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Avoiding wealth decrease – an option for insiders?

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Abstract

Title:	Avoiding wealth decrease – an option for insiders?
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Authors:	Andrei Krés Fredrik Sylvén
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Five key words:	Insider trading, option exercise, event study, market model, abnormal return
Purpose:	The purpose of this thesis is to broaden the research field and contribute with a new perspective regarding insider trading and insiders' ability to avoid negative abnormal return
Methodology:	An event study framework is applied to examine market efficiency on Swedish stock market. Market model is used as an equilibrium model for identifying abnormal returns.
Theoretical Perspectives:	The theoretical framework is built on efficient market hypothesis, concept of information asymmetry and signaling hypothesis.
Empirical foundation:	The data about insider transactions and stock performance for time period 2000 to 2010 is studied.
Conclusions:	The findings contradict the efficient market hypothesis in its strongest form. Insiders in Swedish listed firms are able to avoid wealth decrease by selling their shares prior to decline in stock price.

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Chapter 1 - Introduction

The first chapter presents the background to the problem discussed and analyzed in the thesis. The problem is concretized into a research question, which is the question that aims to fulfill the purpose of the study. Delimitations of this study are discussed last in this chapter.

1.1 Background

Information is a key resource in financial markets, asset and firm specific information is a vital resource which enables market participants to assess value of financial assets. However, it is not controversial that different market participants have access to different asset specific information. A private investor, investing in corporate stock in hope of increasing his wealth does not have the same information as corporate analyst. The private investor often relies on his own estimation of firm value or on valuation performed by some other party. Corporate analyst on the other hand can discuss company performance with firm´s management and has access to advanced databases that facilitate assessment of firm value. But despite that, an analyst does not have access to new daily information known by persons even more closely related to corporation. These persons, broadly defined as insiders, take decisions that affect firm value. Even if the insiders do not take the decisions, they can get immediate information about corporate actions due to their position in the firm. Information known by insiders is referred to as insider information. People might associate insider information with something illegal, yet possession of insider information is not illegal per se but rather is a consequence of persons´ employment in corporation.

According to Swedish Financial Supervisory Authority, insiders are persons who are very likely to have access to insider information about the company due to their position in the firm (Finansinspektionen , 2011). The essence of this definition is that due to insiders' closer involvement in the business they have advantage of knowing information that is not publically available. Knowing more or more precise information is undoubtedly advantageous in assessing asset value. It is thus not surprising that investors thoroughly follow transactions made by the insiders. In particular, investors follow stock transactions made by insiders to derive the informational content of a transaction and

predict company's future performance. Some investment funds base their whole investment strategy on following insider transactions with the anticipation of utilizing mispricing in stock markets. New technology enables investors to follow transactions made by the insiders. Databases like Swedish Financial Supervisory Authority´s database with insider transactions and analogous Securities and Exchange Commission (SEC) EDGAR database in United States, provide information about all insider transactions given the transaction is properly reported to supervisory authority. Although this information is not provided instantaneously after the insider transactions, many investors use this information to interpret firm´s long term potential and predict stock price movement.

The databases have introduced a research area that studies whether insiders use insider information to generate returns in excess of "normal" returns. Returns in excess of/below "normal" returns are referred to as positive/negative abnormal returns (hereafter the term abnormal returns will be used throughout the paper). Focus of the studies is to analyze whether stock buy and sell transactions are made by insiders in order to gain positive abnormal returns or avoid negative abnormal returns. However databases generally also contain information about other insider transactions (option exercises, participation in new shares issue, share transfers *etc.*), which have broadened the research area.

1.2 Problem discussion

According to Fama (1970), market prices of financial assets should reflect all the available information about the assets. The theory is known as the efficient-market hypothesis (Fama 1970) and has been heavily debated since its origin for roughly 30 years ago. The core implication of the efficient-market hypothesis in its strongest form is that all available information about an asset, including information known by insiders, is incorporated in its price. Consequently, insiders should not be able to generate abnormal returns. A considerable amount of studies have come up with results that contradict the efficient-market hypothesis (Seyhun (1986 & 1988), Lakonishok & Lee (2001), Iqbal & Shetty (2002), Del Brio, Miguel, & Perote (2002), Jeng, Metrick, & Zeckhauser (2003), Hotson, Singh, & Kaur (2008)), *i.e.* that insiders are able to make abnormal returns by using insider information. These studies are mainly focusing on the relationship between insiders trading of company stock and consequent stock performance. After revelation of

the fact that insiders can use insider information to generate abnormal returns, the focus of the studies has expanded to examining whether outsiders can mimic their actions and make similar returns. A good example of the latter is a study by Seyhun (1986).

Another extension of the study field was enabled following development of nontraditional compensation methods to corporate managers. One of such developments is the increased usage of stock options as a part of directors´ compensation package, which increased rapidly in 1990s (Bryan, Hwang, & Lilien, 2000). Usage of stock options motivates directors to increase market value of the stock price, which aligns goals of directors with those of shareholders. Research shows that companies with more growth opportunities are using stock options to higher extent, compared with mature companies in mature industries (Gaver & Gaver (1993), Smith Jr. & Watts (1992)). Stock options provide all the benefits of the upside movement in the stock price and at the same time protection from the downside, which creates incentives to take on risky growth opportunities to possibly increase the value of the firm. Suitability of the stock options as a part of incentive program is a widely discussed topic, however this topic is beyond the scope of this paper. Data about insiders' exercise of stock options enables researchers to test the relationship between exercise of the stock options and consequent stock performance. There should be no doubt that the exercise of stock options can contain valuable information about the company and anticipated stock performance (Tavakoli, Mcknight, & McMillian, 2011). Insiders' timing of option exercise can be compared to their choice of buying/selling the stock of their company on the basis of insider information. Recent research shows evidence for usage of insider information to time the exercise of stock options (Carpenter & Remmers (2001), Abody, Hughes, Liu, & Su (2008)), thus suggesting that all information about a security is not incorporated in the stock price as proposed by the efficient-market hypothesis.

Relationship between pure stock sell and buy transactions by insiders has been widely studied in different contexts (brief review of previous studies is presented in Chapter 2). In the context of Swedish stock market the subject has been a recurring topic in academical theses. Relationship between option exercises by insiders and consequent stock performance has not been as widley studied, with few studies based on US data. This topic has not been explored in the context of Swedish stock market. This study aims to fill that research area by analyzing whether insiders use insider information when exercising the options and accordingly avoid wealth decrease. Examining this relationship will give a more complete picture of insiders´ usage of insider information.

1.3 Purpose and Research Question

The purpose of this thesis is to broaden the research field and contribute with a new perspective regarding insider trading and insiders' ability to avoid negative abnormal returns. In order to accomplish this purpose, the study aims to answer the following research question:

> Do Swedish insiders use insider information to avoid wealth decrease?

1.4 Delimitations

The thesis is delimited in following aspects:

- The study focuses solely on insiders' ability to avoid abnormal returns, no attempt is made to quantify possible gains for outside investors
- Study is performed on transactions between calendar years 2000 and 2010
- Firms included in the study are or have been listed on Swedish stock exchange
- Transaction costs are not taken into consideration

1.5 Thesis outline

Chapter 2 presents previous relevant studies, both international and Swedish, regarding insider trading and insiders ability to utilize informational advantage. The chapter ends with a discussion about previous research and its relevance for this study.
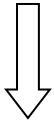
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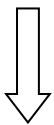
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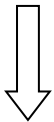
Chapter 5 presents the methodology approach used in this study. The hypothesis is formulated and the event study process is described in detail. The end of this chapter discusses reliability and validity of the study. Criticism of method and sources used in the study concludes the chapter.
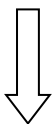
Chapter 6 reports combined empirical result and analysis of the results.
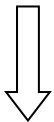
Chapter 7 concludes the study and suggests topics for future research.

Chapter 2 - Previous research

In the second chapter previous relevant studies are reviewed, this firstly to position the study and secondly to provide an overall picture of a widely researched topic. Both international and Swedish, which is the market analyzed in this study, studies are reviewed.

2.1 International studies

Previous international studies trying to find out whether insiders use insider information to make abnormal returns have produced various conclusions. Only limited number of conclusions from international and Swedish studies is summarized to highlight the depth of the subject and broaden reader's perspective.

Seyhun (1986) find that insiders can predict future stock price movements of individual firm and thereby generate abnormal profits. Study is performed using US data on insider transactions between year 1975 and 1981. Another conclusion of the study is that higher ranked insiders (chairman of the boards and officer directors), who are more knowledgeable about firm´s future prospects, are better at predicting future stock performance. Seyhun (1988) confirms the results on aggregate level using same sample as in the study performed in 1986. Increased aggregate buying of stock by insiders is highly correlated with following increase in stock price. Contrary relationship of increasing aggregate sale of stock and consequent decrease in stock price is also found to be statistically significant.

Insider´s ability to earn abnormal returns is refuted by Eckbo & Smith (1998) in their study on the Oslo Stock Exchange for insider transactions between 1985 and 1992. The authors are able to replicate findings of Seyhun (1986) when using simple event study approach. However there is no evidence of insiders making abnormal returns when the model is extended to capture change in firm specfic risk over time.

Lakonishok & Lee (2001) show that sale transactions by insiders have marginal effect on consequent stock performance, while buy transactions are associated with higher abnormal returns. The study is performed on US data covering time period from 1975 to 1995. One explanation to low abnormal returns following sale transactions is that during the studied time period, the usage of stock options as a compensation method

increased rapidly. Consequently, more insider wealth was tied to one firm which increased need for diversification. This is proven by increasing selling activity during the studied time period.

Iqbal & Shetty (2002) investigate stock price reaction after high concentration of insider trades. They come to a conclusion that stock performance determines insiders' actions *i.e.* insiders purchase the stock after a decrease in stock price and sell the stock after stock price increases. Implication of this causality is that insiders may actually have informational advantage but they are not exploiting it to generate abnormal returns by timing buy transactions before stock price increase and selling stock before stock price decrease.

Del Brio *et al.* (2002) perform study on Spanish stock market, investigating whether insiders are able to generate abnormal returns. Study shows that insiders are indeed able to make abnormal profits by trading stock of their own company, however outside investors´ ability to mimic insiders and make similar profits is limited. Outside investors in the Spanish market are only able to earn abnormal return on specific days. The market then adjusts for these gains and the study does not show any significant cumulative abnormal return for the whole holding period.

Hotson *et al.* (2008) investigate insider trades by directors in listed corporations on Australian stock market during three month period in 2005. Results show that directors time their stock transactions to exploit mispricings in the market by selling stock prior to decrease and purchase prior to increase in stock price. In particular, directors in small companies generate higher abnormal returns than directors in large corporations. Another conclusion of the study is that sale transactions are associated with higher abnormal returns than buy transactions, which contradicts the results of Lakonishok & Lee (2001).

Data about insiders´ option exercise transactions has also been used to perform studies concerning insider information and insiders' ability to utilize the information to generate abnormal profits. Carpenter & Remmers (2001) perform study using US data for time period from 1984 to 1995. Prior to 1991 insiders in US listed corporations were prohibited from selling the stock acquired from option exercise within six months from exercise occasion. Carpenter & Remmers (2001) show that during this period, insiders exercised their options before periods with significant positive abnormal returns, suggesting that insiders time their exercise transactions to experience wealth appreciation by holding stock of their company. For the period after 1991, researchers anticipated to detect abnormal returns after exercise occasion, since insiders were permitted to sell shares immediately. However this relationship is not found to be significant for full

sample. Only for managers in small corporations, exercise date was followed by a period with negative abnormal returns, suggesting that insiders in small corporations time their option exercise to avoid negative abnormal returns. The fact that it applied on managers in smaller firms is in line with findings of Hotson *et al.* (2008) and Lakonishok & Lee (2001) who show that the market is better at incorporating information regarding larger firms compared with smaller firms, accordingly insiders in smaller firms have higher ability to earn abnormal returns.

Huddart & Lang (2003) use a somewhat different approach; they study option exercise patterns among 50 000 employees at seven US companies. They differ between periods with high respectively low option exercise activity and study stock performance after these periods. Researchers find that periods with low exercise activity is followed by a six month period where stock returns are 10% lower than during six months following period with high exercise activity. Conclusion of the study is that insiders can predict times when stock will underperform so they exercise their options and sell the obtained shares before the drop in stock price.

Abody *et al.* (2008) analyze stock option exercises in US during 1996 – 2003 and find that option exercises that were followed by immediate sale of the stock were associated with abnormal future negative returns and those exercises followed by a hold of the shares were associated with positive future abnormal returns. Evidence for the former relationship (*i.e.* immediate sale of shares is associated with negative abnormal returns) is found to be weaker than the latter relationship (*i.e.* hold of shares is associated with positive abnormal returns).

2.2 Swedish studies

To our knowledge there are no Swedish published studies that investigate insiders' transactions on the Swedish Stock Exchange. However the subject is a popular research topic in master theses at Swedish universities.

Sjöholm & Skoog (2006) perform their study on Swedish listed corporations for period between 1991 and 2004. The study concludes that sale transactions result in higher abnormal returns compared to buy transactions implying that the sale transactions have higher informative value for an outsider. Widlund & Da Fonseca (2007) investigate if it is possible to trade in substitutes to the company of the insider, *i.e.* similar companies in the

same industry. Based on data for years between 2000 and 2005 the study indicates that insiders can profit by trading in substitutes, using non-public, industry specific information. Li & Nogeman (2008) find some support for sale transactions being associated with future negative abnormal returns for years 2004 to 2008. Based on insider transactions in different industry sectors the authors conclude that negative abnormal returns could be identified after sale transactions in Banking, Oil Gas & Fuel and Machinery sectors. More recent study by Alvén & Antbacke (2010) finds that board members´ trading patterns have the highest information content, suggesting that mimicking the board members´ transactions makes it possible to earn abnormal returns. Contrary to Carpenter & Remmers (2001), Alvén & Antbacke (2010) find that trades made by chief executive officers (CEO) are least informative.

2.3 Research discussion

From a brief review of previous research it is possible to highlight some similarities as well as contradictory findings. Maybe one of the most apparent similarities across previous studies is the fact that insiders in smaller corporations seem to have better ability to generate abnormal returns. The phenomenon is also given similar explanation, that market participants are better at pricing stock of large corporations that provide continuous stream of information.

Another interesting similarity in findings of several studies is that higher-ranked managers have greater ability to predict future stock price movements and exploit their informational advantage to generate abnormal returns. Undoubtedly, persons responsible for taking decisions that affect firm value, have information about these effects before lower-ranked managers who are not directly involved in decision making. There seems to be an information hierarchy within the corporation which can be compared to different access to information between insiders and investors.

The international studies presented above, span over a time period from 1975 to 2005. Despite that, the results seem to be consistent over time, although one would expect that technological improvements enable processing of more information at higher speed and less severe mispricing due to fast information update. Studies are also consistent across markets, with an exception of study performed on Norwegian stock exchange (Eckbo & Smith, 1998). Majority of the studies are performed on US data, which is not

surprising since US SEC provides comprehensive database with insider filings and amount of transactions by insiders is considerably larger than in other countries.

The most salient finding among reviewed studies is the result of Eckbo & Smith (1998) study on Oslo stock exchange. By improved method that more closely reflects insider transactions, abnormal returns are proved to be insignificant. These findings must of course be taken into consideration when evaluating actual returns to insiders from their transactions with company stock.

The research focusing on stock option transactions show results that are similar to studies analyzing pure share buy and sale transactions. This implies that informational advantage can be used to time option exercise and consequent sale transaction of the stock. The similarities in findings of both option transaction and stock transaction studies enable us to draw a parallel between these two security types regarding their informational content. Although these securities (options and stocks) are very different in practice, they might convey the same information about managers' belief of company´s future prospects and impact on firm value.

Generally, findings of the Swedish studies are supporting the idea that insider transactions convey information that can be used to predict future stock performance. Buy transactions are concluded to be more informative than sale transactions implying that insiders use the information to generate positive abnormal returns rather than avoid negative abnormal returns.

Chapter 3 - Theoretical framework

The third chapter consists of theories relevant for the study, which in turn is the foundation for the analysis. The theories discussed are the efficient market hypothesis, information asymmetry and signalling theory. The efficient market is core issue of this thesis, therefore the robustness of the hypothesis is discussed more in detail.

3.1 Efficient market hypothesis

According to Fama (1970) a market is considered to be efficient when all relevant information is incorporated in the price of a given security. In an ideal market, investors should be able to allocate resources based on the securities´ prices due to the fact that the prices fully reflect all available information. The efficiency of markets is dependent on certain criteria, namely:

(i)   trading securities should be costless

(ii)   all information should be available

(iii)   investors should act rationally

The above market criteria are to some degree fulfilled on all markets, instead it is the extent to which they are satisfied that will affect the market efficiency. Obviously, market participants are capable of affecting all three criteria. In practice, the regulatory bodies take active steps to satisfy the second criteria *(ii)*, that all information should be available. Regulators set up common rules regarding information availability, which should be seen as an attempt to enhance market efficiency. Regarding the transaction cost condition *(i)*, it is not a secret that trading financial instruments is not costless. However not all market participants are affected by the costs to same extent. This is one of the explanations to why insider transactions that seem to be generating abnormal profits cannot be replicated by outsiders with the same result (Seyhun, 1986). Higher transaction costs for outsiders eliminate possibilities to generate abnormal returns by following market participants that meet lower transaction costs. The third *(iii)* market condition is widely debated subject. Investors do not seem to behave rationally in all cases. This fact is often given behavioral explanation (Tversky & Kahneman (1986), Daniel, Hirshleifer, & Subrahmanyam (1998), Gervais & Odean (2001)) that points out biases and heuristics as factors contributing to irrationality.

Market efficiency is subdivided into three categories:

(i)   *weak-form efficiency*

(ii)   *semi-strong-form efficiency*

(iii)   *strong-form efficiency*

The purpose of categorization is to pinpoint on which level the efficient market hypothesis does not hold. Fama (1970), states that in a weak-form efficient market *(i)* the prices of securities solely reflect historical information. Accordingly, past behavior of prices cannot be used to predict the future price movements and as a consequence, technical analysis cannot be used to generate returns that are above the expected returns. In weak-form efficient market investors can instead benefit from exploiting insider information or apply fundamental analysis.

The second subdivision of market efficiency according to Fama (1970) is the semi-strong form *(ii)*. In order to determine if a market is semi-strong, the primary objective for analysis is market´s ability to incorporate all publicly available information. Information is relevant if it is assumed that announcement of the information will affect the stock price. Examples of such events could be new information about stock splits, earnings announcements or announcement about upcoming dividend levels. If the market adjusts itself adequately to new publicly available information, the market is considered to be semi-strong efficient. Additionally, investors can only benefit from trading on the basis of insider information since it is not publicly available.

The strong-form efficiency *(iii)* emphasizes that all available information should be reflected in the price of a security (Fama, 1970). Accordingly, no party in the market possesses monopolistic information that can be used for beneficial trading. Thus insiders should not be able to earn abnormal returns by trading based on non-publicly available insider information.

3.2 Robustness of efficient market hypothesis

The following discussion about efficient market hypothesis is only a short summary of research that not in any way tries to review the enormous amount of research that has been done. Any attempt to summarize the comprehensive research about market efficiency would inevitably lead to shift of our thesis focus. For more deep discussion on

past research see Fama (1991), Beechey, Gruen, & Vickery (2000), Malkiel (2003), Sewell (2011).

The hypothesis suggesting that markets show weak-form efficiency is a widely researched area. Dating back to 1960s, studies by Fama (1965) and Fisher (1966) provide evidence for the fact that stock prices can be predicted (in short term) based on historical price movements. In 1990s considerable amount of studies have explored the possibility to use technical analysis to generate abnormal results. Several studies (Brock, Lakonishok, & LeBaron (1992), Sullivan, Timmermann, & White (1999), Goldbaum (1999)) find that technical trading rules can generate excess returns. Allen & Karjalainen (1999) show that when including transaction costs, the excess returns are eliminated and not significantly abnormal.

Semi-strong market efficiency conditions that all new and relevant public information is incorporated into price of a security (Fama, 1970). Research of whether the information is efficiently incorporated into stock price has been carried out by using event studies, pioneered by Fama, Fisher, Jensen, & Roll (1969). Since the first introduction of the event studies the research has been carried out on practically every corporate event, or to put it in words of Fama (1991 p. 1599): *"We had no clue that event studies would become a research industry"*. The aim of this study is not to go through findings of all the event studies that have been carried out, however the general implication is that prices do adjust for new information. Some contradiction to the fact is the finding that stock prices do not adjust instantaneously to new information, but rather show a drift towards new equilibrium (Chan, Jagadeesh, & Lakonishok (1996), Fama (1998), Griffin, Kelly, & Nardari (2010)). For comprehensive list of event studies and their results see Fama (1991) and Sewell (2011).

Proposition that markets show strong-form efficiency is the core issue of this thesis. Belief that all information (including insider information) is incorporated in the price of a security is controversial, not least due to fact that large amount of studies are able to show that insiders can exploit their informational advantage to generate abnormal returns. Studies rejecting the hypothesis that markets are strong-form efficient date back to 1960s. Neiderhoffer & Osborne (1966) show that market dealers on NYSE used insider information about order book to generate abnormal returns. Some more recent studies and their findings are discussed in Chapter 2 and the reader is referred to this chapter for empirical findings on strong-form efficiency in financial market.

3.3 Information asymmetry

The concept of asymmetric information, exemplified by Akerlof (1970), can to some extent explain the consisting inefficiencies in capital markets. The idea of information asymmetry suggests that different parties in the marketplace have different information, where some parties have more information than others. This imbalance of information creates opportunities for one party to exploit his informational advantage.

Insiders have naturally access to new company specific information before the outsiders. Moreover, the insiders can see firm performance on asset level, while outsiders have to rely on aggregated numbers presented in financial statements. This informational advantage can make it possible for an insider to generate abnormal returns. One of the possibilities is to buy the company stock before an anticipated increase in the stock price. If insider knows that information that will be released to the public will result in an increase in stock price, then he or she can utilize this informational advantage by buying the stock before information is released and the stock price is then revalued to higher level. On the contrary, if insider knows that the firms' future prospects are bad and will conesequently result in lower stock price when the information about it is released, then he or she can utilize this information by selling current stock holdings and avoiding wealth decrease that is caused by reevaluation of the stock to a lower level (Frankel & Li, 2004).

The concept of asymmetric information between insiders and outsiders can be further exemplified with a study performed by Aboody & Lev (2000). The study is implemented using information about insider transactions in US listed corporations between 1985 and 1997. The study concludes that insiders in research and development (R&D) intensive companies generate higher abnormal returns than insiders in firms not engaged in R&D. Because R&D process is not observable by outsiders and cannot be summarized in one number, the insiders can use their knowledge about ongoing R&D process to predict future stock performance and generate abnormal returns. The abnormal returns occur when market adjusts the stock price based on information about outcome of the R&D. But by that time, insiders are already aware of how disclosure about R&D affects the stock price, thus making it possible to take actions before information is disclosed.

The imbalance of information and exploiting of informational advantage can rapidly decrease confidence in financial markets which is one of the reasons why

countries adopt insider regulation. Insider regulation explicitly prohibits usage of informational advantage by insiders to exploit other parties (Bris, 2005).

3.4 Signalling hypothesis

A theoretical implication related to asymmetric information is the signalling hypothesis, which implies that investors interpret company´s financial decisions as signals of firm´s future prospects (Pettit, 2007). Due to information asymmetries in capital markets, investors do not only consider financial statements when making investment decision, but also try to derive the future prospects of the company by analyzing the decisions taken by corporations. One of the more widely studied corporate action and its informational content is the dividend announcement by a company (Pettit, 2007), which is assumed to convey information about company´s future ability to generate cash flows. But signaling hypothesis is also closely related to insider transactions, because outsiders can interpret the transaction as a signal of company´s future prospect. Del Brio & de Miguel (2010) find that in the context of Spanish market, outsiders are more sensitive to signals from insider transactions than signals from dividend announcements.

Interpretation of signalling hypothesis for insider transaction is that, solely the transaction in itself might trigger stock reactions. If outsiders believe that the insider transaction conveys information about firm´s future prospects, outsiders can mimic insider transaction and thereby affect stock price. This causality is explored by Iqbal & Shetty, (2002) who conclude that insider trades are caused by stock performance rather than opposite *i.e.* stock performance is caused by insider transactions. Tavakoli *et al.* (2011) show the opposite causality for specific insider groups. Trades by directors have strong effect on future stock performance, while trades by large beneficiaries are to a large extent caused by previous stock performance.

Although insider transactions can be interpreted as signals of firm´s future prospect they are ambiguous signals. Insiders can have several motives to make the actual stock transaction. Stock sale transaction can be driven by a need to diversify wealth or realize previous gains. If insiders have part of their compensation in stocks, then sale of the obtained stock is a natural way to turn compensation into cash holdings. Similarly, a stock buy transaction can be a signal of firm´s future prospects but can also be driven by increased willingness to align goals of shareholders and management (Iqbal & Shetty, 2002).

Chapter 4 - Legislation

Swedish insider legislation is reviewed in the fourth chapter, to highlight the relevant regulations in Swedish financial market. Legislation affects insiders' ability to exercise options and trade company´s stocks which is the empirical foundation of this study.

It is important to highlight that insider trading is not illegal per se and this study does not aim to conclude if insiders have acted illegally or not. In fact, Aktas, de Bodt & Oppens, (2008) argue that insider trading and databases with information about insider transactions enhance market efficiency by providing additional information to outside investors. To increase transparency and lower information asymmetry between outside investors and insiders, most of the developed countries have adopted insider regulations. Countries with soft insider trading regulation may experience limited capital inflow from large investors due to lower confidence in the stock market. This can particularly be the case for the Swedish stock market due to its relatively small size (Bris, 2005).

The current Swedish legislation regulating insider transactions was adopted in 2005 (SFS 2005:377). The legislation is based on directive from European Union on insider dealing and market manipulation (market abuse) (2003/6/EC). Transactions with options are treated in 5 § in SFS 2005:377, which states that options are allowed to be executed on the expiration date if they have value at that time. However the consequent transactions with obtained shares are regulated within the framework of 2 §, according to which all transactions by insiders, based on insider information are illegal and can result in a sentence of up to 2 years in prison. Insider information is classified as information about not publicly released or publicly known circumstance that is considered to affect the price of a financial instrument.

Our data on insider transactions is from years 2000 to 2010, which implies that the first study period (January 2000 - July 2005) was surrounded by earlier regulation. Prior version of SFS 2005:377 was adopted in year 2000 (SFS 2000:1086). Regarding differences in these two legislation frameworks, the modifications have no impact on our study focus. Concerning the option transactions, the earlier law (2000:1086) allowed exercise of all options on expiration date, while the recent law (SFS 2005:377) allows only exercise of options that have *value* on expiration date.

Law SFS 2000:1087 on notification of certain holdings of financial instruments (authors translation) requires that all transactions by insiders must be reported to Swedish Financial Supervisory Authority within five days after the transaction occasion (6 §). Additionally, 15 § prohibits all insider transactions within 30 days prior to company´s earnings announcement.   An insider is defined in 3 § in SFS 2000:1087. Insiders are considered to be persons that through their position in the company are very likely to possess non-public information. Following persons are considered to be insiders:

- a member or alternate member of the company's or its parent company's board of directors
- a managing director or deputy managing director of the company or its parent company
- an auditor or deputy auditor of the company or its parent company
- a partner in a partnership that is the company's parent company, though not a limited partner
- a holder of another senior executive post or qualified function of a permanent nature at the company or its parent company,
- a holder of a senior executive post in a subsidiary if they may normally be considered to have access to non-public information which may affect the company's share price
- larger shareholders who themselves own at least ten per cent of the share capital or number of votes for all shares in the company

Persons with an insider position are also obligated to report their closely related parties' shareholdings and changes in those holdings in accordance with 5 § SFS 2000:1087.

Chapter 5 - Methodology

The methodological approach used in this study is described in the fifth chapter. In order to analyze abnormal returns the widely used market model is described. Both the method and the sources used in the study are then criticized.

5.1 Hypothesis formulation

Aim of the study is to examine whether insiders on Swedish stock market use insider information to avoid wealth decrease. The study uses combined data about insiders´ stock option exercise transactions and stock sale transactions. If the insider has insider information which indicates that the future stock price will decrease/underperform then insider can benefit by exercising the option and selling the underlying stock. This assures that the wealth of an insider does not decrease as a consequence of decline in stock price.

The underlying assumption for this study is that the sale of shares within one month after the stock option exercise date can indicate usage of insider information by an insider. If the insider is aware of information that stock will underperform during the period following option exercise, then he or she has incentives to sell the shares obtained from option exercise. The sale of shares beyond one month is assumed to be caused by new information (public or private) and not based on information known by insider prior to the option exercise. This is of course a subjective assumption, but by limiting the window between option exercise date and sale transaction the probability that new information and corporate events cause the sale transaction is reduced. Another reason for limiting the time period to one month is that Swedish insider legislation prohibits stock sale within one month prior to the earnings announcement. If option expires in the money one month prior to the earnings announcement then insider will choose to exercise the option but he or she will be unable to sell the obtained stock during a consequent period of one month.

Ability to sell company´s shares can also be limited by company specific policy. Firm owners might condition that stock obtained from the option exercise must be kept for a certain time. This restriction might be put in place to try to align managements´ goals with those of shareholders. Companies with such restrictions are not represented in

this study due to limitation of the time period between option exercise and sale transaction.

Data provided in Swedish Financial Supervisory Authority´s "stock exchange information" database does not include information about whether shares sold by insiders are the actual shares obtained from the previous option exercise. A simplified assumption is made in this study, explicitly, insider chooses to first sell the shares obtained from option exercise.

The discussion above results in following general hypotheses that are tested:

H₀: There are no negative abnormal returns following insider stock sale transaction

H₁: There are negative abnormal returns following insider stock sale transaction

5.2 Research approach

The goal of the study is to test the hypotheses regarding market efficiency in the context of Swedish stock market. To test the hypotheses an exclusively quantitative study approach is used. Hypotheses' testing is performed on quantitative data collected from secondary sources. No attempts are made to complement the quantitative data with qualitative data from primary sources. The aim is not to develop new theory but rather complement current research in market efficiency by using new event focus in a context of Swedish stock market.

5.3 Event study

Event study methodology is a widely used approach to measure impact of one particular economical event on firm´s value (Fama, 1991). Assumption of rationality in financial markets, *i.e.* market participants rationally incorporate all new available information into price of a given security, makes it possible to separate the "normal" performance of a security from an event driven increase/decrease in the price of the security (MacKinlay, 1997). Normal performance is defined as normal return on a security that would occur in the absence of the event. Event driven returns are the abnormal returns that occur due to the event. In other words, abnormal return is the difference between actual return on a

security and normal return that is predicted by a model that defines normal returns. In this sense, study of abnormal returns is a combined test of two hypotheses: *(i) test of asset pricing model and (ii) test for abnormal returns.* It is only possible to draw conclusions of the study in the context of the equilibrium model used to define normal returns. Finding any abnormal returns should ultimately be assigned to market inefficiency *i.e.* insiders are able to exploit insider information and/or effect of a bad model.

Event studies are usually used to see impact of some particular event, *e.g.* earnings announcement, stock split, merger announcement on firm´s value. In this study approach, the same underlying method is used to analyze stock performance following a sale transaction made by an insider. An event study requires following eight steps (Seiler, 2004):

1. Identification of an event date.
2. Definition of an event window.
3. Definition of an estimation window.
4. Selection of sample of firms.
5. Calculation of "normal" returns.
6. Calculation of abnormal returns
7. Calculation of cumulative abnormal returns.
8. Determining the statistical significance of abnormal returns and cumulative abnormal returns.

All of the eight steps above are described in the following sections, section 5.3.1 – 5.3.8.

Graphically the relationship between event date, event window and estimation window is illustrated in figure 1. Term τ denotes time index.
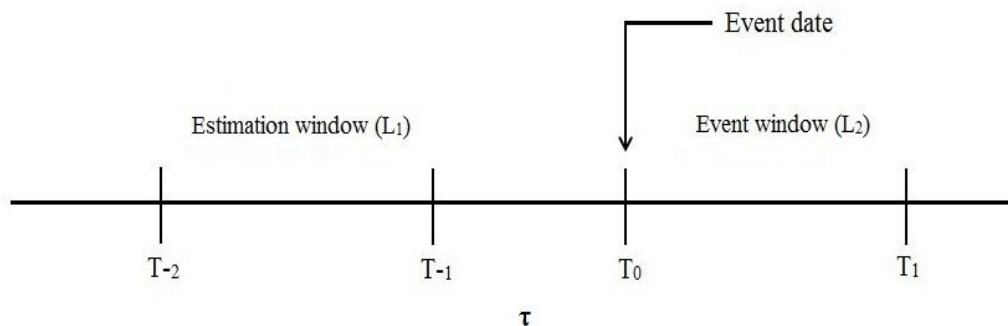

Figure 1. Relationship between event date, estimation window and event window.

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5.3.1 Event date

The event date (T_0) is defined as the date for first stock sale transaction. Swedish Financial Supervisory Authority database provides information about both when the actual transaction was made by an insider and when the transaction was published on their homepage. The date for actual transaction, rather than the publication date is used. The study aims to observe the returns for an insider rather than outsider's ability to mimic the insider´s returns, in which case the publication date would be more appropriate event date.

If the same insider made several sale transactions within one month after the option exercise date, the first sale transaction is considered as the event date. The period between option exercise date and date for first sale transaction ($T_{-1} - T_0$) can be between 1 and 30 calendar days. The option exercise transaction in itself is not assumed to be informative, thus not affecting the stock price after the exercise transaction. Rather the consequent sale transaction is driven by insider information.

5.3.2 Event window

The event window (L_2 which stretches between $T_0 - T_1$) is divided in three lengths; 5 (T_0 + 5), 15 (T_0 + 15) and 30 (T_0 + 30) trading days. The shortest event window is five trading days after the first sale transaction to observe stock performance during one trading week. Considering that it can take up to five days for transaction to be published on Swedish Financial Supervisory Authority´s homepage, abnormal returns during first five trading days are not affected by outsiders' interpretation of sale transaction as being bad news. A longer event window of 15 trading days is chosen to observe whether outsiders actually interpret the sale transaction as a signal of bad news and sell company´s shares, thereby putting downward pressure on stock price. It is assumed that news about insiders sale are incorporated into stock price within 10 trading days, thus not affecting the remaining 15 days of the longest event window. In this case it is expected that the abnormal returns following the first 15 days after event date are lower. The event window is limited to maximum of 30 days to avoid noise from other corporate events that would affect stock price, thus making it difficult to interpret the results (Armitage, 1995). Another reason for limiting the event window to shorter time period is because previous

research has shown that analysis of short term abnormal returns and long term abnormal returns necessitate different model specification (Fama E. E., 1998).

5.3.3 Estimation window

The estimation window, denoted L_2, starts 120 trading days prior to the option exercise transaction and ends on the day of option exercise transaction ($L_{-2} - L_{-1}$). A choice of estimation window of 120 days is based on discussion put forth in articles by MacKinlay (1997) and (Peterson, 1989). 120 trading days are considered to be sufficient to determine relationship between return on a security and market portfolio. Extending the event window for a longer time period can increases the predictive power of return determinants, however this introduces a problem of parameters being out of date. As with the data for the event date the date when actual option exercise transaction took place is used.

5.4 Sample

The initial sample includes all transactions made by insiders in Swedish listed corporations between years 2000 and 2010. The data is filtered to only include stock option exercise transactions. Transactions where an insider bought, sold or was assigned stock options are excluded. Each option exercise transaction is followed up to see if the same insider has sold the same stock class within following 30 days. It is not possible to determine whether the shares that are sold are the actual shares that were obtained in the option exercise transaction, since this is not specified in Swedish Financial Supervisory Authority database. In total, 1369 option exercise transactions were made by insiders between years 2000 and 2010 (see figure 2). In majority of the cases (935 transactions or 68%) insiders accumulated the shares for a time period beyond one month. The remaining transactions (434 or 32%) include sale of company´s shares within one month after the option exercise. These 434 transactions are initially chosen to be included in our study. Because several insiders in a corporation made similar transactions (resulting in same event date, event window and estimation window) the repeating transactions in the full sample are excluded. The adjustment decreased the full sample with 80 transactions resulting in total remaining sample of 354 transactions.
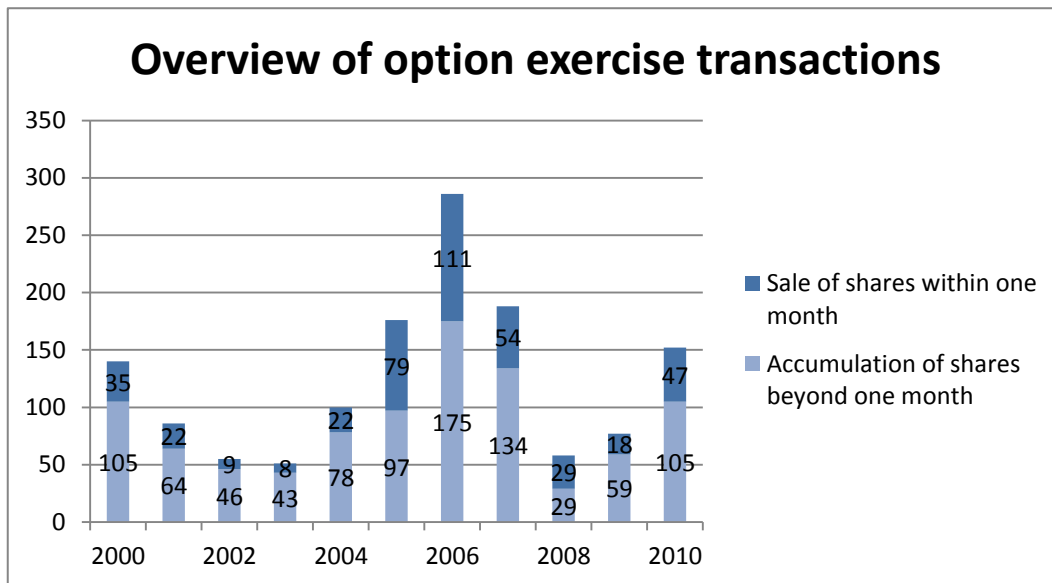
Figure 2. Option exercise transactions

Test for abnormal returns and their significance is performed on total sample of events as well as subsamples of the events. Motives for partitioning the total sample are discussed next.

5.4.2 Subsamples based on firm size

Subdivision by firm size is made in an attempt to capture differences between insiders ability to utilize insider information. Previous research examining pure share buy and sell transactions (Seyhun (1986), Lakonishok & Lee (2001), Hotson *et al.* (2008)) show that insiders in smaller corporations generate higher abnormal returns, implying better ability to exploit insider information. Similar pattern is recognized in a study on option exercise transactions by Carpenter & Remmers (2001), with a conclusion that insiders in smaller corporations are better at utilizing their informational advantage. Subdivision of insider transactions is based on firm´s market capitalization in accoradance with sections on NASDAQ OMX Stockholm:

Large Cap: firms with market capitalization of above 1 billion euro.

Mid Cap: firms with market capitalization of 150 – 1000 million euro.

Small Cap: firms with market capitalization of below 150 million euro.

5.4.3 Subsamples based on date

The total sample is partioned by time between option exercise and stock sale transaction. The study examines stock performance for events where option exercise transaction and first sale transaction is the same date, *i.e.* insider sold shares the same day as he or she received shares from option exercise. The subdivision is made to analyze whether immediate sale is associated with more severe stock underperformance. If an insider is unsure about future stock performance then he or she does not have to take immediate decision to sell shares and is indifferent between waiting for some days between option exercise and sale of shares and sale of shares immediately. Immediate sale on the contrary can be a sign of strong belief that the stock will underperform and the insider takes rapid action to avoid any wealth decrease.

5.4.4 Subsamples based on insider position

Previous research has shown that higher-ranked insiders might have better information about firm´s future prospects (Carpenter & Remmers (2001), Seyhun (1986)) and use this information to avoid wealth decrease. To see whether higher-ranked insiders are better at timing their sale transactions to avoid wealth decrease, the total sample is subdivided into two samples. One sample comprises of CEOs, vice CEOs and board members (higher-ranked insiders) who are directly involved in taking decisions that have an impact on the firm value. The other group consists of remaining insiders (lower-ranked insiders) that have either non-executive positions in the firm or are classified as insiders due to their involvement in subsidiaries to the parent company. If higher-ranked insiders do have superior information compared to other insiders, it is anticipated that abnormal returns for these two groups differ.

5.5 Normal returns

There are several models that provide framework for calculation of normal returns. MacKinlay (1997) distinguishes between statistical models and economical models. Statistical models rely on statistical behaviour of asset returns, while economical models consider behaviour of investors and economical relationships as determinants for defining

normal returns. One of the more widely used models that has been tested for its precision in context of event studies is the market model (Strong, 1992). The market model has been proven to show good precision (Armitage, 1995). Usage of market model is motivated by its stronger statistical properties which lead to more powerful statistical tests (Beaver, 1981). However the model has not remained uncritisized and research has shown that misspecification of the model can result in unadequate conclusions about abnormal returns (Coutts, Mills, & Roberts (1995), Kolari & Pynnönen (2010)).

Market model is a statistical model based on an assumption that price of a given security i has a stable linear relation with return on a market portfolio of securities. The strength of the market model is determined by the regression coefficient (R^2) calculated from regression analysis of market and security returns. The higher the regression coefficient, the more of variance in security´s returns is explained by variance in market portfolio, which consequently empowers statistical significance of abnormal returns. Mathematically, the market model is expressed as:

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + \varepsilon_{it}$$

$$E(\varepsilon_{i,t} = 0) \qquad \text{var}(\varepsilon_{i,t}) = \sigma^2_{\varepsilon_i}$$

Equation (1). Market model

$R_{i,t}$ – period t return on security i

$R_{m,t}$ – period t return on market portfolio

$\varepsilon_{i,t}$ – zero mean disturbance term

Parameters β_i and α_i are calculated from the estimation window using equation (2) and (3). β_i (beta) is a measure of security´s sensitivity to performance of market portfolio and α_i (alpha) is the intercept in the regression. Both terms α_i and β_i capture the systematic component of security that is linearly related to market portfolio ($R_{m,t}$). Alpha and beta are considered to be stable throughout the estimation window. Term ε_{it} captures the unsystematic component that measures abnormal returns in excess of expected returns.

$$\widehat{\beta}_i = \frac{\sum (R_{i,\tau} - \bar{R}_i)\,(R_{i,\tau} - \bar{R}_m)}{\sum (R_{m,\tau} - \bar{R}_m)}$$

Equation (2). Beta estimation

$$\hat{\alpha}_i = \overline{R}_i - \beta_i \overline{R}_m$$

Equation (3). Alfa estimation

$\overline{R}_i$ – is the average daily return on a security *i* during the estimation window (L_1)

$\overline{R}_m$ – is the average daily market return during the estimation window (L_1)

NASDAQ OMX indexes are used as a benchmark for market portfolio, description of the indexes is provided in appendix 1. Company with market capitalization of below 150 million euro is matched with OMX Stockholm Small Cap Price Index. Companies with market capitalization of between 150 and 1000 million euro are matched with OMX Stockholm Mid Cap Price Index. Companies with market capitalization above 1 billion euro are matched with OMX Stockholm 30 Price Index. OMX Stockholm Small Cap and Mid Cap indexes were first provided in 2003. For years prior to 2003, Carnegie Sweden Small Cap Price Index is used to match the smallest companies, with market capitalization below 150 million euro. OMX Stockholm Benchmark Price Index is used for calculation of normal and abnormal returns for companies with market capitalization above 150 million euro in years 2000 through 2002. Companies´ market value of equity is considered when assigning proper index to calculate normal and abnormal returns.

The returns for both security and benchmark index are calculated as:

$$R_{i,\tau} = \ln(\frac{P_{i,\tau}}{P_{i,\tau-1}})$$

Equation (4). Logarithm return

$P_{i,\tau}$ – adjusted closing price for security or index on day τ.

$P_{i,\tau-1}$ – adjusted closing price for a security or index on day $\tau - 1$ (previous trading day).

Logarithm returns are used due to their additive property which is more suitable for event studies examining cumulative returns over longer time period (*i.e.* logarithm return of a security in one month is equal to sum of daily logarithm returns during one month). Another benefit of using logarithm returns is that they are more likely to be normally distributed which is advantageous in performing standard statistical tests (Strong, 1992).

5.5.1 Abnormal returns

Abnormal return is defined as the difference between actual return on a security i in time period τ and expected return (defined by market model) in period τ (equation 5).

$$AR_{i,\tau} = R_{i,\tau} - E(R_{i,\tau}|X_\tau)$$

Equation (5). Definition of abnormal returns

$AR_{i,\tau}$ – Abnormal return on a security i at time τ.

$R_{i,\tau}$ – Actual return on a security i at time τ.

$E(R_{i,\tau}|X_\tau)$ – Expected return on a security i at time τ.

In settings of the market model it is assumed that there is a stable linear relation between stock return ($R_{i,\tau}$) and market return ($R_{m,\tau}$). Using parameters α_i and β_i derived from estimation window, abnormal returns are calculated for each security i for every day in the event window, using equation (6):

$$AR_{i,\tau} = R_{i,\tau} - (\widehat{\alpha}_i + \widehat{\beta}_i R_{m,\tau})$$

Equation (6). Abnormal returns

5.5.2 Statistical properties of abnormal returns

To perform statistical tests and ensure significance of abnormal returns, one has to take into consideration the statistical properties of abnormal returns and how they change when abnormal returns are aggregated across time and securities. Variance of the abnormal returns on a security level is calculated using following equation:

$$\sigma^2(AR_{i,\tau}) = \widehat{\sigma}_{e_i}^2 + \frac{1}{L_1}\left[1 + \frac{R_{m,\tau} - \bar{R}_m}{\sigma_m^2}\right]$$

Equation (7). Variance of abnormal returns

Component $\widehat{\sigma}_{e_i}^2$ is a disturbance term that captures variance in security´s residual returns during the estimation period and is calculated using equation (8). The second component of equation (7) captures variance in security´s returns due to sampling error in α_i and β_i.

If estimation window (L_1) is very long, the second term approaches zero and variance of abnormal returns in the event window is approximated by variance in residual returns during the estimation window, as shown in equation (9). To consider sampling error the full equation (7) is used to calculate variance in abnormal returns.

$$\widehat{\sigma}_{e_i}^2 = \frac{1}{L_1 - 2} \sum_{\tau=T_{-2}+1}^{T_{-1}} (R_{i,\tau} - \widehat{\alpha}_i - \widehat{\beta}_i R_{m,\tau})^2$$

Equation (8). Variance disturbance term

$$\sigma^2(AR_{i,\tau}) = \widehat{\sigma}_{e_i}^2$$

Equation (9). Variance for long estimation window

5.5.3 Cumulative abnormal returns

To be able to perform statistical tests about significance of abnormal returns the average abnormal returns are aggregated for all securities in the sample for each day in the event window. Average abnormal returns are calculated using equation (10) and aggregation is made using equation (12). Statistical properties of average abnormal returns (equation 11) and cumulative average abnormal returns (equation 13) are derived from MacKinlay (1997).

$$\overline{AR}_\tau = \frac{1}{N^2} \sum_{i=1}^{N} AR_{i,\tau}$$

Equation (10). Average abnormal return

$$var\,(\overline{AR}_\tau) = \frac{1}{N^2} \sum_{i=1}^{N} \sigma_{e_i}^2$$

Equation (11). Variance of average abnormal returns

$$\overline{CAR}(\tau_1, \tau_2) = \sum_{\tau=\tau_2}^{\tau_2} \overline{AR}_\tau$$

<p align="center">Equation (12). Cumulative average abnormal returns</p>

$$var\left(\overline{CAR}(\tau_1, \tau_2)\right) = \sum_{\tau=\tau_2}^{\tau_2} var\left(AR_\tau\right)$$

<p align="center">Equation (13). Variance of cumulative average abnormal returns</p>

τ_1 and τ_2 denote time index in the estimation window so that $T_0 < \tau_1 \le \tau_2 \le T_1$.

5.6 Statistical tests

The cumulative average abnormal returns are used to perform statistical tests to determine whether abnormal returns are statistically significant. Following the hypothesis formulation (section 5.2) the null and alternative hypotheses tested are:

H₀: $\overline{CAR}(\tau_1, \tau_2) = 0$

H₁: $\overline{CAR}(\tau_1, \tau_2) < 0$

To test the hypotheses Student's t-test (hereafter t-test) and Wilcoxon signed rank test (hereafter Wilcoxon test) are used. In both tests the same null hypothesis and alternative hypothesis are tested. P-values for both tests are presented and in addition the samples are tested for distribution normality. Description of the statistical tests and their properties are presented below.

5.6.1 Normal distribution

Assumption about normal distribution across abnormal returns of securities enables usage of t-test to determine significance of abnormal returns. T-test is reliant on underlying assumption that the sample is normally distributed (Corrado, 1989). It is however not clear whether abnormal returns are normally distributed even in large samples that should converge to normality according to central limit theorem (Brown & Warner, 1985). To

<p align="center">29</p>

avoid misinterpretation of the results, each sample is tested for normality using Shapiro-Wilk test. Test is performed using SPSS software. The hypotheses tested are:

H₀: $\overline{CAR}$ $(\tau_1, \tau_2) > 0{,}05$ Implies that the sample is normally distributed

H₁: $\overline{CAR}$ $(\tau_1, \tau_2) < 0{,}05$ Implies that the sample is not normally distributed

5.6.2 Student´s t-test

T-test is a parametric test, well suited for testing samples that are normally distributed (Brown & Warner, 1985). However strong reliance on sample distribution normality makes t-test unsuitable for testing significance of abnormal returns that are not normally distributed. T-test is performed using t-statistics obtained from equation (14) with inputs from equations (12) and (13).

$$T_1 = \frac{\overline{CAR}(\tau_1, \tau_2)}{\sqrt{var(\overline{CAR}(\tau_1, \tau_2))}}$$

<u>Equation (14). T-statistics</u>

Confidence interval for t-test is 95%. Since the alternative hypothesis is that there are negative abnormal returns, one tailed t-test is used.

5.6.3 Wilcoxon signed rank test

Additionally, the hypothesis test is complemented with Wilcoxon signed rank test to empower the statistical results in cases when samples are not normally distributed. Wilcoxon test is performed on all study samples to strengthen the statistical results. The advantage of Wilcoxon test is that it considers both magnitude and the sign of abnormal returns. Nonparametric rank based tests have improved robustness of statistical results (Kolari & Pynnönen, 2010) and it is not unusual that traditional parametric tests are complemented with nonparametric tests to ensure validity of statistical results (MacKinlay, 1997). Wilcoxon test is performed using SPSS software to determine whether difference between positive and negative cumulative average abnormal returns between securities is statistically significant. If normality test rejects H₀, that the sample

is normally distributed, the conclusion is based on the results of the Wilcoxon test, since it does not assume specific distribution of returns (MacKinlay, 1997).

5.7 Data sources

The main source of data is Swedish Financial Supervisory Authority database with insider transactions, which is available on authority's homepage. Data about all insider transactions between year 2000 and 2010 is downloaded from authority´s homepage.

Data about companies´ stock quotes is retrieved from Thomson Reuters Datastream database. To calculate stock returns the daily adjusted closing price is used, which is adjusted for dividends and stock splits. Data on quotes of all indexes used in the study is retrieved from Thomson Reuters Datastream database.

5.8 Reliability

Event study methodology is a common way to measure the presence of abnormal returns. The general process, comprised of 8 steps described in earlier sections, is common across most of the event studies. The modifications between different studies appear in choice of model that defines "normal" returns and statistical properties of abnormal returns. Reliability of the study is enhanced by giving detailed description of choices within event study framework. Raw data used in the study is distributed by Thomson Reuters Datastream and Swedish Financial Supervisory Authority. The raw data is used to calculate inputs for statistical tests and not modified in any way. Calculations are performed using Microsoft Office Excel and statistical tests are performed using SPSS software.

5.9 Validity

Internal validity of the study is enhanced by limiting time period for measuring abnormal returns after the event date. Decreasing the event window increases the probability that there is actual causality between sale transaction and consequent stock performance,

although noise from other events may still persist. Additionally, research has shown that investors are slow at incorporating new information into stock price (Fama, 1998). It is thus impossible to prove strong causality between insiders´ sale transaction and negative abnormal returns. The study can be complemented with a causality test to increase internal validity of the study.

External validity is considered to be high when results can be applied beyond the specific study context (Bryman & Bell, 2005) . This study contributes to research on market efficiency in Swedish financial markets. However the results of the study should not be seen in isolation but rather as a complement to overall research, that in combination gives more generalized picture of market efficiency in Swedish financial market.

5.10 Method criticism

Several subjective assumptions are made throughout the study. The choice of event date is not obvious and can be discussed. The usual approach in event studies is to choose event date and estimation window close to each other to decrease noise from other events that might affect stock price. In this study the estimation window and the event date are in some cases distant from each other, which can result in misspecification of normal returns. Since insiders are prohibited from trading stock one month prior to earnings announcement the risk of earnings announcement affecting stock price is eliminated.

Due to large amount of data and time constraint, no attempt to clean the data for extreme events is made. It is common to exclude stocks that show high volatility due to firm specific risks. In this study the only conditions for being included in the study are: option exercise transaction, stock sale transaction within one calendar month after the option exercise transaction and available stock quotes 120 trading days prior to exercise transaction and 30 trading days after the sale transaction.

The market model for determining normal and abnormal returns as presented in this study is valid under the condition that event windows across securities do not overlap. The pattern of overlapping event windows is called clustering. In this study only total clustering, *i.e.* event date is exactly the same for several insiders in the same firm, is eliminated by exclusion of observations from study sample. Kolari & Pynnönen (2010) demonstrate that neglecting the clustering effect increases the probability of rejecting the

hypothesis of no abnormal returns, the null hypothesis in this study, when it is true. A nonparametric test (Wilcoxon signed rank test) is employed to reduce the impact of overlapping event windows which create cross-correlation among securities. Kolari & Pynnönen (2010) argue that nonparametric tests do decrease the probability of rejecting true hypothesis of no abnormal returns, although not completely eliminate the bias of clustering effect.

The study by Eckbo and Smith (1998) shows that different methods for estimating abnormal returns generate different results for the same sample. More specifically they show that abnormal returns are reduced or insignificant when using time-varying beta values, in comparison with constant beta-values. Accordingly this study can only derive conclusions based on the results generated by the method approach previously discussed.

5.11 Source Criticism

The articles used in this study are obtained using Lund University article database (LibHub). Book sources used as references are part of course literature on master programme in strategic and corporate finance at Lund University School of Economics and Management. Additional book sources in econometrics and event study methodology are retrieved from library at School of Economics and Management. Data sources used in this study are described above and are considered to be reliable.

The purpose of the theoretical sources in this study is to give an overall perspective on an extensively discussed topic. In order to do this, only generally accepted studies and theories are discussed. The studies and theories are questioned using contradicting findings from other studies.

The methodological part of this study is to a high extent based on article by (MacKinlay, 1997). Criticism of method suggested by MacKinlay is based on later studies that cite the author and discuss properties of market model for calculating abnormal returns.

The purpose of studies covered in review of previous research is to position this study and reduce preconceptions about insider trading. Previous research may not be representative for the comprehensive research about market efficiency and insiders' ability to utilize their informational advantage.

Chapter 6 - Empirical results and analysis

The empirical results and analysis of the results is reviewed in the sixth chapter. The chapter uses previous studies and theories discussed to analyze the findings of this study. The result review and the analysis are combined in order to enhance the reasoning in the study. The chapter is subdivided into the various subsamples discussed in the methodology.

The first part of the result and analysis reviews the findings for the full sample during the period 2000-2010, analysis of various subsamples is presented next. Each of the subdivision tests the hypotheses outlined in the methodology:

H_0: There are no negative abnormal returns following insider stock sale transaction

H_1: There are negative abnormal returns following insider stock sale transaction

6.1 Full Sample Result

The full sample consists of 118 Swedish firms contributing with 354 transactions during the full length period between the years 2000 and 2010. The results for the full sample are summarized in table 1.

Table 1. $\overline{CAR}$ **Full sample**

Event window	$\overline{CAR}$	p value t-statitics	p value Wilcoxon	Normality test	H_0 Rejected
5 days	-0,0100	0,002	0,001	<0,05	**Yes**
15 days	-0,0296	0,000	0,000	<0,05	**Yes**
30 days	-0,0466	0,000	0,000	<0,05	**Yes**

The sample is not normally distributed for any event window which is a criterion for using the t-test, the conclusion is therefore based on results of Wilcoxon test. Wilcoxon test implies that the difference between positive $\overline{CAR}$ and negative $\overline{CAR}$ is statistically significant for all event windows. Test results reject the null hypothesis of no negative abnormal returns following insider sale transaction.

The findings summarized in table 1 support the hypothesis that option exercise, followed by sale transaction, is associated with negative future average abnormal returns during all event windows studied. This result contradicts findings of Carpenter & Remmers (2001) who confirm that negative abnormal returns are not significant for their full sample. Abody *et al.* (2008) are also unable to confirm the hypothesis that option exercise followed by a sale transaction is associated with negative abnormal return on an aggregated level. Both Carpenter & Remmers (2001) and Abody *et al.* (2008) investigate insider option exercises in the United States where option trading is far more extended comparing with Sweden, resulting in a significantly larger test sample. A main difference between this study and the two studies discussed is that the latter use an event window of up to 12 months comparing with one month used in this study. For the shortest event window of one month both studies show positive $\overline{CAR}$, contradicting results of this study that show negative $\overline{CAR}$ of -4,66% on day 30 (table 1).

The results are in line with studies examining pure stock sale transactions. Seyhun (1986) concludes that insiders sell stocks prior to negative returns. These findings can be compared with the study by Iqbal & Shetty (2002) who show that insiders buy stocks after stock price decreases and sell after stock price increases in order to exploit mispricing. This study is not explicitly considering previous stock performance and the possible impact on expected returns. This can be a shortcoming when estimating the expected future stock price, due to the fact that a stock may increase significantly during the estimation window. If this is the case, the expected returns based on the estimation window are not the most proper estimates for future stock performance. The higher expected returns, based on previous upward trend in stock price, increase the likelihood that the actual returns turn out to be below the expected returns and that the null hypothesis is rejected.

Short-term negative abnormal returns can also be a result of the transaction itself, since market participants might believe that insiders are in fact more informed and therefore mimic insider´s behavior causing a self-fulfilling negative stock performance. In this study the negative abnormal returns continue to increase after 5 days (figure 3) when the transaction is observable by outsiders, which can be a result of outsiders mimicking insiders' transaction. However the results show than even after 15 days, when the market is assumed to have adjusted stock price to new information, the abnormal returns continue to increase. This pattern, suggests that negative $\overline{CAR}$ for longer event window are not only caused by downward pressure on the stock due to outsiders mimicking behavior.
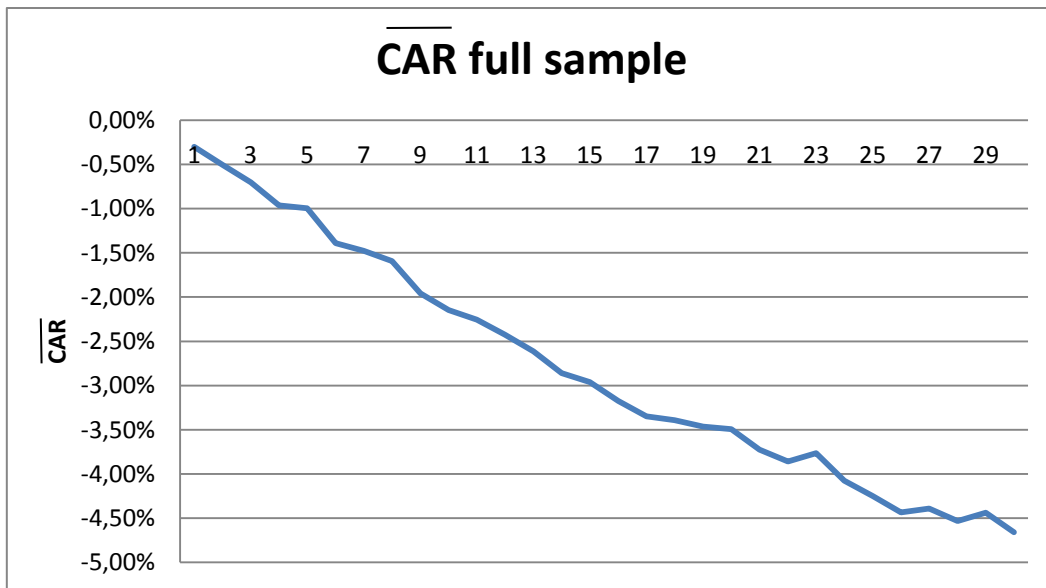
Figure 3.

Based on results from the full sample, there is a statistically significant stock price decrease after insiders sell their shares. This finding suggests that insiders sell their shares prior to stock price decrease to avoid wealth decrease. The significant $\overline{CAR}$ during the shortest event window, when outsiders have no information about the transaction, implies that the stock price decrease is not only depressed by possible mimicking behavior by the outsiders. It rather suggests that insiders are able to predict stock price decrease and sell their shares before this actually occurs. The continuing decrease after 15 day event window can have two explanations. One is that insiders do mimick insiders behavior but it takes longer time than one month before they adjust the price to the right level. If this is the actual case, then market is not semi-strong efficient, which conditions that all new available information is priced into a security. Another explanation could be that the stock price actually is declining as a result of worsening company performance and market adjusts the stock price not necessarily by mimicking the insider transaction but revaluing firms future prospects. In either cases, the insider does not experience any wealth decrease.

6.2 Subsamples based on firm size

The Swedish stock exchange is as of today subdivided into three different categories which are large cap, mid cap and small cap. Of the 112 firms analyzed, 24 firms are listed

on large cap, 30 on mid cap and 58 on small cap (relative numbers are presented in figure 4).

Full sample size distribution

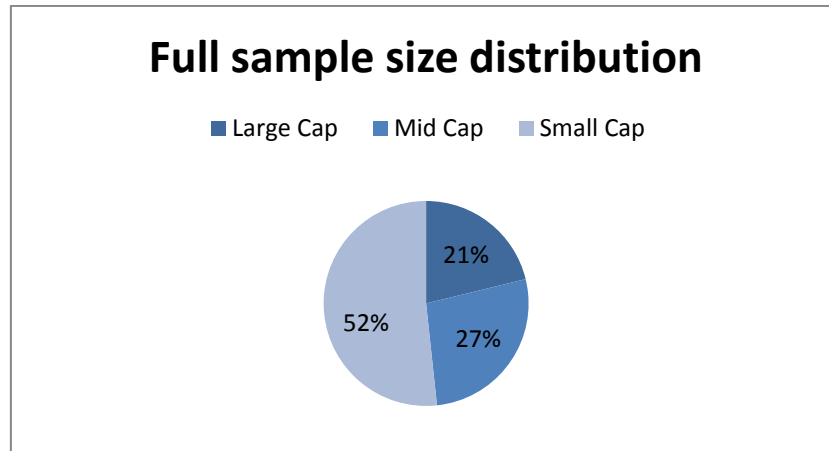■ Large Cap   ■ Mid Cap   ■ Small Cap

21%

27%

52%

Figure 4.

Higher number of smaller firms might be explained by the fact that larger firms are more observed by the investors and hence insiders in these firms can be more restricted to sell their shares. A stock sale transaction can be interpreted as negative signal about firm´s future prospects by investors. Since larger firms are followed by many investors the signal from sale transaction can decrease firm value by putting downward pressure on stock price. This reasoning is in line with findings of Tavakoli *et al.* (2011), that insider trades cause stock reactions. To avoid this causality the insiders in larger corporations might keep their shares after option exercise in order to avoid negative signalling. The signalling effect of insider actions is supported by the findings of Del Brio & de Miguel (2010).

For firms listed on large cap, results for 5 and 15 day event window are not statistically significant for both the t-test and the Wilcoxon test and therefore the null hypothesis for large cap firms cannot be rejected for these event windows (table 2). For the longest event window, the null hypothesis for large cap firms is rejected. $\overline{CAR}$ for both mid cap and small cap firms are significant for all of the three event windows and the null hypothesis is rejected. Figure 5 plots the daily $\overline{CAR}$ for large cap, mid cap and small cap.

Table 2. $\overline{CAR}$ **by firm size**

| Event window	$\overline{CAR}$	p value t-statitics	p value Wilcoxon	Normality test	H_0 Rejected
Large Cap					
5 days	0,0007	0,425	0,394	<0,05	**No**
15 days	-0,0058	0,056	0,094	>0,05	**No**
30 days	-0,0215	0,006	0,015	>0,05	**Yes**
Mid Cap					
5 days	-0,0097	0,050	0,000	<0,05	**Yes**
15 days	-0,0358	0,000	0,000	>0,05	**Yes**
30 days	-0,0447	0,001	0,000	<0,05	**Yes**
Small Cap					
5 days	-0,0242	0,002	0,011	<0,05	**Yes**
15 days	-0,0464	0,001	0,000	<0,05	**Yes**
30 days	-0,0805	0,000	0,000	<0,05	**Yes**
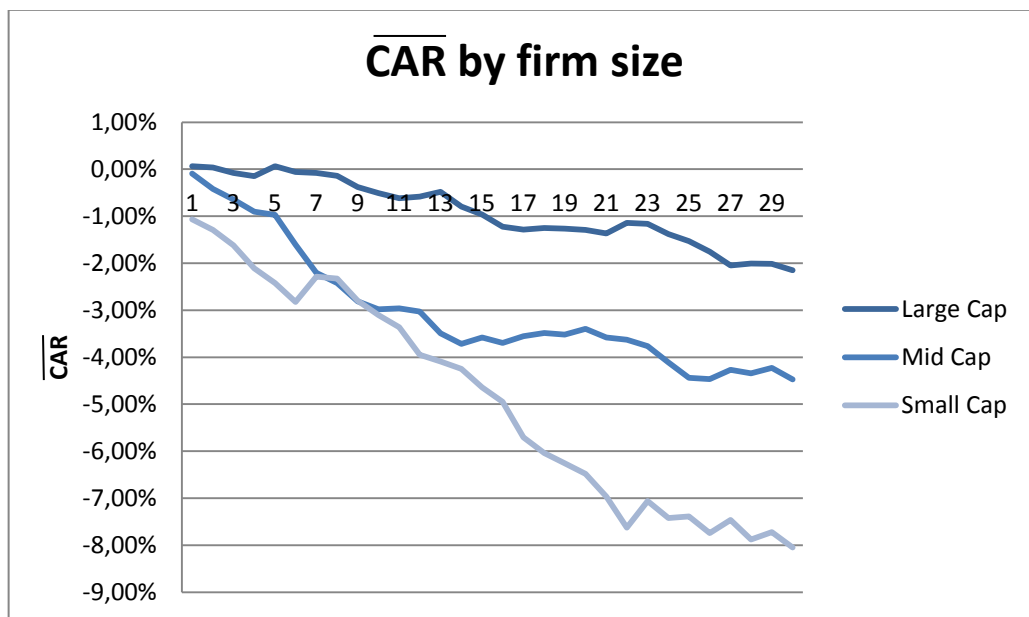
Figure 5.

The result that the $\overline{CAR}$ is statistically significant for large cap firms on day 30 is not in line with conclusions of Carpenter & Remmers (2001). Their study finds no significant abnormal returns for large firms, arguing it is because large firms provide more information and thereby decrease information asymmetry. The market is better at assessing value of large firms due to continuous information stream, which in turn reduces insiders´ ability to exploit their informational advantage. Possible explanation

for the insignificant results for 5 and 15 day event window could be that the longest event window captures other corporate events that affect stock prices.

The results of the study show that negative abnormal returns are largest after insider sale transactions in small cap firms. Negative returns are significant for all event windows and $\overline{CAR}$ 30 days after the sale transaction are as high as 8 %. This rapid decrease can have several explanations. Firstly, shares in small cap firms can be concentrated among few large shareholders. When an insider sells large amount of shares, the stock can decline since large sale transaction depresses the stock price. Secondly, small firms presumably suffer from higher information asymmetry, which results in sale transaction being a stronger signal. When information stream from small firms is not continuous, investors are interpreting the sale transaction as a negative signal about firm´s future prospect and sell their shares, thereby depressing the stock price. Thirdly, as discussed in articles by Lakonishok & Lee (2001), Hotson *et al.* (2008) and Seyhun (1986), insiders in smaller firms are more involved in the overall business and therefore possess more valuable information that can be exploited. The informational advantage makes it easier to predict stock performance and in turn avoid wealth decrease.

For firms listed on mid cap, the results show similar returns as for smaller firms, although negative $\overline{CAR}$ are not as high. During the shortest event windows, stock declines with 1%, but negative returns increase to 3,6 % after 15 trading days. The transaction in itself might thus trigger stock decrease after day 5 when outsiders can observe the transaction.

Analyzing table 2, $\overline{CAR}$ for longest event window of 30 days are -2,15% for large cap firms compared with -8 % for small cap firms. One of the explanations, suggested by Lakonishok & Lee (2001) is that large firms are more monitored and thereby insiders in large firms are discouraged from undertaking any illegal actions. Large firms attract more publicity so there is higher probability that the illegal transaction will be discovered.

The results from subsamples based on firm size, supports the findings of previous studies that insiders in smaller firms have better ability to exploit the insider information. Moreover, this relationship seems to be characteristic for several countries; Carpenter & Remmers (2001) and Lakonishok & Lee (2001) support this finding based on US data, Hotson *et al.* (2008) conclude the same relationship based on Australian stock market.

6.3 Subsamples based on date for exercise and sale transaction

Of the 354 transactions analyzed, 160 option exercises are associated with immediate sale of the company´s shares, *i.e.* the option exercise date was the same as the date for sale transaction. This subdivision assumes that option exercise followed by immediate sale is associated with higher negative abnormal returns, thus insiders' want to take rapid actions to avoid wealth decrease. If the option is not tradable, the only way for insiders to exit their position based on negative information is to exercise the option and sell the obtained shares. Table 3 summarizes results for the samples with immediate sale and sale of shares after the option exercise date.
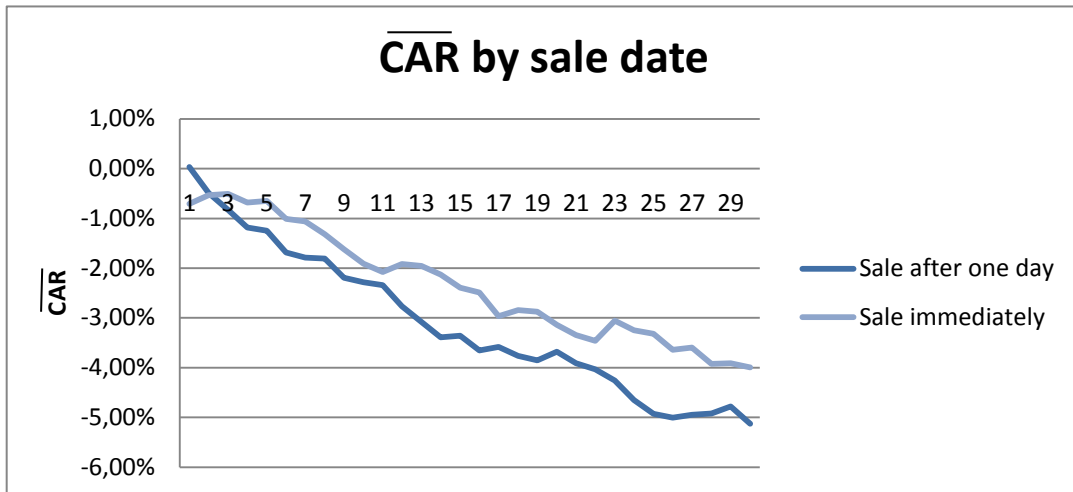

Figure 6.

Table 3. $\overline{CAR}$ **by event date**

Event window	$\overline{CAR}$	p value t-statitics	p value Wilcoxon	Normality test	H$_0$ Rejected
		Immediate sale			
5 days	-0,0065	0,084	0,280	<0,05	**No**
15 days	-0,0240	0,002	0,000	<0,05	**Yes**
30 days	-0,0399	0,000	0,000	<0,05	**Yes**
		Not immediate sale			
5 days	-0,0125	0,006	0,001	<0,05	**Yes**
15 days	-0,0336	0,000	0,000	<0,05	**Yes**
30 days	-0,0513	0,000	0,000	<0,05	**Yes**

The results show that option exercise followed by immediate sale is associated with higher negative $\overline{CAR}$ (-4%) for the 30 day event window compared to transactions that occurred after one day (-5%). Moreover the shortest event window for immediate sale transactions does not result in statistically significant $\overline{CAR}$. The results do not support the assumption that immediate sale is associated with larger negative abnormal returns, however in both transaction types insiders avoid wealth decrease by selling the shares. The immediate sale can have lower signalling effect, because investors see a combined transaction on one day *i.e.* both exercise transaction and sale transaction appear on the same day. If insider exercises the option and sells the shares immediately, then the sale transaction can be perceived as insider´s need for liquidity or willingness to diversify. However if the sale transaction is made later, the transaction is seen in isolation and perceived as a signal of negative firm prospects. Immediate sale is thus less likely to be mimicked by investors and affect stock price.

6.4 Subsamples based on insider position

Figure 7 summarizes share of transactions made by respective insider category as published by the Swedish Financial Supervisory Authority. The analysis is subdivided into higher-ranked insiders and lower-ranked insiders, the former consists of transactions made by CEOs, vice CEOs and board members in parent company and the latter sample consist of remaining insiders.
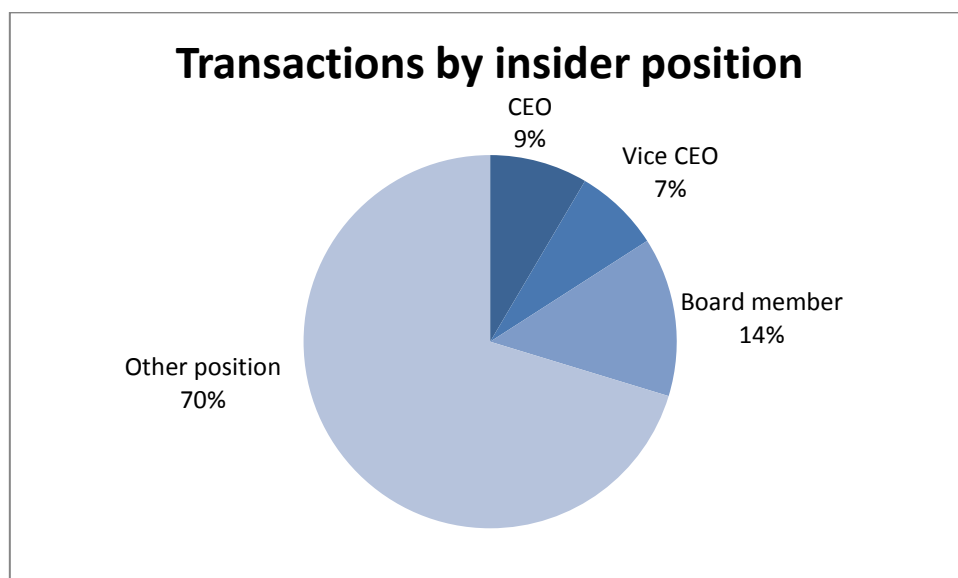

Figure 7.

Table 4 presents the results for statistical tests for the two samples. Null hypothesis for higher-ranked managers cannot be rejected for 5 and 15 day estimation window. For lower-ranked insiders the tests show significant abnormal returns for all three event windows.

Table 4.			$\overline{CAR}$ by insider position		
T					
Event window	$\overline{CAR}$	p value t-statitics	p value Wilcoxon	Normality test	H_0 Rejected
			Higher -ranked insiders		
5 days	-0,0063	0,187	0,473	<0,05	**No**
15 days	-0,0266	0,016	0,120	<0,05	**No**
30 days	-0,0318	0,035	0,007	<0,05	**Yes**
			Lower-ranked insiders		
5 days	-0,0115	0,001	0,000	<0,05	**Yes**
15 days	-0,0309	0,000	0,000	<0,05	**Yes**
30 days	-0,0530	0,000	0,000	<0,05	**Yes**
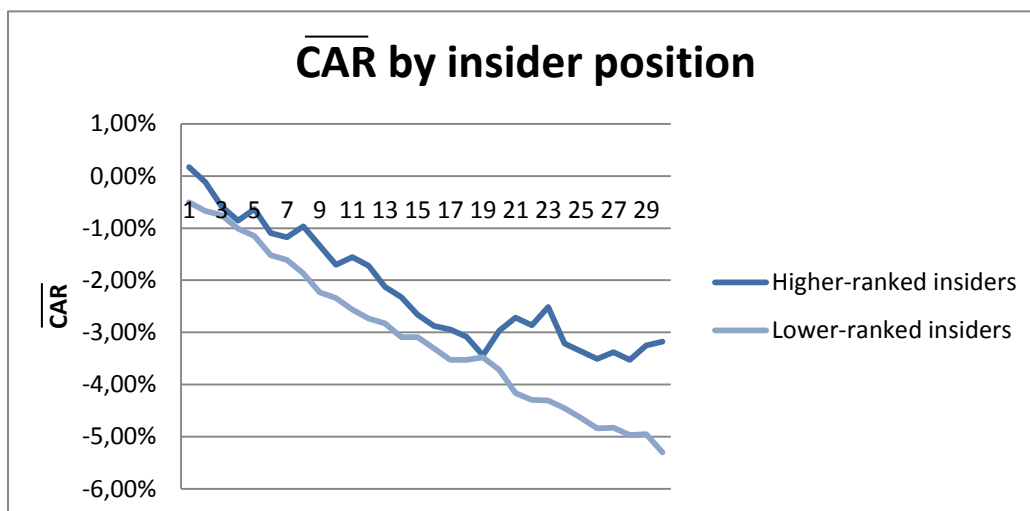
Figure 8

The subdivision into insider position is based on the assumption that higher-ranked insiders possess more valuable information compared to lower-ranked insiders. Accordingly, higher-ranked executives should be able to benefit the most from timing their option exercise and avoid larger wealth decrease. Findings in table 4 do not support this assumption, since $\overline{CAR}$ for day 30 are larger for lower-ranked insiders (-5,3%)

compared with higher-ranked insiders (-3,2%). Both insider classes avoid wealth decrease during the 30 days after the stock sale transaction. These results are not in line with previous findings by Seyhun (1986) and Carpenter & Remmers (2001) who show that higher-ranked managers are better at predicting stock prices since they have more information about the company. The fact that $\overline{CAR}$ for 30 day event window are lower for higher-ranked insiders can have several explanations. One explanation can be that actions by higher-ranked managers are more monitored by investors, which makes it more risky to exploit information. Another explanation can be that it presumably is more important to align goals of higher-ranked managers by tying their wealth to the company. This can be achieved by constraining higher-ranked insiders' possibilities to sell shares after exercising their options. Lower-ranked insiders may not be constrained to sell shares, thus enabling them to exploit their informational advantage to a larger extent and consequently avoid wealth decrease.

Insignificance of the abnormal returns after stock sale by higher-ranked insiders can be explained by their need to diversify. Since higher-ranked managers have more of their wealth tied to a company, the shares obtained from option exercise are sold to decrease risk of wealth decrease and not necessarily to exploit insider information.

Chapter 7 – Conclusion

The final chapter concludes the study based on the empirical findings and the analysis, chapter concludes with suggestions for future studies.

The study provides new evidence of insiders' ability to utilize their informational advantage, which confirms the general findings of previous studies on Swedish stock market. The findings reject the efficient market hypothesis in its strongest form.

On aggregated level, the insiders are able to predict stock price and sell their shares before the decline in stock price. The stock sale transactions examined in this study are preceded by option exercises, which suggest that the option exercises and consequent stock sales are timed to avoid wealth decrease. Stock sales after option exercises can be assumed to have less informational content because outsiders might interpret it as part of insiders' compensation. This study shows that option exercise with consequent sale of shares can convey important information about future stock price performance. Contrary to an assumption that insiders sale transactions is not informative because insiders have many reasons to sell the shares, this study provides support for the fact that insiders seem to know when to sell their shares.

Higher-ranked managers seem to be worse at predicting future stock price although they have presumably more information about the firm. The result is contradicting empirical findings from international studies. This finding can be a result of efficient monitoring mechanism in Swedish financial markets. Since higher ranked managers are more monitored they can be reluctant to exploit their informational advantage and risk regulatory actions. On the contrary, this implies that lower-ranked insiders are less monitored and get to exploit their informational advantage.

Insiders in smaller firms seem to be better at utilizing their informational advantage, which is in line with findings of similar international studies. The higher stock price decrease after insider sales in smaller firms can have an alternative explanation derived from signalling hypothesis. Smaller firms suffer from more severe information asymmetries which results in sale transaction being stronger signal about firm´s future prospects. The signalling effect can thus decrease stock price if outsiders interpret it as bad news and put downward pressure on stock price.

Sale of shares immediately after the option exercise is not a signal of more severe stock decline than shares sold later during a month consequent to the option exercise. The implication of this finding is that insiders want to diversify immediately after they exercise their options and the stock sale in itself is not caused by negative information about future stock price.

A suggestion for further research could naturally be to analyze post-exercise stock performance for insiders who keep their shares. International studies have concluded that insiders who keep their shares after option exercise experience positive abnormal returns. Another suggestion is to analyze the relationship between option exercise and insiders´ private wealth or risk exposure to determine motives behind option exercise decisions.

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Databases

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Thomson Reuters datastream

Finansinspektionen https://fiappl.fi.se/FinansCentralen/search/Search.aspx

Appendix 1

OMX Stockholm Small Cap Price Index (OMX S SCPI)

Index representing the bottom 20% of the shares based on market capitalization. The index is reviewed semiannually to ensure that only the bottom 20% of shares is included in the index. Price index implies that cash dividends are not reinvested in the index. Thereby the price return index only yields performance of stock price movements. Index is adjusted for corporate actions (splits, reversed splits, new shares issues *etc.*)

OMX Stockholm Mid Cap Price Index (OMX S MCPI)

Index representing all shares listed on OMX Stockholm Mid Cap, which contains firms with market capitalization of between 150 and 1000 million euro. Dividends are not reinvested in the index. Index is adjusted for corporate actions (splits, reversed splits, new shares issues *etc.*)

OMX Stockholm 30 Price Index (OMX S 30 PI)

Index comprised of 30 most traded shares. Cash dividends are not reinvested in the index. Index is adjusted for corporate actions (splits, reversed splits, new shares issues *etc.*)

OMX Stockholm Benchmark Price Index (OMX SBPI)

Index representing 80 to 100 largest and most traded stocks on Stockholm stock exchange. Cash dividends are not reinvested in the index. Index is adjusted for corporate actions (splits, reversed splits, new shares issues *etc.*)

Carnegie Sweden Small Cap Price Index (CSX PI)

Index representing performance of "smaller" companies listed on Stockholm stock exchange. Definition of "smaller" companies is revised annually by taking into account total capitalization of Carnegie Nordic Total Index. Index is adjusted for cash dividends so that performance of the index reflects stock price performance. Index is adjusted for corporate actions (splits, reversed splits, new shares issues *etc.*)

Source:

http://www.carnegie.se/sv/foretag/Kurser--index/Carnegie-Nordic-Ind-X/Viktningsrapporter/Indexaktie/

http://omxnordicexchange.com/produkter/index/OMX_index/OMXS_Local_Index/

https://indexes.nasdaqomx.com/docs/Methodology_NASDAQ_OMX_and_Oslo_Bors_Equity_Indexes.pdf

Appendix 2

Firms represented in the study

Academedia	Hemtex	Ratos
Acando	HiQ International	Raysearch Laboratories
Active Biotech	HMS Networks	Riddarhyttan Resources
Addnode	HQ	Sagax
Addtech	Human Care	Sandvik
Anoto Group	Höganäs	Sanmina Kista
Aspiro	IBS	Sapa
Atlas Copco	Intrum Justitia	Scania
Atrium Ljungberg	Invik & Co	Scanmining
Avanza Bank Holding	Jeeves Information Systems	Semcon
Axfood	Karlshamns	Sensys Traffic
B&B Tools	Kipling Holding	Shelton Petroleum
Bilia	Klövern	Sigma
Billerud	KMT Group	Skandinaviska Enskilda Banken
Biosensor Applications	Know It	SKF
Sweden	Lagercrantz Group	Song Networks Holding
Björn Borg	Lindex	Sotkamo Silver
Boss Media	Lundin Mining Corporation	Starbreeze
BTS Group	M2S Sverige	Strand Interconnect
Capio	Meda	Svenska Cellulosa
Cision	Melker Schörling	Tanganyika Oil Company
Consilium	Midsona	Technology Nexus
Countermine Tecknologies	Modern Times Group	Tele 2
Custos	Multiq	Teleca
Cybercom Group	NCC	Telefon AB L M Ericsson
D. Carnegie & Co	Net Insight	Telelogic
DGC One	Netonnet	Teligent
Diamyd Medical	New Wave Group	TMG International
Electrolux	Nobia	Trelleborg
Elekta	Nordea Bank	Trio
Europolitan Vodafone	Nordic Service Partners Holding	Turnit
Firefly	Nordnet	Uniflex
Frango	Obducat	Utfors
Gambro	OEM International	Volvo
Geveko	PA Resources	Vostok Gas
Glocalnet	Prevas	Zodiak Television
Guideline Technology	Pricer	
Gunnebo	Protect Data	