholm Stock Exchange. However, it would also be beneficial to go into more details regarding what these abnormal returns are the results of – foreknowledge regarding future earnings, a more profound understanding and better ability among insiders to analyze public information or simply the result of the signaling value itself. In this paper, we have put forth our analysis on these topics, but this analysis is only based on the information provided by our tests, which are not designed specifically to answer these types of questions. Admittedly, these questions are difficult to receive answers to, but by conducting tests similar to those of Givoly & Palmon (1985) and Sivakumar & Waymire (1994) on the Stockholm Stock Exchange, one would take another step closer to understanding *why* Swedish insiders earn such large abnormal returns. This, then, would help in improving the current insider trading legislation in general, and the enforcement in particular.

Another interesting topic is that of insiders trading through so called Kapitalförsäkringar, a type of account where the bank or broker is listed as the owner of the assets in the account, and the individual investors remain anonymous. These types of accounts have until recently been excluded from the insider transaction reporting regulations, but as of summer 2016, they are included. It would therefore be of interest to, in the future, examine the level of abnormal returns between

insider transactions before and after the inclusion of these accounts, thereby indicating if insiders have been hiding profits in these types of accounts.

Finally, studying the occurrence of abnormal returns among insiders in different industries would also be interesting. The results of such a study could then form a basis for which industries that could be the subject of more thorough investigations from the authorities. Intuitively, it is easy to suspect that some industries, for example R&D heavy pharmaceutical companies, are suffering more in terms of lower public trust due to insider trading than others. If that would turn out to be the case, authorities can target more resources towards insider trading in these particular industries, thereby utilizing their resources better and receiving a higher marginal return, in terms of increased public trust in the financial market, on their enforcements.

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