Disposition

Chapter 1 - Introduction

The thesis will begin by giving an introduction to the concept of abnormal return and the indications that shows that this might be possible in the Swedish bank sector by following insider trading. It furthers analyses earlier research regarding mimicking insider trading and illustrates how this study differes from theirs. Also a clear purpose will be stated that will be the backbone of this thesis.

Chapter 2 - Methodology

In the second chapter a explanation of the the use of an Event study will be given. The chapter also provides which data that will be used and the description and motivation of the use of the concept CAAR. Last there will be a list of common mistakes one must be careful about when conducting empirical research.

Chapter 3 - Theoretical Framework

Here will the criterias for abnormal return be described. After that two theories regarding the state of the market will be presented. Those are EMH and BF, and they describe if and/or why abnormal return could appear in a market.

Chapter 4 - Empirical Findings

In this chapter the empirical results of both the bank sector as a whole and each individual bank will be presented by several tables. Both buy and sell transactions are observed and these are based on selfcreated databases. Both statistical and economical significance will be tested.

Chapter 5 - Analysis

Here the analysis of the results from the empirical findings will be compared to earlier findings. Further the finacial theories presented in chapter three will be applied in order to describe the observations.

Chapter 6 - Conclusion

In the last chapter a reflection of the analysis regarding what information this study has presented will be given. Here will also be a statement whether the bank sector coincides with the EMH or not. Finally there will be suggestions for further research based on the findings of this study.

Table of Contents

Appendix

Equation

Figure

Table

1 Introduction

Here an introduction of the possibilities of abnormal return will be presented. There will also be a motivation why the four big banks in Sweden are interesting to investigate. Then results of previous research will be presented, in order to give the reader a broader view of what to expect from the result of this study.

Achieving an abnormal return on your investment is something investors are trying to achieve. The definition of abnormal return is "*A rate of return for taking a particular risk is greater than that required by the market"* (Law, 2008). A lot of attempts have been made to try and find an investment strategy that always generates abnormal return, although none has been proven to be absolute.

This is according to Fama (1970) what to be expected, since markets are considered to be efficient[1]. He stated that in most markets there is no possibility to earn abnormal profit on public available information, but he admitted that trading on non public available information could be used to get an advantage. This also coincides with later research[2] which concludes that insiders do earn abnormal profit on their trades.

For markets to have the best possibilities for being efficient, it must be a large and competitive market where information transmitted rapidly (Elton, Gruber, Brown and Goetzmann, 2011). That the American market is large, where Fama did his studies, is unquestionable. Whether or not the Swedish market is large enough to be considered efficient has not been proven. When it comes to the competiveness factor, there is a branch in the Swedish market that cannot be seen as complete competitive. This branch is the large-cap banks.

The large-cap banks in Sweden are few and they have all been caught for delaying their insiders' transactions, which is a clear sign for illegal insider trading according to Seyhun (2000). When analysing the aspects[3] necessary for earning abnormal return for outsiders, there are indications that it might be possible to mimic the insiders in the Swedish large-cap bank sector to earn abnormal return.

[1] See chapter 3.2

[2] See chapter 1.3

[3] See chapter 3.1

1.1 Background

In order to try to prohibit insiders from trading on non public information on the Swedish market, several laws have been constructed[4]. In Sweden it is the government elected Financial Supervisory Authority[5] (FI) who has the responsibility to overview the market. Their purposes according to themselves are:

Monitors and analyses trends in the financial market. We assess the financial health of individual companies, the various sectors and the financial market as a whole. We examine the risks and control systems in financial companies and supervise compliance with statutes, ordinances and other regulations. We also supervise compliance with the Swedish Insider Act, investigate cases of suspected offences and share price manipulations (FI, 2011).

The authority is the Swedish version of the U.S. Securities and Exchange Commission (SEC).

According to the Swedish law, every person who is considered to be an insider person must register their transactions on the market to the FI. This must be done within five days from the day of the transaction. All these transactions are then summoned into an insider trading database on FI's webpage, which is open to the public. If they find any companies that do not follow these rules, they will issue a flag to the company, which then must pay a fee.

In Sweden there are four banks which are considered to be large-cap (Swedish Bankers Association, 2011). Those are Svenska Handelsbanken (SHB), Nordea, Swedbank and Skandinaviska Enskilda Banken (SEB). When analyzing the companies that are among the top ten companies to be flagged in 2010 all the four big banks were included (Table 1-1).

Table 1-1, Times being flagged by FI (position)

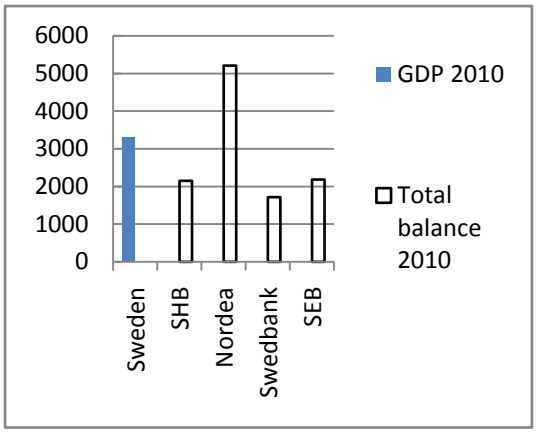
	2010	**2009**	**2008**
SHB	15 (8)	3	6
Swedbank	30 (5)	62	46
Nordea	15 (8)	20	27
SEB	44 (2)	30	21

This is according to Seyhun (2000) an indication that the insiders are trading on insider information. He claims that when insiders do trade on special information and want to avoid regulatory attention, they will delay their reporting as much as possible. They would even choose to report later than required by law because they calculate that the information is worth more than the potential fee sentenced by the regulatory force.

[4] See Chapter 1.2

[5] In Swedish "Finansinspektionen"

Figure 1-1, Swedish GDP and banks total turnover



In order to see the banks' control in the Swedish market we can note that in 2010 the Swedish GDP was 3 308 billion SEK (SCB, 2011). In the same year SHB, Nordea, Swedbank and SEB showed a total balance of 2 153, 1 715, 2 179 and 5 207 billion SEK respectively[6] (Figure 1-1). This indicates that these banks are too big to fail. If any of the banks would go into bankruptcy, the economic backswing in Sweden would be devastating and which would take years to recover from. As long as the four big banks control their dominance in the bank market, the situation is likely to remain the same. The sector cannot be seen as purely competitive since there are too few players competing at the top level.

Therefore an investor has the information that the banks will not default. This minimizes some risk and according to Seyhun[7] (2000), minimizing risk is one of the key factors in order to exploit insider information. Further the investor knows that the insiders in these banks delay their transactions information and slows down the speed of information, which weakens that aspect, which is assumed to hold in order for the theory of efficient markets to work efficiently. It would therefore be interesting to explore if these indications can result in achieving abnormal returns for outsiders. In order for outsiders to benefit from the insiders' trading, the insider must be trading on special information. The Swedish government, like many other governments, however try to make the insiders transactions as transparent as possible by applying laws concerning insider trading.

1.2 Insider Trading Law

The law against insider trading was introduced in 1985 and has since then been reinforced in 1991, 2000 and 2005. The law is called "Market Abuse Penal Act" (2005:377) and states that it is illegal to trade on information which is not public. Further it prohibits its disclosing inside information which would otherwise influence the price of the financial instrument. In other words it states that you are not allowed to influence the share prices in an improper way. An additional act called "Act concerning Reporting Obligations for Certain Holdings of Financial Instruments" (2000:1087) states that people who are to be considered insider persons must report their actions on the market to the FI. In Sweden there are different types of insider persons. Each of which must report their actions on the market within five days from the occurrence of the transaction.

[6] Numbers are taken from each bank annual reports.

[7] See chapter 3.1

Active insiders are those who inherit a position where they will get exclusive information first handed. Then there are those who are to be considered non-active insiders. These are the ones who have the opportunity to possess the exclusive information from the active insiders before any other. These can be seen in Table 1-2 and this study will regard both kinds of insiders equal.

Table 1-2, Definition of active and non-active insiders (Taken from FI)

Active Insiders	Non-active Insiders
- A board member of the company or in the parent company, - 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, - A holder of another senior executive post or qualified function of a permanent nature at the company or its parent company, - If the post or function can normally be considered to have access to non-public information, - A holder of a senior executive post or a service provider if they may normally be considered to have access to non-public information, - Larger shareholders who own at least ten percent of the share capital or number of votes for all shares in the company.	- The spouse of the person with an insider position, - Children who are in the custody of the person with an insider position, - Other closely related parties for example if they have shared a household with the person who has an insider position for at least one year, - A legal person whose activities are significantly influenced by the person with an insider position or total share of votes of ten per cent or more.

The purpose of regulating insider trading has been criticised. Anthony Evans (2009), who is a columnist for The Guardian, says that all markets would be better off by legalizing illegal insider trading. He argues that by eliminating the boundary between what information you can use and cannot use, then trading on what was before regarded as illegal insider trading would then be reflected in the stock-price. Bourdreaux (2003) argues that the idea of regulating insiders does not protect any part and that it keeps information from being able to flow free. His argument is that by abandoning the regulations only the experts will remain on the market and thereby making the market efficient. Those people who think the regulations are good for eliminating unfairness in the market, he responds;

> *If I embark upon an occupation that I know nothing about — say, running a restaurant — I am likely to suffer substantial losses. These losses would result from the competition of other restaurants run by people who possess more knowledge about the restaurant business than I do. No one thinks that the industry-specific knowledge possessed by experienced restaurateurs gives them any advantage that is unfair*.
>
> -Bourdreaux, 2003

Even though there are those who oppose the insider trading laws, the laws are still active. However, when analyzing previous research, these laws do not seem to prohibit insider trading as they were designed to do.

1.3 Earlier studies

Since the theory of efficient markets[8] was developed by Fama (1970), several studies have been performed in order to test it. Fama claimed that markets which are "large" are efficient up to at least the semi-strong level. When analysing the effects of outsiders mimicking insider trading, we are in fact testing the semi-strong efficiency. In order for the outsider to earn from the insiders action, the insider must also make money resulting in that the insiders must have new information. One of the first to test this was Jaffe (1974), who investigated the New York Stock Exchange market and revealed that insiders do possess special information. He also found that for outsiders this information vanished when the transaction cost was taken into account, except for one strategy. The findings suggested that to make abnormal profit as an outsider, one must invest only in intensive trading companies and then hold the stocks for eight months. He further acknowledged that the size of the insider transaction did not affect the value of the information contained in the insider transaction.

Other studies have shown similar results, such as Seyhun's study from 1986. He studied 60 000 observation of insider transactions from 1975 to 1981 with data taken from SECs *Official Summary*. He concluded that insiders can gain from their information and that they also can determine the value of the information they have. From an outsider point of view he found that it was not profitable to mimic the insiders' transactions. This because, during this period it took two months for the public to receive the information that an insider trade had taken place, which by the time it became public was worthless. Firth, Leung and Rui (2011) also found indications that insiders have special information, but that it is difficult to gain from it as an outsider. They tested whether the Hong Kong market was affected by insider trading. When they analysed the insider's transactions between 1993 and 1999, they discovered that insiders do earn excessive profits on both buy and sell transactions. They even revealed that sell transactions contain more information than buy transactions, which is contrary to Bettis, Vickrey and

[8] See chapter 3.2

Vickrey (1997) findings (see below). When trying to mimic the insiders' action, Firth et al. found that there were little, to no gain from such a strategy. In Europe, Del Brio, Miguela and Perote (2002) discovered that also the Spanish market, based on data between 1992 and 1996, gave indication that insiders' special information could not be used by outsiders as an investment strategy.

From these studies there seems to be no opportunity of getting abnormal return as an outsider, indicating that markets are indeed efficient in the semi-strong form. There have, however, been studies which have showed that outsiders are able to earn abnormal return by following insiders. Bettis, Vickrey and Vickrey (1997) did their test by observing insider trades during 1985 to 1990 on the New York Stock Exchange. They found that outsiders can indeed make abnormal return by following insider transactions. Their result showed however that only buy transaction gave abnormal returns while sell transactions did not generate abnormal returns. Further they realized that the reporting delay had a huge impact on the return. In other words, the sooner the market gets the information about an insider transaction has taken place, the more valuable is that information to outsiders. Zingg, Lang and Wyttenbach (2007) found that there are possibilities for outsiders to earn abnormal return by mimic insiders' transactions. However they only found this to be true for the buy transactions. They observed transaction on the Swiss market between 2005 and 2006. Across the Atlantic, Lakonishok and Lee (2001) did a study on the US market and discovered that the market does not react when insider trading occurred. They further found that only buy purchases prove to contain valuable information. Even though they found a profit opportunity for outsiders, they claimed that creating a good investment strategy is not straightforward. This is because insider trading in high liquidated stocks contains less information while investing in small liquid stocks is more costly.

Cheuk, Fan and So (2006) tested the Hong Kong market between 1993 and 1998, and they found that insiders earn abnormal profit from both buy and sell transactions. In contrary to Firth et al (2011) findings they claimed that as an outsider there was a profitable strategy for sell transactions. The abnormal profits from buy transactions were too small to be profitable.

Eckbo and Smith (1998) did their study on the Norwegian market, which have similar trading laws and market size as the Swedish market. They found that on the Oslo Stock Exchange, based on data from 1985 to 1992, there could not be proven that there were any signs of abnormal gain by the insiders trading, which concluded that the Norwegian market was in a strong form state. Therefore there were also no gains for the outsiders to profit by mimicking the insiders. They however do not discuss why the Norwegian laws concerning insider trading are more effective than in other countries.

A summary is presented in Table 1-3. When observing it there seems to be a clear pattern that insiders do trade on special information, but whether an outsider would be able

to profit from this seems inconclusive. Overall it appears that buy transactions contain more information than insiders' sell transactions.

Table 1-3, Overview of earlier findings

Study	Country	Data	Insiders earn abnormal return	Outsiders mimicking insiders earn abnormal return.
Jaffe (1974)	**USA**	**Monthly**	**Yes**	**No**
Seyhun (1986)	**USA**	**Daily**	**Yes**	**No**
Bettis et al (1997)	**USA**	**Daily**	**Yes**	**Yes**
Eckbo and Smith (1998)	**Norway**	**Daily**	**No**	**No**
Lakonishok and Lee (2001)	**USA**	**Monthly**	**Yes, for buy transactions**	**Yes, for buy transactions**
Del Brio et al (2002)	**Spanish**	**Daily**	**Yes**	**No**
Cheuk et al (2006)	**Hong Kong**	**Daily**	**Yes**	**Yes, for sell transaction**
Zingg et al (2007)	**Switzerland**	**Daily**	**Yes, for buy transactions**	**Yes, for buy transactions**
Firth et al (2011)	**Hong Kong**	**Daily**	**Yes**	**No**

1.4 Problem discussion

Based on the previous studies in chapter 1.3, the insiders are trading on special information. This give indications that an insider can, and do, trade on non public information in Sweden as well. However the results from whether or not outsiders can benefit from this are mixed. Fama (1998) argued that, if there exists an abnormal return opportunity it must exist in all of the economical states and not only during a specific bad time or specific good time. This means that the opportunity must exist during both recessions and booms. In general large-cap companies are better equipped to deal with recessions than small-cap companies (Bodie, Kane and Marcus, 2009). Therefore if abnormal profit would be available while minimizing risk, it should be found within large cap stocks.

In Sweden there exists an indication that the four big bank insiders are trading on insider information. This is a requirement in order for the outsiders to be able to profit from mimicking insider trading. Because of stricter insider trading laws the reporting delay for insiders transactions has shrunk compared to earlier years and has created a more transparent flow of information. However, the banks' insiders seem to slow down

the speed of information, indicating that they are trying to maximize their profit on special information. The four banks are all large-cap, hence should not reveal as much extra information when insiders trade (Lakonishok and Lee, 2001). There therefore exist many contradictory observations regarding the possibilities for abnormal return. This is what makes it interesting to find out if the possibility actually exists.

While a lot of studies have been made on international markets, especially the American market, there have not been any recent peer-reviewed articles constructed on the Swedish market regarding outsider mimicking insider trading. Further, according to my concern no studies have been done that analyse a special segment within the market.

1.5 Purpose

The purpose of this thesis is to explore whether there exist an opportunity in the Swedish bank sector for outsiders to earn abnormal return based on insiders' transactions. In the process an indirect test will be made to see if the semi-strong form of efficiency holds for the Swedish bank sector.

1.6 Method

In order to determine whether or not there is a possibility to make abnormal return by following insider trading in the banks, the results must also be statistically and economically significant. With the intention of achieving this, the hypotheses will be based on earlier research and findings and test these against my empirical data. The data is collected from the Financial Supervisory Authority and Nasdaq WebPages. The conclusion will come from the empirical findings and state whether or not the results are in line with economic theories and earlier research.

2 Methodology

This chapter will start by presenting the approach I have chosen in order to get as good results as possible. Then the concept of the event study will be introduced. Finally a motivation will be given towards the usage of the different tests that will be used.

2.1 Method approach

The philosophical statements are important to have in mind when doing research. According to Saunders, Lewis and Thornhill (2009) there are four aspects of the term philosophy. They are;

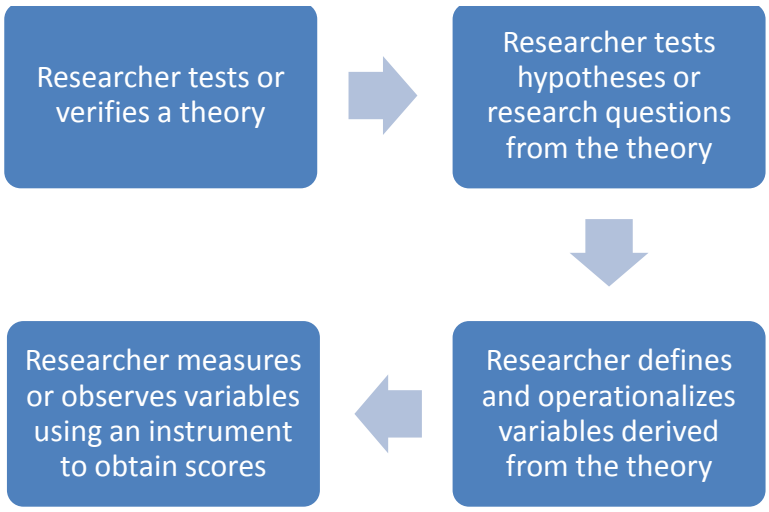
- Positivism
- Realism
- Interpretivism
- Pragmatism

Positivism states that you take the position of "the natural scientist". When wanting to try to find out an answer by collecting quantitative data and applying theories, then the researcher is using the positivistic philosophy. This study is therefore using the positivistic philosophy[9].

2.2 Research approach

In general there are two ways of conducting a research. They are the deductive approach and the inductive approach. Creswell (2003) explains that when doing a quantitative analysis the best way to do is by following a deductive approach. Figure 2-1 shows the steps in a deductive model for quantitative studies. The researcher verifies a theory by

Figure 2-1, Research process, (Creswell, 2003)



[9] See Saunders et al (2009) to read about the other aspects.

constructing hypotheses derived from theory. This is the method that will generate the best solution toward the research (Creswell, 2003). Inductive testing is the deductive testing but in reverse. This kind of approach is more applicable when conducting qualitative researches. Therefore instead of sticking my hand into the fire ten times to see if it is warm each time (inductive), the assumption will instead be that the fire is warm and the research will start from there (deductive).

After focusing on those aspects, it is important to start determine what kind of tests one wants to conduct.

2.3 Event study

When testing for semi-strong form, a very widely used method is to construct an event study (Elton, Gruber, Brown and Goetzmann, 2011). Event studies were originally designed by Fama, Fisher, Jensen and Roll (1969) in order to measure how stock prices respond to new information.

When constructing the event study, this thesis will follow the eight steps presented by Elton et al (2011).

1. *Collect a sample of firms that had a surprise announcement.* The "surprise" will be when any insider in the banks makes a buy or sell action within the bank stocks and that action from the insider becomes public.

2. *Determine the precise day of the announcement and designate this day as zero.* The precise day when the action happens will be constructed as day zero. This study will use daily data to test the before and after effects.

3. *Define the period to be studied.* The intervals will differ from -10 up to + 120 days (see Figure 2-2).

4. *For each of the firms in the sample, compute the return on each of the days being studied.* The expected return will be calculated with the market model[10].

5. *Compute the abnormal return for each of the days being studied for each firm in the sample.*

6. *Compute for each day in the event period the average abnormal return for all the firms in the sample.* Meaning that all the transactions within the banks will be added together, and then calculate the average.

7. *Often the individual day's abnormal return is added together to compute the cumulative abnormal return from the beginning of the period.*

8. *Examine and discuss the results.*

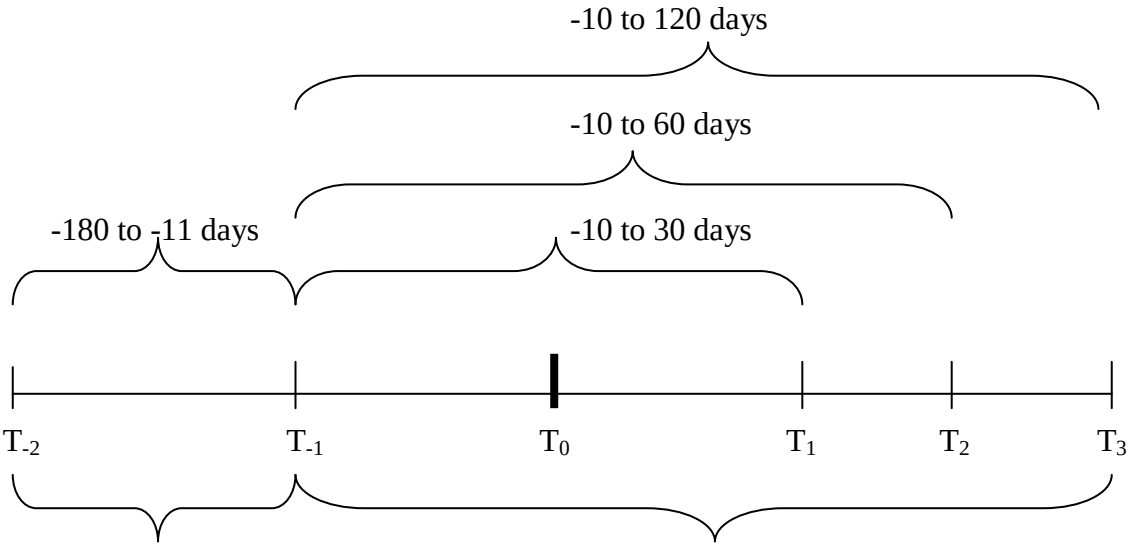
[10] See chapter 2.4

What the test does is that it helps observing anomalities at a certain point of time, which is very useful when one wants to see the market movement from insider trading.

2.3.1 Estimation window

The estimation window (Figure 2-2) is constructed in order to be able to calculate parameters for the expected return model and will symbolise the state of the market before the event. According to Mackinlay (1997) the estimation window should be no longer than 250 days before the event. In this study the estimation window will be between -180 to -11 days prior to the event.

Figure 2-2 Event window and Estimation window



2.4 Abnormal return

To be able to calculate the abnormal return, one must first calculate the expected return. To calculate the expected return one must first define what kind of return that will be used; daily, weekly or monthly. This study uses daily data because it shows a more precise movement of the stock prices (Aczel and Sounderpandian, 2009). There are also two ways to calculate the daily return. One is by using discrete values and the second by using logarithmic values. This study will use logarithmic return (Equation 1) since it is better at constructing normally distributed results than the discrete method, which increases the power of the t-test (Aczel and Sounderpandian, 2009).

$$R_{it} = ln\frac{P_{it}}{P_{it-1}} \quad (1)$$

Where;

P_{it}= closing price of day t in security i
P_{it-1}= closing price of the day before t in security i
R_{it}= return on day t, in security i

There are four models that are widely used to determine expected return (Copeland, Weston and Shastri, 2005). These are the CAPM-based method, empirical market line, the multifactor cross-sectional model and the market model. The empirical technique of constructing the CAPM and the empirical market line are subject to Roll's critique[11]. He argued that it is mathematically impossible to get statistical significant abnormal return by using those methods and therefore those methods will not be applied. The multifactor cross sectional model is better when comparing performance by different sizes and since in this study all the companies are large cap stocks; this kind of model will not be used.

By conclusion the market model will be applied, which has also been used increasingly in finance (Elton et al, 2011). The market model states a linear relationship between the return and the market and is seen in Equation 2.

$$R_i = a_i + \beta_i R_m \tag{2}$$

Where $a_i = \ return\ independent\ of\ the\ market\ return$, and can be put as;

$a_i = \alpha_i + e_i$, where $\alpha_i = expected\ value\ of\ a_i$, and $e_i = random\ element\ of\ a_i$

We get;

$$R_i = \alpha_i + \beta_i R_m + e_i \tag{3}$$

Where;

$R_i = Actual\ return\ in\ security\ i$

$\beta_i = Responsiveness\ in\ security\ i\ to\ the\ market\ return$

$R_m = Market\ return$

The market index in this thesis is a bank index called OMX Stockholm Banks PI, it has been chosen to minimize the non-systematic risk.

This leads to the expected return that can be seen in Equation 4.

$$\bar{R_i} = \alpha_i + \beta_i \bar{R}_m \tag{4}$$

Were;

$\bar{R_i} = \ Expected\ return$

$\bar{R}_m = Expected\ market\ return$

The abnormal return (AR) is then calculated as in Equation 5.

$$AR_i = \ R_i - \bar{R}_i \tag{5}$$

[11] Read more in Roll R (1977)

2.5 Cumulative Average Abnormal Return

Trying to determine whether the actions of insiders in certain companies have significant effects, constructing AR will not be sufficient. Instead one should apply the Cumulative Average Abnormal Return (CAAR) when constructing event studies (Kothari and Warner, 2006). This is done by first calculating the Cumulative Abnormal Return (CAR) (Equation 6).

$$CAR_{it} = \sum_{t=1}^{n} AR_{it} \quad (6)$$

To calculate the average of the result from CAR, the procedure can be seen in Equation 7.

$$CAAR_{it} = \frac{1}{n} \sum_{t=1}^{T} CAR_{it} \quad (7)$$

2.6 Hypotheses

Lakonishok and Lee (2001) found that the market does not respond when the news of an insider transaction has occurred, resulting in an opportunity to get abnormal return on the investment since insiders indeed were trading on special information. It would therefore be interesting to see if that same opportunity exists within the Swedish banks. The first Hypothesis is therefore conducted in order to see if the market regards the announcement of insider trading to bring new information about the companies or not. Both buy transactions and sell transactions will be analysed.

H_0: $CAAR_0 = 0$, No new information

H_1: $CAAR_0 \neq 0$, New information

In order to see if the market responded correctly on the event day or not, a test on the CAAR some days later of the event day must be done. Stocks in banks purchased by insider persons and employees are not allowed to sell their stocks until 30 days has passed. This makes controlling any time shorter than this irrelevant. Therefore test on the 30^{th}, 60^{th} and 120^{th} day has been decided and will be analysed. The maximum of 120 days has been chosen to further minimize the problem of cross-correlation which Kothari and Warner (2006) warns about (see below).

The second hypothesis is constructed to see whether the market responded correctly at the event day or if there is an opportunity for an outsider to gain abnormal return by following insider traders in any of the four banks.

H_0: $CAAR_{30,\ 60,120} = 0$

H_1: $CAAR_{30,\ 60,120} \neq 0$

2.7 T-test

When testing a hypothesis it is important to have a strong power of the test (Aczel and Sounderpandian, 2009). The power is measured in the probabilities of Type 1 and Type 2 error to occur. The errors are shown in Table 2-1.

Table 2-1, Type I and Type II error

	H_0 True	**H_0 False**
Not reject H_0	No error	Type II error
Reject H_0	Type 1 error	No error

The most used type of testing the significance is to use the T-test. In order for the T-test to work properly, the result must be following normal distribution. It is calculated in Equation 8.

$$T - test = \frac{CAAR_t}{(\sigma_{CAAR} / \sqrt{n-1})} \quad (8)$$

The result is then tested against a distribution table and can be tested against different levels of significance. The results that are showing a 90% significance will be noted but not be assumed to be significant in the analysis.

A number of studies has shown that by using CAAR in the long run the distribution will not necessarily be normal, meaning that the Central Limit Theorem[12] (CLT) (the assumption of when n>30, the distribution becomes normal) does not apply (Lyon, Barber and Tsai, 1999 & Kothari and Warner, 2006). Another problem in the long run is the problem with cross-correlation between the event windows. The definition of long run is tests of one year or longer (Jegadeesh and Karceski, 2009). Since this test involves at most up to the first 120 days after the event, these problem will not affect the results as much. Nevertheless in order to minimize the problem with the data not being normal distributed, a non-parametric test will be conducted, which does not need the assumption of normal distribution to hold.

2.8 Wilcoxon signed rank test

This test is useful when testing comparison between two populations, often used in "before and after" studies (Aczel and Sounderpandian, 2009). In this test the expected return will be the "before" population and the actual return will be the "after" population. The test also takes into consideration the magnitude of the difference between the populations by dividing them into ranks. Then you sum up all the negative (in this case when expected return ≥ actual return) ranks absolute value. This result generates a value that is tested against a table chart for different levels of significance and sample sizes. If this value is greater than the critical point, the null hypothesis cannot be rejected (Aczel and Sounderpandian, 2009).

[12] See Aczel and Sounderpandian (2009)

Table 2-2, Wilcoxon signed rank test

Observation	Actual return	Expected return	Difference (D)	Rank absolute numbers	Rank of positive D	Rank of negative D
1	2	1	1	1	1	
2	3	5	-2	2		2
Etc.					∑+=1	∑-=2

From the example in Table 2-2 the Wilcoxon T value is 2, if the critical value where to be 3, then we would have rejected the null hypothesis.

In this research the standardized Z-statistic (Equation 9) will be used to determine the significance of the Wilcoxon test.

$$Z = \frac{T - E(T)}{\sigma_T} \tag{9}$$

Where;

$$E(T) = \frac{n(n+1)}{4} \tag{10}$$

$$\sigma_T = \sqrt{\frac{n(n+1)(2n+1)}{24}} \tag{11}$$

This rises however the question of which of the test to go on, when the T-test and the Wilcoxon test shows contradictive results. Therefore in order to determine that the chi-square test for normal distribution will be used.

2.9 Chi-square test for normal distribution

In order to see which of the test should be more emphasized when n>30, a Chi-square test for normal distribution will be applied. It is constructed by dividing the data in six different interval based on the data's value. From there it calculates the chi-square value according to Equation 12. If the p-value of the chi-square test is lower than the significance, then we cannot assume a normal distribution and the non-parametric test will have greater power than the t-test.

$$\chi^2 = \sum_{i=1}^{k} \frac{(O_i - E_i)^2}{E_i} \tag{12}$$

Where;

k = Numbers of interval being used

O_i = Observed counts in the interval

E_i = Expected counts in the interval

When n<30 the chi square test becomes biased and will not be a good measure for the distribution. However this will not be a problem, because when n<30 the Wilcoxon test will be a better test of testing for significance than the t-test, because the assumption of normal distribution cannot be applied.

Seyhun (2000) says that the transaction cost is approximately around 1 %. Therefore this study will assume 1% in transaction costs in order to better compare the result to earlier research. This percentage will be subtracted from the statistical significant CAAR results in order to see if the CAAR remains positive.

2.10 Validity

Validity is a term which tries to determine if the data provided is answering the question at hand or not (Bell, 2006).

2.10.1 Primary and secondary data

Primary data consists of data collected for the first time from primary sources (Kumar 2008). These kinds of data are usually collected when doing qualitative research or using questionnaires (Saunders et al 2009). This research will instead use secondary data which consists of data that have been conducted and analysed by other individual, these types of data are usually found in journals and books. The problem with secondary data is to assure the reliability of the information. In the literature research I have mostly used academic journals found in secondary resources. Since an academic journal is being evaluated by academic peers before granting access to be published (Saunders et al, 2009), the articles found in them are considered legitimate.

The data concerning the insider trading and information about the different banks has come from government affiliations. Sweden comes fourth on the Corruption Perceptions Index[13]. There is therefore no reason to believe that the government would interfere in the statistic results made by their affiliations, meaning that those results are not to be considered biased.

2.10.2 Data collection

To get as good results as possible which reflect the reality one should try to have as large sample as possible (Kumar, 2008). In this thesis all the transactions, which have been made by insiders between the year 2006 and 2010 within the banks, were used as the sample. The sample period has been determined so that it contains both good economic periods and bad economic periods. This is important according to Fama (1998) and Copeland et al (2005) to prove that an abnormal profit opportunity clearly exists. All transactions which were not a pure buy or sell transaction were abolished, since those two types of transactions symbolise an active action from the insiders.

[13] Constructed by Transparency International, where the better position the country places the less corrupt it is.

The announcements of when insiders have made a transaction, have been obtain from FI, which means that all insider trades that are being made by the insiders via their capital insurance companies will not be taken into account, since they do not need to report those transactions to the public. The historical stock prices of the companies have been collected from each bank's website, while the data from the market index (OMX Stockholm Banks PI) was collected from the Nasdaq website. The stock prices were taken from the dates when the insider transaction became public which resulted in a total of 561 observations and is shown in Table 2-3.

Table 2-3, Observations

	Buy observations	**Sell observations**
SHB	87	13
Swedbank	102	9
Nordea	202	12
SEB	54	82

In order to minimize the cross-correlation Jegadeesh and Karceski (2009) warned about, all transactions which occur on the same day will be viewed as one transaction. Therefore the number of events that were calculated became 350 in total as shown in Table 2-4.

Table 2-4, Unique events

	Buy observations	**Sell observations**
SHB	44	13
Swedbank	70	9
Nordea	85	11
SEB	46	72

Both buy and sell transactions will be calculated with the same method with the exception that the sell transaction result will be multiplied by -1. Otherwise a negative CAAR would be a bad result for buy transactions but good results for sell transactions. Therefore this is done in order for the result to be easier to interpret in context of its value to the outsider where all positive CAAR are good for the outsider and all the negative CAAR are bad for the outsider.

2.10.3 Common mistakes

When conducting empirical studies, Copeland, Weston and Shastri (2005) warn about eight common mistakes.

1. *Biased model of equilibrium returns,* telling us that if the model we use to define normal return is biased, our result will not estimate the correct normal return. This problem has been minimized by using the Market model.

2. *Specification searches,* indicating that you will always find certain periods where a model beats the market, the problem is to find one that is consistent. This study uses a

five year (2006-2010) sample period, which contains different states of the market, which will limit this problem.

3. *Sample selection bias,* describes that a portfolio will always show positive abnormal return prior to a split. These problems often affect those who are examining split reactions.

4. *Survivorship bias,* when, for example, a study is made to test the earnings of small-cap companies over a ten year period. If the researcher neglects to add the result of all those companies that has disappeared in the last ten years, the results will be upward-biased. This potential bias is however eliminated in this study, since the study is testing predetermined stocks which have existed during the whole test period.

5. *Biased measurements of return,* saying that calculations of geometric returns over several years will overstate the real performance. Instead using the ratio of geometric returns gives appropriate results when comparing different time spans.

6. *Inappropriate portfolio weightings,* indicates that for example using to many small-cap companies in order to determine the state of the whole market is not appropriate. This test is however not testing whether or not the whole market is inefficient.

7. *Failure to distinguish between statistical and economic significance,* to conclude that market is inefficient based only on statistical significance is wrong. A researcher must also test whether the arbitrage profit withstands after taking into account the transaction cost. This study uses a transaction cost of 1%.

8. *Overestimation the frequency of opportunity for arbitrage,* to be able to determine that markets are inefficient the frequency of opportunity of abnormal returns must be high.

3 Theoretical framework

In this section I present the necessary aspects for abnormal profit to outsiders mimicking insiders. After that, a presentation of the Efficient Market Hypothesis (EMH) which claims that it is unlikely that outsiders will benefit from insiders will be described. Finally the Behavioural Finance (BF) is introduced in order to try to explain the pattern found in previous research where EMH fails to explain.

3.1 Exploiting insider trading

According to Seyhun (2000) there are three factors to be considered in order for outsiders to be able to earn abnormal return from insider trading. The first assumption regards the reporting delay when insiders reporting their transactions. If for example it would take up to two months for an outsider to know that an insider has made a transaction, then that special information the insider traded on has already become public, leaving the information useless now. However, internet and the stricter governmental laws toward insider trading, has contributed so that most countries demand that insiders must report their transactions within 5 days. Knowing that the banks insider must hold their stocks for at least 30 days, the outsider know if the insider is trading on special knowledge then he or she will also be able to benefit from it.

The second assumption is that the abnormal profit must exceed transaction costs. Since an active investment strategy is more costly than a simple buy-and-hold strategy with the index portfolio, the awareness of transaction cost becomes even more important. This goes hand in hand with Copeland et al (2005) remarks about economic significance.

The last factor in order to be able to earn from insiders is that the risk to outsider must be minimized in order for them to see it beneficial. This is because Seyhun (2000) claims most people are risk averse, meaning that they are not only concerned with the ability to make profit, but also the probability to make losses. Seyhun continue saying that as long as the transactions are not cross-correlated with each other the portfolio remains diversified which minimizes the risk further.

In order for an outsider to have the opportunity of abnormal return, the outsider must be able to act before the rest of the market does. This could be difficult since the market receive the news simultaneously. According to the Efficient Market Hypothesis this is indeed very unlikely to occur.

3.2 Efficient Market Hypothesis

"If you find a $100 bill on the street walk, don't pick it up. If it were real somebody would have picked it up already" - Unknown

The quote above is a common joke among economists in order to describe the Efficient Market Hypothesis (EMH). The theory behind the EMH comes from Fama (1970). To

describe the theory in short it would be that prices fully reflect all available information. In his article he states that there are some conditions that should be fulfilled if the theory should hold. In a summary they are;

- There are no transaction costs
- All available information is available at no costs to all of the market participants
- All investors analyses the available information and make the same conclusions. Hence they are being rational.

Fama (1970) continues stating that even though these conditions are sufficient for the capital market efficiency, they are not necessary. As long as a satisfactory amount of investors have access to available information and that there are not some investors who constantly make better evaluations of available information than others, the market efficiency holds. He later divides up the market condition into three groups;

- **Weak form;**

For the weak form (also called tests of return predictability) to hold, all past stock prices must be reflected into current stock price (Fama, 1991). This means that as an individual you cannot analyse recent stock prices in order to predict future stock prices. The market should follow what is called a Random Walk. A Random Walk explain that the likelihood that the price tomorrow will go up, down or stay the same, have the same probability to occur (Fama, 1965).

The random walk theory claims that the usage of both technical analysis and fundamental analyses of stock prices are inefficient. Technical analysis is based upon examine past returns in order to find trends or other abnormalities to be able to predict future stock prices. Fundamental analysis focuses more on today's data (for example annual reports) in order to make future forecasts. In the weak form however the usage of fundamental analysis could still be useful in order to predict future returns.

- **Semi-strong form;**

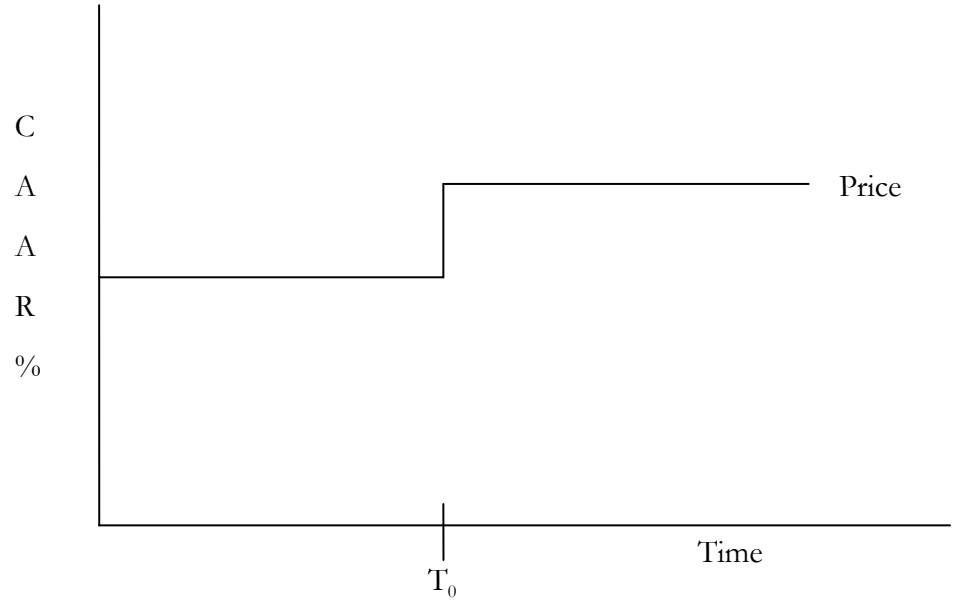
The semi-strong form (also called studies of announcements) states that all public available information is reflected in the stock price (Fama, 1991). The assumption of this is that it is impossible to make abnormal returns by analysing publicly available data, for example annual reports. This means that the usage of fundamental analysis no longer is effective. Fama (1970) finds that much empirical results support the market conditions up to this level.

- **Strong form;**

The strong form represent a market were both public and non-public information are reflected in the stock price. This proposes a scenario where not even insiders can trade on information which is not known to the public, and make excessive profit. Fama (1970) argues that even if this market state is most likely unreachable, there are so few who can take advantage of it, leaving the EMH still in a good description of the real world.

In conclusion for this study the weak form will not be tested since the purpose of this study does not concern it. The strong form seems to have little real life proof of existing and even Fama (1970) states that it is unlikely to hold. Even this state is not in direct concern of this study; the bank sector must however not be in this form, in order for outsider to be able to profit from insiders abnormal returns investments. The state that is interesting to examine is the semi-strong form, and according to EMH my result would look similar to Figure 3-1, if the market assumes that the insider contain special information. This leaves no possibility for abnormal return after the announcement of insider trading.

Figure 3-1, Semi-strong form



How come that some research find evidence for inefficiency in semi-strong form? One could state that the market researched simply does not meet the requirements for semi-strong form and conclude that the market is, at highest, in a weak form state. This however does not explain what is happening when people earn abnormal return on public available information. In order to try to explain why that would be possible in the first place, the concept of Behavioural Finance (BF) is introduced.

3.3 Behavioural Finance

The definition of Behavioural Finance (BF) is *"The study of the role played by psychological factors in financial decision making and hence their effect on overall market outcomes"* (Law, 2008). BF is according to Shleifer (2000) based upon two foundations, which are Limits to Arbitrage and Investor Sentiment. Limits to Arbitrage states that a lot of securities do not have good substitutes, which is very risky for the arbitrageur, since the prices do not go back to the equilibrium state directly. This gives indication that prices do not always shift in the right amount, leaving the market inefficient. Investor sentiment tries to explain how investors own biases and belief creating the de-

mand for securities, which contradicts the assumptions of rational behaviour. Therefore BF is based upon the idea of irrational investors' makes disturbances in the market which arbitrageurs cannot eliminate (Shleifer, 2000).

3.3.1 Limits to Arbitrage

According to the EMH theory, even if there are irrational investors in the market, there will always be so called arbitrageurs who exploit this irrationality and therefore brings back the price back to its fundamental value. In order for them to be able to do that, they must be able to short sell stocks. Short selling is illegal or at least regulated in many markets. In those markets where it is not, it can still be very hard to find any brokers who are willing to lend their stocks (Shleifer, 2000).

Shleifer and Vishny (1997) found that arbitrageurs do make the price return towards its fundamental value, when the mispricing is small. When the mispricing is larger the effect is not as powerful. The reason being the higher the mispricing the higher the volatility of the arbitrage position will be. Even though the position would have attractive expected returns, the volatility would also bring greater risk of losses and the ability to liquidate the portfolio under pressure from the outside investors.

Ritter (2003) divides the opportunity of arbitrage into high frequency events and low frequency events. He claims that high frequency events are in line with the EMH because it is hard to locate an investment strategy that is continuously profitable. The low frequency events do not support the EMH because if it did then for example the 1987 stock market crash or the 1999-2000 IT-bubble would not have occurred. For low frequency events the arbitrageurs gets wiped out, even though their assumptions of the long run are correct but they cannot afford to stay in their position until the market realises the mispricing.

When researching for opportunities in insider trading, the theory of limited arbitrage claims that this indeed would be possible, since the professionals fail to close the gap that may occur from market movements. However the most interestingly factor when regarding opportunity for abnormal return, is the possibility to do this if you understand peoples motives and be able to exploit this. This brings us to the concept of Investor Sentiment.

3.3.2 Investor Sentiment

The idea of people being rational has been questioned by many researchers. Ricciardi and Simon (2000) found evidence that there is a correlation between decision and irrationality, where the EMH claims that the irrational investors' behaviour is random and that the effects will cancel them out. Ritter (2003) lists some patterns describing irrational behaviour;

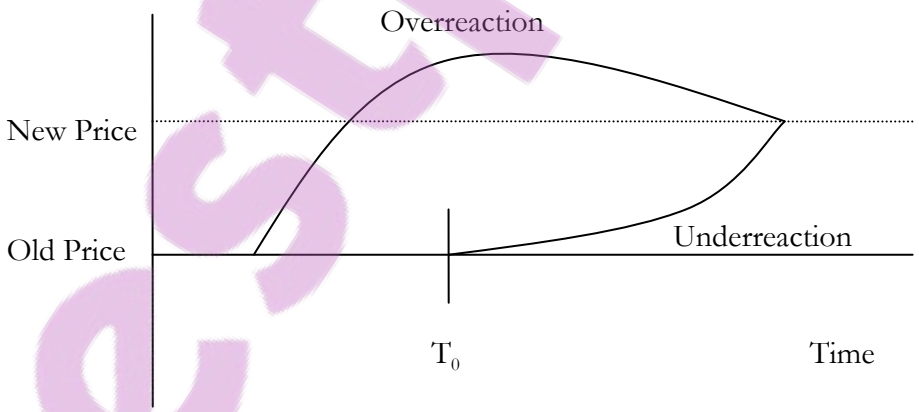
- Heuristics
- Overconfidence

- Mental accounting
- Framing
- Representivness
- Conservatism
- Disposition effect

The points which are the most relevant to this study are the overconfidence, representivness and conservatism factors[14]. According to Shefrin (2008) investors seem to be overconfident in their investing abilities and ignoring or at least underestimate the risk that is involved. The conservatism factor states according to Ritter (2003) that investors seem to adjust slowly to news announcements, especially when the news contradicts their own beliefs for the future. However if the same news keeps on coming for a long time then people will react to it, but they will probably by then overreact due to the representivness bias. This bias describes the pattern when investors ignore the long term averages and instead only analyse recent events. This is according to Shiller (2002) one of main the reasons why economic bubbles like the stock market crash in 1987 and the IT bubble bursting in 2000 were realised.

These points help the understanding of why there is a possibility to earn abnormal return. This is because they explain the phenomena of over- and underreactions in the stock price of news announcements. In Figure 3-2 we can see that if people overreact to news, then it will take awhile before the price returns to its fundamental value. This is because arbitrageurs are unable to correct this directly. If an investor is able to foresee this, then he or she would be able to benefit from this before the stock price adjusts back to its fundamental value. This phenomenon could very well explain why recent studies have shown that earning abnormal return by mimicking insiders is possible.

Figure 3-2, Over and underreaction



[14] To read about the other factors see Ritter (2003)

In criticism towards BF, Fama (1998) argued that BF theories can only explain one specific event at the time and are unable to explain the whole market. He therefore argues that BF is not a good replacement for EMH. Further he claims that the techniques in order to find anomalities are predetermined and when using other methods, the anomalities disappear. He therefore questions the results of BF research.

To summarize, Seyhun (2000) brings up three factors in order to be able to mimic insiders as an outsider. The EMH claims that this is not possible in the semi-strong form, and if it is possible then the market could be described as at most to be in weak form efficiency. The EMH fails to describe why some researchers found events that could disprove the semi-strong form. BF however claims that it is not likely for markets to be efficient in the first place, indicating that opportunities for abnormal return do exist, due to Limits to Arbitrage and Investor Sentiment.

4 Empirical Findings

In this chapter the results of the findings will be presented, together with the tests of significance. First the overall market movements on the event day will be tested. Later in the chapter the results of the findings on the days after the event of each of the banks will be accessible. There will also be a short statement whether or not the results are significant.

Before presenting the result I will present the different critical values[15] each statistical test must be larger, in absolute values, in order for the results to be considered significant. For the buy transactions, all of the companies have more than 30 observations which lead them to have the same critical values. When it comes to sell transactions, three of the banks do not overcome 30 observations. This means that they have different critical values and will therefore first be compared towards the Wilcoxon test. The critical values for the t-test are presented in Table 4-1.

Table 4-1, Critical values T-test

T-test, critical values	Buy (90%, 95% and 99% significance)	Sell (90%, 95% and 99% significance)
SHB	1.65, 1.96, 2.57	1.78, 2.18, 3.10
Nordea	1.65, 1.96, 2.57	1.81, 2.23, 3.17
Swedbank	1.65, 1.96, 2.57	1.86, 2.30, 3.35
SEB	1.65, 1.96, 2.57	1.65, 1.96, 2.57

For the Chi-square test and Wilcoxon test, their p-value must simply be lower than the error level being tested, to be viewed as significant.

4.1 Market movements

When observing the market adjustments on the event day for the bank sector, Table 4-2 shows that there in fact are no adjustments. This pattern seems to hold until 60 days has passed, when the negative CAAR result of 1,6% is 99% significant on both the t-test and the Wilcoxon test. Between the 60th day and the 120th day the market shows indication to adjust back to its fundamental value. Interestingly, the result on the 60th day is negative, indicating that the market is acting opposite of what the insiders predicted. Further the Chi-square test shows strong indication that the distributions does not remain normal when the number of observations exceeds 30, since the Chi square results are significant on all periods with 99% significance.

[15] Collected from Aczel and Sounderpandian (2009)

Table 4-2, Market movements, buy

Buy	CAAR	T-test	Chi-square	Wilcoxon
Day 0	0,002	0,60	33,291***	0,200
Day 30	-0,004	-1,12	24,880***	-1,232
Day 60	-0,016	-2,59***	39,271***	-2,756***
Day 120	-0,008	-1,02	25,754***	-0,814

* = 90% significance, ** = 95% significance, *** = 99% significance

The market movements of insiders sell transactions are presented in Table 4-3. From the table we can conclude that there are no movements in the market at, or after, the announcement. The result on the 60th day show however a weak significance (90%) on the Wilcoxon test. As the same as for the buy transactions, the Chi-square test tells us that also that the distribution for sell transactions tends to be non-normal. Since the significance in the Wilcoxon test is only 90% and not 95% significant, the result will not be viewed as significant.

Table 4-3, Market movements, sell

Sell	CAAR	T-test	Chi-square	Wilcoxon
Day 0	-0,001	-0,36	26,362***	-0,020
Day 30	0,006	1,43	27,725***	1,523
Day 60	0,006	1,36	30,316***	1,836*
Day 120	0,008	1,19	31,425***	1,451

* = 90% significance, ** = 95% significance, *** = 99% significance

In order to see if the results are the same as within each of the banks we move to the next section.

4.2 The event day in each bank

The first test in each bank was to observe how the market responded on the day of the announcement of insider trading. Over viewing the results from Table 4-4 there seems to be a very small difference from zero for the CAAR value, the result of 0,008 for SEB, being the highest observable. Notably the market seems to respond negatively when an insider makes a purchase within SHB and Swedbank. However when comparing all the t-tests to their critical value of 1.96, none of the results remain significant. This results in a non-rejection of the null hypothesis. Therefore based on the t-test the market does not seem to adjust to the new information.

Table 4-4, CAAR buy day 0

Buy	$CAAR_0$	T-test	Chi square	Wilcoxon
SHB	-0,006	-0,820	2,172	-0,922
Nordea	0,008	0,982	3,332	2,622***
Swedbank	-0,004	-0,218	14,358***	-1,419
SEB	0,008	0,634	6,395*	0,825

* = 90% significance, ** = 95% significance, *** = 99% significance

When observing the chi-square test, we note that the Swedbank data tends to move towards a non-normal distribution, however the Wilcoxon Z-test is not significant different from zero. The SEBs distribution is also non-normal on a 90% significant, but the Wilcoxon test also turns out to be non significant. One of the Wilcoxon test is however significant, which is Nordea's result. The result is undermined by the fact that the chi-square test is not significant, indicating a normal distribution hence the t-test should be used. Therefore the CAAR of the Nordea stock will be viewed as insignificant.

Still keeping focus on the event day, but instead observing the result of the sell transaction (Table 4-5), we tend to see that the results are similar to the buy transactions.

Table 4-5, CAAR sell, day 0

Sell	$CAAR_0$	T-test	Chi -square	Wilcoxon
SHB	-0,013	-1,144	5,658	-0,734
Nordea	0,011	1,117	1,343	1,156
Swedbank	-0,026	-1,367	3,631	-1,125
SEB	0,002	0,325	6,828*	0,348

* = 90% significance, ** = 95% significance, *** = 99% significance

Since the numbers of observations are very few we know that we should emphasize the non-parametric result. This is the case for each bank with the exception of SEB which have n>30. Notably the changes in CAAR are larger in sell transactions than for the buy transactions, but nevertheless the results fail to be significant in both the t-test and the Wilcoxon test.

So there seems that the market do not adjust the prices when the news is announced, in order to see if the market is reacting correctly or not, the CAAR from the days after the event must be tested.

4.3 CAAR 30 days after

For the buy transactions in Table 4-6 there are some of the CAAR results that are indeed significant. The Nordea CAAR of 0,79% is significant on the 95% level with the Wilcoxon test. However the t-test is not significant resulting in contradictory conclusion of the two tests. The chi-square gives an argument for the Wilcoxon test being more reliable, even though it is only showing the distribution not being normal with a 90% significance, the result will be regarded as significant. The CAAR result for Swedbank is at least significant on the 95% level on both the t-test and the Wilcoxon test (99% on the t-test). Interestingly the CAAR of Swedbank is negative, which again gives indication that the market acts opposite of the insiders' forecasts.

Table 4-6, CAAR buy, day 30

BUY	$CAAR_{30}$	T-test	Chi-square	Wilcoxon
SHB	-0,006	-0,558	2,027	-1,207
Nordea	0,007	1,006	6,611*	2,412**
Swedbank	-0,016	-2,832***	13,922***	-2,186**
SEB	-0,008	-1,088	6,907*	-0,847

* = 90% significance, ** = 95% significance, *** = 99% significance

Two of the banks showed significant result for buy transactions, resulting in that the market did not act correct on the event day. Whether there is the same result for sell transactions after 30 days we take a look at Table 4-7.

Table 4-7, CAAR sell, day 30

SELL	$CAAR_{30}$	T-test	Chi-square	Wilcoxon
SHB	0,011	1,020	4,897	1,013
Nordea	0,0005	0,066	5,893	0,089
Swedbank	0,027	4,786***	2,179	0,296
SEB	0,003	1,226	4,187	1,513

* = 90% significance, ** = 95% significance, *** = 99% significance

From the table there is one of the results that are significant. It is the result of the Swedbank CAAR showing a positive reaction of 2,78%, with a t-test showing a significance of 99%. Again one must be very careful in interpreting the t-test, since the number of observation with sell transaction in Swedbank were only nine. Observing that the Wilcoxon tests value being only 0,296 there seems to be doubt about the assumption that the result should be absolute and not have appeared by chance. Since the Wilcoxon test is so low the Swedbank CAAR will be regarded as insignificant.

4.4 CAAR 60 days after

Moving further away from the event day, in Table 4-8 we can see the CAAR 60 days after the announcement of an insider had made a buy transaction within the company. The CAAR of SHB is not significant in neither of the tests. Neither are Nordea's results. Both Swedbank and SEB results are however significant by the t-test, which is the relevant one when observing the chi square result. Again similar to the significant result after 30 days, the significant results after 60 days are negative, where notably the -3,2% CAAR of Swedbank is 99% significant.

Table 4-8, CAAR buy, day 60

BUY	$CAAR_{60}$	T-test	Chi-square	Wilcoxon
SHB	-0,007	-0,692	8,411**	-1,599
Nordea	-0,006	-0,878	6,150	-1,128
Swedbank	-0,032	-5,473***	3,519	-1,419
SEB	-0,017	-2,163**	4,383	-1,633

* = 90% significance, ** = 95% significance, *** = 99% significance

For the sell transactions (Table 4-9) we conclude that SHB, Nordea and Swedbank show significant values by their t-test. The only result however that remains significant after the Wilcoxon test is the CAAR result from SHB, which is most important given the fact that none of those companies had observation over 30 sell transaction. Worth mentioning is that in contrast to the buy transaction after 60 days, the significant result from sell transaction is positive.

Table 4-9, CAAR sell, day 60

SELL	$CAAR_{60}$	T-test	Chi-square	Wilcoxon
SHB	0,025	2,280**	12,048***	2,062**
Nordea	0,027	3,430***	2,518	1,156
Swedbank	-0,015	-2,639***	4,813	-1,125
SEB	0,002	0,974	0,627	1,039

* = 90% significance, ** = 95% significance, *** = 99% significance

4.5 CAAR 120 days after

The final observations on CAAR were the ones which occurred 120 days after the events. From the buy transactions presented in Table 4-10, the CAAR results do not seem to be different from zero. The result from Swedbank's t-test is however significant

on the 90% level, but the chi-square result indicates that the non-significant result of the Wilcoxon test is the correct one.

Table 4-10, CAAR buy, day 120

BUY	$CAAR_{120}$	T-test	Chi-square	Wilcoxon
SHB	-0,010	-0,927	4,532	-0,770
Nordea	-0,012	-1,579	20,203***	-0,730
Swedbank	-0,011	-1,891*	8,051**	-0,348
SEB	0,003	0,440	3,493	0,574

* = 90% significance, ** = 95% significance, *** = 99% significance

We can therefore note that the significant results from 60 days after the event, disappears when it reaches the 120th day after the event day. When observing the sell transactions (Table 4-11) we see a similar result to the 60 day CAAR. Again the t-test shows strong significance for SHB, Nordea and Swedbank, but the Wilcoxon test, which is the relevant one in this case, shows no signs of significance. In contrast to the earlier result the SEB CAAR is now significant on both the t-test (90% significance) and the Wilcoxon test (95% significance) concluding that a 0,7% abnormal return does exist after 120 days.

Table 4-11, CAAR sell, day 120

SELL	$CAAR_{120}$	T-test	Chi-square	Wilcoxon
SHB	0,029	2,649**	2,939	0,454
Nordea	0,041	5,189***	6,513*	1,334
Swedbank	-0,054	-9,364***	5,980	-1,362
SEB	0,007	1,941*	6,543*	2,098**

* = 90% significance, ** = 95% significance, *** = 99% significance

4.6 Event studies overview

To give an overview of what the results have been showing in regard towards the hypothesises, Table 4-12 and Table 4-13 shows the outcome from the buy and sell transactions respectively.

The overall sector regarding buy transactions shows that there exists an anomaly event when 60 days has passed. In the SHB stock there is no sign of abnormal return being made during the time-span investigated. The same is observed in the Nordea transactions. For Swedbank however there is a change after the event which exists at least up to 60 days after the event, but disappears when we reach the 120th day. The result of SEB

shows that a window occurs when 60 days has passed, but at 30 days and at 120 days after the event no change in the CAAR has been shown.

Table 4-12, Overview Hypothesis, buy

Buy	H_0, Day 0	H_0, Day 30	H_0, Day 60	H_0, Day 120
Bank sector	Do not reject	Do not reject	Reject***	Do not reject
SHB	Do not reject	Do not reject	Do not reject	Do not reject
Nordea	Do not reject	Reject**	Do not reject	Do not reject
Swedbank	Do not reject	Reject**	Reject***	Do not reject
SEB	Do not reject	Do not reject	Reject**	Do not reject

* = 90% significance, ** =95% significance, *** =99% significance

The sell transactions tell us that for the overall sector there is no opportunity for abnormal return. In the SHB stock however, there is a window for earning abnormal return between 30 and 120 days after the event. For Nordea and Swedbank however there is no abnormal return. Based on the data presented regarding the opportunity for abnormal return with the SEB stock it seems one must wait up until 120 days before an investor can actualize his or hers abnormal profit.

Table 4-13, Overview Hypotheses, sell

Sell	H_0, Day 0	H_0, Day 30	H_0, Day 60	H_0, Day 120
Bank sector	Do not reject	Do not reject	Do not reject	Do not reject
SHB	Do not reject	Do not reject	Reject**	Do not reject
Nordea	Do not reject	Do not reject	Do not reject	Do not reject
Swedbank	Do not reject	Do not reject	Do not reject	Do not reject
SEB	Do not reject	Do not reject	Do not reject	Reject**

* = 90% significance, ** =95% significance, *** =99% significance

4.7 Economic significance

In order for the statistical significant results to also be considered economically significant, its value must exceed the transaction cost from the active strategy. The buy transactions that had negative value clearly states that if following those, adding the transaction cost to it the loss would be greater. However knowing that the market moves in the opposite way of what the insider's predicted, the investor could exploit this by acting the opposite of the insider. In that sense still use the information from insiders to earn abnormal return. They will therefore be viewed as positive at this point. The statistically significant results of CAAR were;

Bank Sector
CAAR Buy 60 days: 0,016
SHB
CAAR Sell 60 days: 0,029
Nordea
CAAR Buy 30 days: 0,007
Swedbank
CAAR Buy 30 days: 0,016 CAAR Buy 60 days 0,032
SEB
CAAR Buy 60 days: 0,017 CAAR Sell 120 days: 0,007

When subtracting the 1% transaction cost we get;

Bank Sector
CAAR Buy 60 days: 0,006
SHB
CAAR Sell 60 days: 0,019
Nordea
CAAR Buy 30 days: -0,003
Swedbank
CAAR Buy 30 days: 0,006 CAAR Buy 60 days: 0,022
SEB
CAAR Buy 60 days: 0,007 CAAR Sell 120 days: -0,003

From this, two (Nordea 30 day buy and SEB 120 day sell) of the statistical significance results did not pass to be viewed as economically significance. In order to determine whether the economic significant results are profitable enough for an outsider, we move to the analysis chapter.

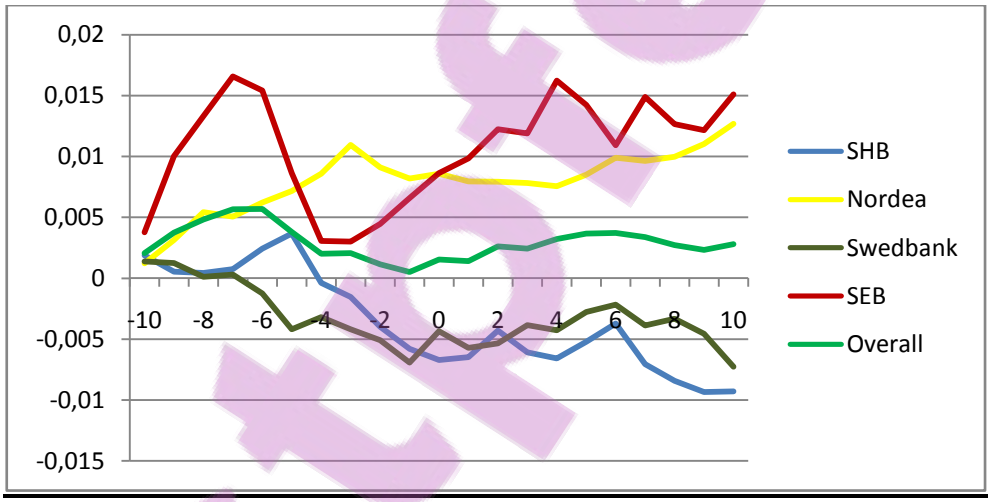
5 Analysis

This chapter will be divided into two parts. The first part will try to describe why the results show the way they do and what implications this leads to. The second part will describe whether or how an outsider can take advantage of the economic significant results.

5.1 Explaining the scenario

Fama (1970) told us that the likelihood that investors could earn abnormal to public announcements were slim. The results from this study seem to be in view with this. But why is that? When analysing the buy transactions around the event day (Figure 5-1), we cannot see any extreme jumps on that specific day, the results seem more random that anything else. Since none of the CAAR around the event day is significant (Appendix 1) the idea of EMH that prices move randomly seems to hold. This aspect contradicts the findings from most of the earlier studies (Jaffe, 1977, Seyhun, 1984, Bettis et al, 1997, etc) where it was found that the market did move when insider transactions became public. That there are no movements in the market on the days around the event day can neither be claimed as proof for or against the EMH without further information.

Figure 5-1, CAAR around event day, buy

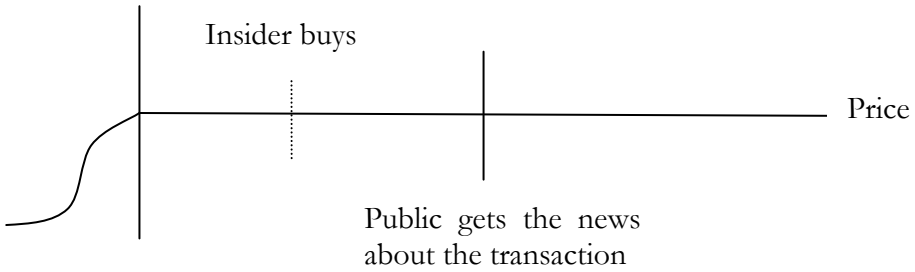


In order to understand why this is one argument could be that this scenario is explained by that the market does not react immediately, leaving room for adjustments later on. That is what to expect according to Lakonishok and Lee's (2001) findings. This would also be in line with BFs theory of over and underreactions. When observing the latter days, there seems indeed be such an opportunity for the buy transactions after 60 days in the overall market. The peculiar thing is that the CAAR of the stock prices on this occasions is negative. This contradicts the idea that insiders construct buy transactions when they feel that the stock is undervalued, giving the market indications for positive times to come for the companies (Zingg et al, 2007). However, the reason for the negative CAAR has most likely a lot to do with the fact the banks work in an international

market and are affected by the state the world economy is in. It therefore suggests that the outsider's view on the insider's capability to foresee its company's future, is not bigger than the power of some of the macro factors that the banks are affected by. It therefore seems that in the overall bank sector the insiders' buy transactions do not contain more information than the sell transactions.

The other argument of no movements around the event day could also be that the market has already adjusted to the new information that the insider is assumed to have. This would in that case be proof of semi-strong efficiency regarding insider trading, but more importantly it would show indication that the market would be in a strong-form efficiency (Figure 5-2). We observed that the actions of the insiders, later showed a opposite outcome, we can therefore claim that the insiders do not earn abnormal return on their investments. This would be in agreement with the findings of Eckbo and Smith (1999) which would in that case indicate that the Swedish bank sector would be in the same state as the Norwegian market.

Figure 5-2, Market movement, if insiders do not trade on special information.



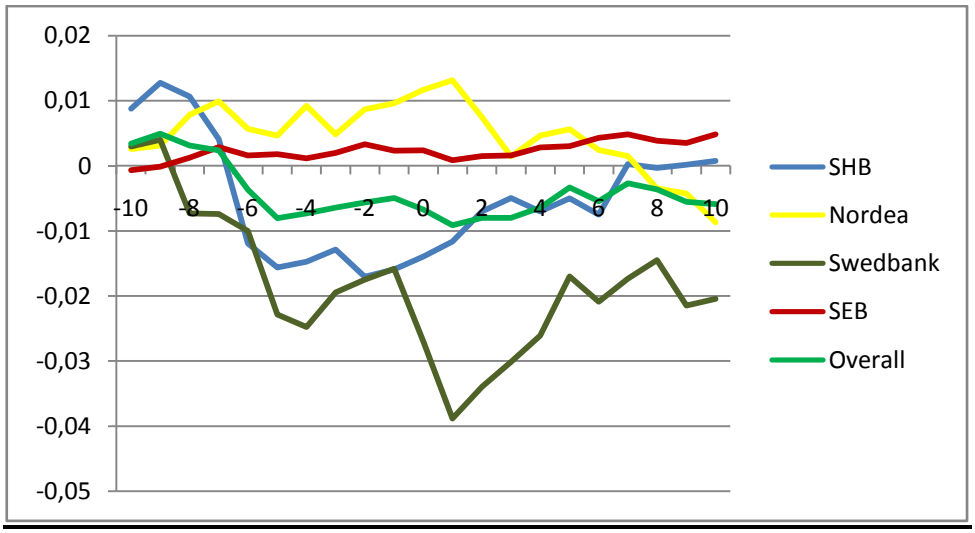
When observing each individual bank however we find that there is evidence for abnormal opportunity 30 days after the event. This is the case for Nordea and Swedbank. Since those findings do not last when taking all banks into consideration one might suspect that those findings are not so large. Again for Swedbank the CAAR is negative which continuous to give indication that the insiders cannot predict the future very well.

Based on the findings, the argument that seems to best describe why there is no movement on the event day is that the stock price has already adjusted to the new information that the insiders trade on. Otherwise the CAAR on the latter days should have shown positive results. The findings are therefore in line with the EMH.

Sell transactions from the insiders are mostly motivated by other factors than pure profit possibilities; it has more secondary purposes such as increase the liquidity in the company (Zingg et al, 2006). The results from the days around the event days (Figure 5-3) seem to indicate this as well, since none of the findings are significant (Appendix 2). When observing the CAAR 30, 60 and 120 days later, in each of the banks, there are some significant results and in contrast to the buy transactions, the results that were significant were positive. This indicates that sell transactions contains better information

than what buy transactions contain in SHB and SEB. This is the opposite of what Lakonishok and Lee (2001) and Zingg et al (2007) found, which concluded that buy transaction contain more beneficial information. The results are however in line with the findings of Cheuk et al (2006) and Firth et al (2011) who found that sell transaction would provide a better opportunity for earning abnormal return for outsiders. When observing the overall sector these significant results disappear all together, this proves that the bank sector is efficient in the semi-strong form when it comes to sell transactions.

Figure 5-3, CAAR around event day, sell



When over viewing the results there seems to be a tendency for abnormal return not to occur in the overall market, because to assume that insiders know that there will be negative news in the future but still chooses to buy before those news are public does not make sense. This gives the indication that the bank sector in Sweden is indeed in a semi-strong form and that it is large enough to follow the assumption that large-cap firms will have difficulties obtaining abnormal return, as Lakonishok and Lee (2001) predicted. This has to do with the fact that large-cap firms often is observed by many more investors and analysed, keeping in mind that the large cap banks control most of people's savings, resulting in an even larger amount of people making sure that the bank is acting correctly. Therefore it seems as the size of the market is more important than the competiveness factor which Fama (1970) argued for, when he tested for evidence of the efficient market. Since there is no movement on the event they, and it has been proved that there is no adjustment later on which are based on insider trading, it indicates that the insiders in the bank sector do not trade on special information, meaning that they are respecting the Market Abuse Penal Act (2005:377) or are at least restricted by it.

With that mentioned there are still some economic significant results in the banks, therefore we need to see if they are big enough for outsider to exploit.

5.2 Economic significance

After the transaction cost both the Nordea's 30 day buy CAAR and the SEB's 120 day sell CAAR become negative, and are not economically significant by definition. When analysing the results of the buy transactions in Swedbank's 30 day CAAR, SEBs 60 day CAAR and in the overall bank sector's 60 day CAAR, one could argue whether the results are attractive enough for an outsider to pursue. Considering that the time consuming is higher for active investment strategies than for non-active investment strategies, the promise of an abnormal return of 0,6% and 0,7% are not considered to be enough to be economically significant and will be disregarded.

This leaves us with two results, which can only be obtained by short-selling the stock. Short-selling requires the investor to put in quite a lot of money as security to the broker in order to be allowed to sell borrowed stocks. This results in that it could be difficult to be able to find a broker who is willing to make such a transaction. That leads to even more time passes before an investor would be able to act upon the opportunity, leading to greater risk (Shleifer, 2000). This contradicts the idea of minimizing the risk for the outsider in order to benefit from insiders trading according to Seyhun (2000).

If the investor has a high enough risk tolerance then he or she could take advantage of the scenario that has been presented. We have concluded that by mimicking insiders in the whole bank sector there were no opportunity for abnormal return. The results for Nordea and SEB also concluded this. Instead an investor could either follow the SHB sell signal and then wait 60 days, or he could not follow, but instead short sell when a Swedbank insider makes a buy transaction and wait 60 days. The time-span is equal for both opportunities which make the time factor vanish. Since the result in Swedbank is negative while the result in SHB is positive, it concludes that the SHB sell transactions contain better predictability information than Swedbank's buy transactions. Therefore if an investor must choose between the banks for the opportunity of abnormal return, it would be better to follow the insiders in SHB than the insiders in Swedbank, even though the CAAR is higher for Swedbank. The investor should short sell stocks in SHB when an insider makes a sell transaction and wait 60 for days and then buy it back.

As already argued however, short selling is risky and hence such a strategy should be preceded with caution.

6 Conclusion

Here I will describe the outcome of the study. Further, the results will also be compared to previous studies. The questions in the problem discussion and the purpose will be answered here as well. In the end there will be suggestion of subjects for researchers in the future.

The purpose of this study was to try and determine whether or not outsiders could mimic the insider's transactions in order to earn abnormal return in the Swedish bank sector. However, based on this study this does not seem to be possible in the overall sector. The signs that indicated that this would be possible for the Swedish large-cap banks turned out to be false. The result that showed statistical difference from zero was negative and it was therefore concluded that the insider did not predict the future very well which leads to the conclusion that there are stronger factors than the sign of insiders' transaction that determine the future stock price. Since the insiders could not predict the future stock prices, any attempt from an outsiders to try to exploit their information would not be beneficial. This resulted in the BF assumption of under- and overreactions in the price, did not occur in this study and instead the results turned out to be in line with the EMH description of semi-strong markets. The results are therefore aligned with the findings of Jaffe (1974), Seyhun (1984), Del Brio et al (2002) and Firth et al (2011) that outsider cannot earn abnormal return from insider trading, leaving the conclusion that the EMH gives a better explanation to the Swedish bank sector than the BF provides.

When observing the individual banks however, there are some opportunities for abnormal return, but when tested for economic significance they were too small and too risky for the average investor to take part of, leaving the bank segment still effective. This is what Del Brio et al (2002) and Firth et al (2011) also discovered. The most contradictory findings against most of the earlier research is that the insiders in the Swedish banks do not tend to trade on special information, instead the results indicate that they are following the Swedish laws of insider trading. Overall there is no difference in the information of a buy or a sell transaction. However in SHB, Swedbank and SEB the sell transactions have a little stronger predictability power than the buy transactions, which are in line with the findings of Firth et al (2011) and Cheuk et al (2006). The Nordea stock tends to have a slightly stronger predictability than sell transaction based on the statistical significance results which are in line with Zingg et al (2007) and Seyhun (1984) findings. For buy transactions the largest anomaly event existed in the smallest of the banks, Swedbank. The result was however not that large which proves that the large-cap banks in Sweden are large enough to be considered efficient. This is also in line with Lakonishok and Lee's (2001) findings when they found that, the larger the firm, the less valuable the non-public information is.

The study also finds that when calculating CAAR, the distributions do not tend to become normally distributed when observations are large, which is what Lyon et al (1999)

and Kothari and Warner (2006) found. It therefore is a need for an easy to use method which could be designed for calculating significances of CAAR.

6.1 Further research

There was one point that contradicted almost all earlier findings, except for Eckbo and Smith (1998), which was the indication that the insiders seem to have no power to predict the future outcome of their companies. I therefore believe that the insiders are deliberately not trading special information on the market and instead, when they do trade on special information they do it through capital insurance companies. These kind of transactions do not need to be reported to the FI.

Therefore, from the findings of this study, there is an interesting aspect to investigate for further research. It would be interesting to know if the insiders in the Swedish banks are more ethical than others or if they are trying a different approach to trade on special information. A way to do this is to see how much the insiders earn by doing their transaction by their capital insurance companies, to see if they still do not trade on special information.

List of References

Articles

Bettis C, Vickrey D, Vickrey D W. (1997) *Mimickers of Corporate Insiders Who Make Large-Volume Trades*, Financial Analysts Journal, Vol. 53, No. 5 (Sep. - Oct.), pp. 57-66

Cheuk M, Fan D K. and So RW. (2006) *Insider Trading in Hong Kong: Some stylized facts,* Pacific-Basin Finance Journal 14 73– 90

Del Brio E B., Miguela A, Perote J (2002) *An investigation of insider trading profits in the Spanish stock market,* The Quarterly Review of Economics and Finance 42 73–94

Eckbo E B., Smith D C. (1998) *The Conditional Performance of Insider Trades,* The Journal of Finance, Vol. 53, No. 2 (Apr.), pp. 467-498Published

Fama F. E, (1965) *The Behaviour of Stock Market Prices,* Journal of Business 38, (Jan.), pp.34-105

Fama F. E, Fisher L, Jensen C. M, Roll R (1969) *The Adjustment of Stock Prices to New Information,* International Economic Review, Vol. 10, No. 1. (Feb.), pp. 1-21.

Fama F. E (1970) *Efficient Capital Markets: A Review of Theory and Empirical Work,* The Journal of Finance, Vol. 25, No. 2, pp. 383-417

Fama F. E (1991) *Efficient Capital Markets II,* The Journal of Finance, Vol. 46, No. 5 (Dec.), pp. 1575-1617

Fama F. E (1998) *Market efficiency, long-term returns, and behavioral finance,* Journal of Financial Economics 49, pp. 283-306

Firth M, Leung T.Y, Rui O.M (2011) *Insider trading in Hong Kong: Tests of stock returns and trading frequency,* Review of Pacific Basin financial markets and policies, vol: 14 iss: 3 pg: 505 -533

Jegadeesh N, Karceski J (2009), *Long-run performance evaluation: Correlation and heteroskedasticity-consistent tests,* Journal of Empirical Finance 16, pp. 101–111

Lakonishok J, Lee I, (2001) *Are Insider Trades Informative?* The Review of Financial Studies, Vol. 14, No. 1 (Spring), pp. 79-111

Lyon J D., Barber B M., Tsai C (1999) *Improved methods for tests of long run abnormal stock returns,* The Journal of Finance, vol. liv, no. 1, february

MacKinlay A. C (1997) *Event Studies in Economics and Finance,* Journal of Economic Literature, Vol. 35, No. 1 (Mar.), pp. 13-39

Ricciardi V, Simon H K. (2000) *What is Behavioral finance?* BET journal, Vol. 2, No. 2 (Fall), pp. 27-34

Ritter J R. (2003) *Behavioral finance,* Pacific-Basin Finance Journal 11 PP. 429–437

Roll R (1977) *A critique of the asset pricing theory's tests,* Journal of Financial Economics 4 129-176.

Seyhun N H. (1984) *Insiders' profits, cost of trading and market efficiency* Journal of Financial Economics 16 (1986) 189-212. North-Holland

Shleifer A, Vishny R W. (1997) *The Limits Of Arbitrage*, Journal of Finance, Vol. 52, no. 1, pp. 35-55.

Shiller R J. (2003) *From Efficient Markets Theory to Behavioral Finance* The Journal of Economic Perspectives, Vol. 17, No. 1 (Winter), pp. 83-104

Zingg A, Lang S and Wyttenbach D (2007) *Insider trading in the Swiss stock market*, available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1091348

Literature

Aczel D. A, Sounderpandian J (2009) *Complete business statistics* (7th edition) New York: McGraw-Hill/Irwin

Bell J (2006) *Doing your research project,* (4th edition) Denmark: Open University Press UK Limited

Bodie Z, Kane A, Marcus J.A (2009), *Investments* (8th edition), New York: McGraw-Hill International edition.

Copeland E. T, Weston J. F, Shastri K (2005) *Financial theory and corporate policy* (4th edition), United States: Pearson Education, Inc

Creswell J W. (2003) *Research design: qualitative, quantitative, and mixed method approaches,* London: Sage publications, Inc

Elton J. E, Gruber J. M, Brown J. S, Goetzmann N. W (2011) *Modern portfolio theory and investment analysis* (8th edition) United States: John Wiley & Sons, Inc

Kothari S P., Warner J B., (2006) *Econometrics of Event Studies,* Authors note: "This article appeared in the Handbook of Corporate Finance: Empirical Corporate Finance (Elsevier/North-Holland), which was written by B. Espen Eckbo."

Kumar R, (2008) *Research Methodology*, New Delhi: APH Publishing Corporations

Law, J. (2008) *Oxford Dictionary Of Finance and Banking* (4th edition), Oxford: Market Books Ltd.

Saunders M, Lewis P and Thornhill A (2009) *Research Methods for Business Students* (5th edition), UK: Pearson Education Limited

Seyhun N H. (2000) *Investment Intelligence from Insider Trading,* United States: Achorn Graphic Services Inc.

Shefrin H (2008) *A Behavioral Approach to Asset Pricing* (2nd edition), UK: Elsevier inc.

Shleifer A (2000) *Inefficient Markets, An Introduction to Behavioral Finance*, New York: Oxford University Press Inc.

World Wide Web sources

Boudreaux (2003) thoughts on insider trading laws:
http://www.fff.org/comment/com0306f.asp
http://online.wsj.com/article/SB10001424052748704224004574489324091790350.html

Evans A (2009) Article about how Insider trading laws should be loosens up:
http://www.guardian.co.uk/commentisfree/2009/sep/14/banking-recession-regulation

Statistics about Corruption:
http://cpi.transparency.org/cpi2011/results/

Statistics about the Swedish bank market:
http://www.swedishbankers.se/web/bfmm.nsf/lupgraphics/Banker_i_Sverige_2011.pdf/$file/Banker_i_Sverige_2011.pdf

Statistics about flagging in Sweden:
http://www.fi.se/upload/43_Utredningar/50_Statistik/10_Kapitalbarometern/2010/kapbar_0210.pdf

Statistics about the Swedish GDP growth:
http://www.scb.se/statistik/_publikationer/NR0103_2010K04_TI_NR01TI1101.pdf

Swedish laws about insider trading:
http://www.riksdagen.se/sv/Dokument-Lagar/Lagar/Svenskforfattningssamling/Lag-20001087-om-anmalningss_sfs-2000-1087/?bet=2000:1087

What FI do:
http://www.fi.se/Folder-EN/Startpage/About-FI/What-we-do/

What must be reported to FI:
http://www.fi.se/Folder-EN/Startpage/Regulations/Market-information/Insider-position/This-shall-be-reported/

Appendix

Appendix 1 - CAAR around the event day, buy

Bank sector:

Days	CAAR	T-test
-10	0,002065	0,163724
-9	0,00374	0,296483
-8	0,00482	0,382156
-7	0,005672	0,449673
-6	0,005699	0,451807
-5	0,003814	0,302402
-4	0,002015	0,159761
-3	0,002055	0,162932
-2	0,001129	0,089472
-1	0,000507	0,040203
0	0,002148	0,204135
1	0,001402	0,11112
2	0,002622	0,207847
3	0,002443	0,193677
4	0,003221	0,255351
5	0,003678	0,291566
6	0,003732	0,295878
7	0,003387	0,268532
8	0,002711	0,21494
9	0,002316	0,183644
10	0,0028	0,222008

SHB:

Days	CAAR	T-test
-10	0,001872	0,228657
-9	0,000541	0,066113
-8	0,000413	0,050486
-7	0,000753	0,092022
-6	0,002419	0,295569
-5	0,00366	0,447194
-4	-0,0004	-0,04844
-3	-0,00155	-0,18915
-2	-0,00399	-0,48695
-1	-0,00581	-0,71035
0	-0,00672	-0,82094
1	-0,00648	-0,79195
2	-0,00431	-0,52646
3	-0,00609	-0,74433
4	-0,00661	-0,80713
5	-0,00524	-0,64016
6	-0,00372	-0,45475
7	-0,00707	-0,86375
8	-0,00845	-1,03214
9	-0,00936	-1,14319
10	-0,00931	-1,138

Nordea:

Days	CAAR	T-test
-10	0,00123	0,140825
-9	0,003146	0,360239
-8	0,005443	0,623201
-7	0,00507	0,580454
-6	0,006224	0,712651
-5	0,007162	0,819998
-4	0,008582	0,982613
-3	0,010954	1,254193
-2	0,009121	1,044269
-1	0,008192	0,937893
0	0,008581	0,982432
1	0,007945	0,909654
2	0,007927	0,907636
3	0,00782	0,895382
4	0,007555	0,864977
5	0,008508	0,974141
6	0,009891	1,132458
7	0,009627	1,102298
8	0,009969	1,141453
9	0,011024	1,262211
10	0,012685	1,452398

Swedbank:

Days	CAAR	T-test
-10	0,001368	0,0686
-9	0,001249	0,062633
-8	0,000114	0,005728
-7	0,000304	0,015246
-6	-0,00126	-0,06302
-5	-0,00419	-0,21013
-4	-0,00319	-0,1598
-3	-0,0042	-0,21089
-2	-0,00508	-0,25483
-1	-0,00693	-0,34741
0	-0,00435	-0,21811
1	-0,00571	-0,28613
2	-0,00535	-0,26829
3	-0,00384	-0,19267
4	-0,00428	-0,2145
5	-0,00278	-0,13964
6	-0,00217	-0,10875
7	-0,00389	-0,19487
8	-0,00334	-0,16747
9	-0,00455	-0,22818
10	-0,00726	-0,3642

SEB:

Days	CAAR	T-test
-10	0,003791	0,278845
-9	0,010022	0,737178
-8	0,01331	0,979043
-7	0,01656	1,218097
-6	0,015408	1,133327
-5	0,008624	0,634369
-4	0,003061	0,225144
-3	0,003019	0,222092
-2	0,00446	0,328066
-1	0,006578	0,483844
0	0,00863	0,634793
1	0,009849	0,72443
2	0,012218	0,898671
3	0,011885	0,874224
4	0,016212	1,192458
5	0,014226	1,046422
6	0,010928	0,803775
7	0,014876	1,094221
8	0,012662	0,931383
9	0,012148	0,893557
10	0,015092	1,110101

Appendix 2 - CAAR around the event day, sell

Bank sector:

Days	CAAR	T-test
-10	0,003408	0,275208
-9	0,004936	0,398614
-8	0,003113	0,251419
-7	0,002362	0,190749
-6	-0,00368	-0,29738
-5	-0,00803	-0,64835
-4	-0,0073	-0,58937
-3	-0,0064	-0,51674
-2	-0,00565	-0,45628
-1	-0,00495	-0,40009
0	-0,00121	-0,36257
1	-0,00913	-0,73704
2	-0,00801	-0,64663
3	-0,00801	-0,64708
4	-0,00643	-0,51893
5	-0,00335	-0,27032
6	-0,00543	-0,43877
7	-0,0027	-0,21837
8	-0,0036	-0,29086
9	-0,00554	-0,44737
10	-0,0059	-0,47657

SHB:

Days	CAAR	T-test
-10	0,008782	0,720882
-9	0,012771	1,048305
-8	0,010673	0,876068
-7	0,004111	0,337464
-6	-0,01197	-0,98225
-5	-0,01561	-1,28176
-4	-0,01474	-1,20967
-3	-0,01289	-1,05804
-2	-0,01707	-1,40089
-1	-0,01594	-1,30858
0	-0,01395	-1,14483
1	-0,01164	-0,95538
2	-0,00702	-0,57608
3	-0,00495	-0,40671
4	-0,00705	-0,57831
5	-0,00499	-0,40921
6	-0,00752	-0,61741
7	0,00027	0,022178
8	-0,0003	-0,02482
9	0,00016	0,013162
10	0,000742	0,060874

Nordea:

Days	CAAR	T-test
-10	0,002564	0,246177
-9	0,00312	0,299547
-8	0,007832	0,751914
-7	0,009889	0,949447
-6	0,005674	0,544738
-5	0,004612	0,442833
-4	0,009183	0,881686
-3	0,004815	0,462322
-2	0,008653	0,83078
-1	0,009602	0,921911
0	0,011643	1,11779
1	0,01314	1,261562
2	0,007499	0,720002
3	0,001425	0,136801
4	0,004625	0,443994
5	0,0056	0,53765
6	0,002416	0,231983
7	0,00145	0,139191
8	-0,00348	-0,33441
9	-0,00429	-0,41228
10	-0,00872	-0,83676

Swedbank:

Days	CAAR	T-test
-10	0,002963	0,150216
-9	0,004013	0,203407
-8	-0,00731	-0,37038
-7	-0,00739	-0,37464
-6	-0,00999	-0,50655
-5	-0,02287	-1,15932
-4	-0,02479	-1,25665
-3	-0,01948	-0,98723
-2	-0,01748	-0,88631
-1	-0,01581	-0,80132
0	-0,02698	-1,36768
1	-0,03884	-1,96885
2	-0,03398	-1,72255
3	-0,03011	-1,52655
4	-0,02608	-1,32188
5	-0,01702	-0,86265
6	-0,02088	-1,05841
7	-0,01735	-0,87936
8	-0,01447	-0,73344
9	-0,02149	-1,08947
10	-0,02043	-1,03553

SEB:

Days	CAAR	T-test
-10	-0,00068	-0,09416
-9	-0,00016	-0,02221
-8	0,001255	0,174231
-7	0,002838	0,393942
-6	0,001556	0,215937
-5	0,00176	0,24423
-4	0,001152	0,159881
-3	0,001955	0,271355
-2	0,003298	0,457719
-1	0,002331	0,323495
0	0,002344	0,325338
1	0,000834	0,115711
2	0,001473	0,204383
3	0,001595	0,221341
4	0,002795	0,387978
5	0,003014	0,418315
6	0,004253	0,590251
7	0,004812	0,667862
8	0,003848	0,534093
9	0,003468	0,481309
10	0,004798	0,665913

Appendix 3 - Wilcoxon signed rank test

Bank sector:

Test Statistics

	Buy30 - expbuy	Buy60 - expbuy	Buy120 - expbuy	Sell30 - expsell	Sell60 - expsell	Sell120 - expsell
Z	-1,232	-2,756	-,814	1,523	1,836	1,451
Asymp. Sig. (2-tailed)	,218	,006	,416	,128	,066	,147

Test Statistics

	buy0 - expbuy	Sell0 - expsell
Z	,200	-,020
Asymp. Sig. (2-tailed)	,841	,984

SHB:

Test Statistics

	Buy30 - expbuy	Buy60 - expbuy	Buy120 - expbuy	Sell30 - expsell	Sell60 - expsell	Sell120 - expsell
Z	-1,027	-1,599	-,770	1,013	2,062	,454
Asymp. Sig. (2-tailed)	,304	,110	,441	,311	,039	,650

Test Statistics

	Buy0 - expbuy	Sell0 - expsell
Z	-,922	-,734
Asymp. Sig. (2-tailed)	,357	,463

Nordea:

Test Statistics

	Buy30 - expbuy	Buy60 - expbuy	Buy120 - expbuy	Sell30 - expsell	Sell60 - expsell	Sell120 - expsell	Buy0 - expbuy	Sell0 - expsell
Z	2,412	-1,128	-,730	,089	1,156	1,334	2,622	1,156
Asymp. Sig. (2-tailed)	,016	,259	,466	,929	,248	,182	,009	,248

Swedbank:

Test Statistics

	Buy30 - expbuy	Buy60 - expbuy	Buy120 - expbuy	Sell30 - expsell	Sell60 - expsell	Sell120 - expsell	Buy0 - expbuy	Sell0 - expsell
Z	-2,186	-1,419	-,348	,296	-1,125	-1,362	-1,419	-1,125
Asymp. Sig. (2-tailed)	,029	,156	,728	,767	,260	,173	,156	,260

SEB:

Test Statistics

	Buy30 - expbuy	Buy60 - expbuy	Buy120 - expbuy	Sell30 - expsell	Sell60 - expsell	Sell120 - expsell	Buy0 - expbuy	Sell0 - expsell
Z	-,847	-1,633	-,574	1,513	1,039	2,098	-825	,348
Asymp. Sig. (2-tailed)	,397	,102	,566	,130	,299	,036	,409	,728

Appendix 4 – Chi Square test for normal distribution, Buy

Bank sector

Day 0:

Mean	0,00068
Std. Devn.	0,05671
Size	245

Class Interval			Actual	Expected
-infinity	to	-0,056	25	38,8815
-0,056	to	-0,024	35	41,9685
-0,024	to	7E-04	62	41,65
0,0007	to	0,026	61	41,65
0,0256	to	0,057	41	41,9685
0,0574	to	infinity	21	38,8815

x^2	33,29169
p-value	**0,0000**

Day 30:

Mean	-0,0039
Std. Devn.	0,06749
Size	245

Class Interval			Actual	Expected
-infinity	to	-0,071	25	38,8815
-0,071	to	-0,034	38	41,9685
-0,034	to	-0,004	65	41,65
-0,004	to	0,026	51	41,65
0,0258	to	0,064	40	41,9685
0,0636	to	infinity	26	38,8815

x^2	24,88078
p-value	**0,0000**

Day 60:

Mean	-0,0158
Std. Devn.	0,10408
Size	245

Class Interval			Actual	Expected
-infinity	to	-0,12	27	38,8815
-0,12	to	-0,062	32	41,9685
-0,062	to	-0,016	50	41,65
-0,016	to	0,03	75	41,65
0,03	to	0,088	31	41,9685
0,0883	to	infinity	30	38,8815

x^2	39,27194
p-value	**0,0000**

Day 120:

Mean	-0,0115
Std. Devn.	0,14393
Size	245

Class Interval			Actual	Expected
-infinity	to	-0,155	24	38,8815
-0,155	to	-0,075	42	41,9685
-0,075	to	-0,012	52	41,65
-0,012	to	0,052	65	41,65
0,0518	to	0,132	32	41,9685
0,1324	to	infinity	30	38,8815

x^2	25,75482
p-value	**0,0000**

SHB

Day 0:

Mean	-0,0067
Std. Devn.	0,03103
Size	44

Class Interval			Actual	Expected
-infinity	to	-0,038	7	6,9828
-0,038	to	-0,02	5	7,5372
-0,02	to	-0,007	10	7,48
-0,007	to	0,007	6	7,48
0,0069	to	0,024	8	7,5372
0,0243	to	infinity	8	6,9828

x^2	2,17254
p-value	**0,5374**

Day 30:

Mean	-0,0062
Std. Devn.	0,04261
Size	44

Class Interval			Actual	Expected
-infinity	to	-0,049	5	6,9828
-0,049	to	-0,025	9	7,5372
-0,025	to	-0,006	10	7,48
-0,006	to	0,013	6	7,48
0,0125	to	0,036	7	7,5372
0,0364	to	infinity	7	6,9828

x^2	2,02707
p-value	**0,5668**

Day 60:

Mean	-0,0077
Std. Devn.	0,06624
Size	44

Class Interval			Actual	Expected
-infinity	to	-0,074	4	6,9828
-0,074	to	-0,037	10	7,5372
-0,037	to	-0,008	8	7,48
-0,008	to	0,021	13	7,48
0,0214	to	0,059	4	7,5372
0,0585	to	infinity	5	6,9828

x^2 8,41163

p-value **0,0382**

Day 120:

Mean	-0,0103
Std. Devn.	0,07892
Size	44

Class Interval			Actual	Expected
-infinity	to	-0,089	7	6,9828
-0,089	to	-0,045	6	7,5372
-0,045	to	-0,01	11	7,48
-0,01	to	0,024	4	7,48
0,0244	to	0,069	10	7,5372
0,0686	to	infinity	6	6,9828

x^2 4,53211

p-value **0,2094**

Nordea

Day 0:

Mean	0,00858
Std. Devn.	0,02612
Size	85

Class Interval			Actual	Expected
-infinity	to	-0,018	12	13,4895
-0,018	to	-0,003	17	14,5605
-0,003	to	0,009	16	14,45
0,0086	to	0,02	17	14,45
0,0201	to	0,035	9	14,5605
0,0347	to	infinity	14	13,4895

x^2 3,33227

p-value **0,3432**

Day 30:

Mean	0,00795
Std. Devn.	0,03114
Size	85

Class Interval			Actual	Expected
-infinity	to	-0,023	12	13,4895
-0,023	to	-0,006	19	14,5605
-0,006	to	0,008	12	14,45
0,008	to	0,022	10	14,45
0,0217	to	0,039	21	14,5605
0,0391	to	infinity	11	13,4895

x^2	6,61125
p-value	**0,0854**

Day 60:

Mean	-0,0069
Std. Devn.	0,04817
Size	85

Class Interval			Actual	Expected
-infinity	to	-0,055	12	13,4895
-0,055	to	-0,028	12	14,5605
-0,028	to	-0,007	13	14,45
-0,007	to	0,014	23	14,45
0,0143	to	0,041	13	14,5605
0,0412	to	infinity	12	13,4895

x^2	6,15095
p-value	**0,1045**

Day 120:

Mean	-0,0125
Std. Devn.	0,05779
Size	85

Class Interval			Actual	Expected
-infinity	to	-0,07	16	13,4895
-0,07	to	-0,038	4	14,5605
-0,038	to	-0,012	16	14,45
-0,012	to	0,013	11	14,45
0,0129	to	0,045	27	14,5605
0,0453	to	infinity	11	13,4895

x^2	20,2035
p-value	**0,0002**

Swedbank

Day 0:

Mean	-0,0043
Std. Devn.	0,08728
Size	70

Class Interval			Actual	Expected
-infinity	to	-0,092	5	11,109
-0,092	to	-0,043	17	11,991
-0,043	to	-0,004	19	11,9
-0,004	to	0,034	15	11,9
0,0341	to	0,083	6	11,991
0,0829	to	infinity	8	11,109

x^2 14,3589

p-value **0,0025**

Day 30:

Mean	-0,0165
Std. Devn.	0,10179
Size	70

Class Interval			Actual	Expected
-infinity	to	-0,118	7	11,109
-0,118	to	-0,061	10	11,991
-0,061	to	-0,016	23	11,9
-0,016	to	0,028	13	11,9
0,0283	to	0,085	9	11,991
0,0853	to	infinity	8	11,109

x^2 13,922

p-value **0,0030**

Day 60:

Mean	-0,0319
Std. Devn.	0,15802
Size	70

Class Interval			Actual	Expected
-infinity	to	-0,19	7	11,109
-0,19	to	-0,101	13	11,991
-0,101	to	-0,032	13	11,9
-0,032	to	0,038	16	11,9
0,0377	to	0,126	12	11,991
0,1262	to	infinity	9	11,109

x^2 3,51942

p-value **0,3183**

Day 120:

Mean	-0,011
Std. Devn.	0,22631
Size	70

Class Interval			Actual	Expected
-infinity	to	-0,237	9	11,109
-0,237	to	-0,111	15	11,991
-0,111	to	-0,011	12	11,9
-0,011	to	0,089	8	11,9
0,0886	to	0,215	19	11,991
0,2153	to	infinity	7	11,109

x^2	8,0512
p-value	**0,0450**

SEB

Day 0:

Mean	0,00863
Std. Devn.	0,04826
Size	46

Class Interval			Actual	Expected
-infinity	to	-0,04	6	7,3002
-0,04	to	-0,013	8	7,8798
-0,013	to	0,009	12	7,82
0,0086	to	0,03	11	7,82
0,0299	to	0,057	4	7,8798
0,0569	to	infinity	5	7,3002

x^2	6,39595
p-value	**0,0939**

Day 30:

Mean	-0,0087
Std. Devn.	0,05288
Size	46

Class Interval			Actual	Expected
-infinity	to	-0,062	5	7,3002
-0,062	to	-0,032	4	7,8798
-0,032	to	-0,009	13	7,82
-0,009	to	0,015	10	7,82
0,0146	to	0,044	8	7,8798
0,0442	to	infinity	6	7,3002

x^2	6,90745
p-value	**0,0749**

Day 60:

Mean	-0,0169
Std. Devn.	0,05194
Size	46

Class Interval			Actual	Expected
-infinity	to	-0,069	6	7,3002
-0,069	to	-0,04	7	7,8798
-0,04	to	-0,017	5	7,82
-0,017	to	0,006	12	7,82
0,0059	to	0,035	10	7,8798
0,035	to	infinity	6	7,3002

x^2	4,38311
p-value	**0,2230**

Day 120:

Mean	0,0035
Std. Devn.	0,05276
Size	46

Class Interval			Actual	Expected
-infinity	to	-0,049	6	7,3002
-0,049	to	-0,02	7	7,8798
-0,02	to	0,004	11	7,82
0,0035	to	0,027	6	7,82
0,0267	to	0,056	6	7,8798
0,0563	to	infinity	10	7,3002

x^2	3,49343
p-value	**0,3216**

Appendix 5 – Chi Square test for normal distribution, Sell

Bank sector

Day 0:

Mean	-0,0018
Std. Devn.	0,03341
Size	103

Class Interval			Actual	Expected
-infinity	to	-0,035	6	16,3461
-0,035	to	-0,016	12	17,6439
-0,016	to	-0,002	32	17,51
-0,002	to	0,013	26	17,51
0,0129	to	0,032	16	17,6439
0,0316	to	infinity	11	16,3461

x^2	26,3628
p-value	**0,0000**

Day 30:

Mean	0,00627
Std. Devn.	0,04388
Size	103

Class Interval			Actual	Expected
-infinity	to	-0,038	8	16,3461
-0,038	to	-0,013	17	17,6439
-0,013	to	0,006	28	17,51
0,0063	to	0,026	31	17,51
0,0256	to	0,05	11	17,6439
0,0501	to	infinity	8	16,3461

x^2	27,7254
p-value	**0,0000**

Day 60:

Mean	0,00675
Std. Devn.	0,04976
Size	103

Class Interval			Actual	Expected
-infinity	to	-0,043	5	16,3461
-0,043	to	-0,015	17	17,6439
-0,015	to	0,007	31	17,51
0,0067	to	0,029	28	17,51
0,0286	to	0,057	15	17,6439
0,0565	to	infinity	7	16,3461

x^2	30,3163
p-value	**0,0000**

Day 120:

Mean	0,00818
Std. Devn.	0,06859
Size	103

Class Interval			Actual	Expected
-infinity	to	-0,06	9	16,3461
-0,06	to	-0,022	14	17,6439
-0,022	to	0,008	34	17,51
0,0082	to	0,038	27	17,51
0,0384	to	0,077	9	17,6439
0,0768	to	infinity	10	16,3461

x^2 31,4252

p-value **0,0000**

SHB

Day 0:

Mean	-0,0139
Std. Devn.	0,05387
Size	13

Class Interval			Actual	Expected
-infinity	to	-0,068	2	2,0631
-0,068	to	-0,038	0	2,2269
-0,038	to	-0,014	4	2,21
-0,014	to	0,01	2	2,21
0,0098	to	0,04	4	2,2269
0,0399	to	infinity	1	2,0631

x^2 5,65819

p-value **0,1295**

Day 30:

Mean	0,01136
Std. Devn.	0,06203
Size	13

Class Interval			Actual	Expected
-infinity	to	-0,051	2	2,0631
-0,051	to	-0,016	1	2,2269
-0,016	to	0,011	2	2,21
0,0114	to	0,039	5	2,21
0,0387	to	0,073	1	2,2269
0,0734	to	infinity	2	2,0631

x^2 4,89794

p-value **0,1794**

Day 60:

Mean	0,02538
Std. Devn.	0,09511
Size	13

Class Interval			Actual	Expected
-infinity	to	-0,07	1	2,0631
-0,07	to	-0,016	0	2,2269
-0,016	to	0,025	5	2,21
0,0254	to	0,067	5	2,21
0,0672	to	0,12	0	2,2269
0,1205	to	infinity	2	2,0631

x^2	12,048
p-value	**0,0072**

Day 120:

Mean	0,02949
Std. Devn.	0,11843
Size	13

Class Interval			Actual	Expected
-infinity	to	-0,089	1	2,0631
-0,089	to	-0,023	4	2,2269
-0,023	to	0,029	2	2,21
0,0295	to	0,082	3	2,21
0,0816	to	0,148	1	2,2269
0,1479	to	infinity	2	2,0631

x^2	2,93982
p-value	**0,4010**

Nordea

Day 0:

Mean	0,01164
Std. Devn.	0,03293
Size	11

Class Interval			Actual	Expected
-infinity	to	-0,021	1	1,7457
-0,021	to	-0,003	2	1,8843
-0,003	to	0,012	2	1,87
0,0116	to	0,026	3	1,87
0,0261	to	0,045	2	1,8843
0,0446	to	infinity	1	1,7457

x^2	1,34315
p-value	**0,7189**

Day 30:

Mean	0,00053
Std. Devn.	0,03665
Size	11

Class Interval			Actual	Expected
- infinity	to	-0,036	1	1,7457
-0,036	to	-0,016	4	1,8843
-0,016	to	5E-04	2	1,87
0,0005	to	0,017	1	1,87
0,0167	to	0,037	0	1,8843
0,0372	to	infinity	3	1,7457

x^2	5,89337
p-value	**0,1169**

Day 60:

Mean	0,02711
Std. Devn.	0,0556
Size	11

Class Interval			Actual	Expected
- infinity	to	-0,028	1	1,7457
-0,028	to	0,003	3	1,8843
0,0027	to	0,027	3	1,87
0,0271	to	0,052	1	1,87
0,0516	to	0,083	1	1,8843
0,0827	to	infinity	2	1,7457

x^2	2,51878
p-value	**0,4719**

Day 120:

Mean	0,04101
Std. Devn.	0,07034
Size	11

Class Interval			Actual	Expected
- infinity	to	-0,029	3	1,7457
-0,029	to	0,01	2	1,8843
0,0101	to	0,041	1	1,87
0,041	to	0,072	1	1,87
0,072	to	0,111	0	1,8843
0,1114	to	infinity	4	1,7457

x^2	6,51323
p-value	**0,0891**

Swedbank

Day 0:

Mean	-0,027
Std. Devn.	0,06161
Size	9

Class Interval			Actual	Expected
-infinity	to	-0,089	2	1,4283
-0,089	to	-0,054	0	1,5417
-0,054	to	-0,027	1	1,53
-0,027	to	1E-04	3	1,53
0,0001	to	0,035	2	1,5417
0,0346	to	infinity	1	1,4283

x^2	3,63115
p-value	**0,3041**

Day 30:

Mean	0,02786
Std. Devn.	0,10022
Size	9

Class Interval			Actual	Expected
-infinity	to	-0,072	1	1,4283
-0,072	to	-0,016	2	1,5417
-0,016	to	0,028	3	1,53
0,0279	to	0,072	1	1,53
0,072	to	0,128	1	1,5417
0,1281	to	infinity	1	1,4283

x^2	2,17939
p-value	**0,5360**

Day 60:

Mean	-0,0154
Std. Devn.	0,07136
Size	9

Class Interval			Actual	Expected
-infinity	to	-0,087	1	1,4283
-0,087	to	-0,047	0	1,5417
-0,047	to	-0,015	3	1,53
-0,015	to	0,016	3	1,53
0,016	to	0,056	1	1,5417
0,056	to	infinity	1	1,4283

x^2	4,81361
p-value	**0,1860**

Day 120:

Mean	-0,0545
Std. Devn.	0,12037
Size	9

Class Interval			Actual	Expected
-infinity	to	-0,175	0	1,4283
-0,175	to	-0,107	4	1,5417
-0,107	to	-0,055	1	1,53
-0,055	to	-0,002	1	1,53
-0,002	to	0,066	2	1,5417
0,0659	to	infinity	1	1,4283

x^2 5,98002

p-value **0,1126**

SEB

Day 0:

Mean	0,00234
Std. Devn.	0,01825
Size	70

Class Interval			Actual	Expected
-infinity	to	-0,016	9	11,109
-0,016	to	-0,006	20	11,991
-0,006	to	0,002	12	11,9
0,0023	to	0,01	12	11,9
0,0104	to	0,021	8	11,991
0,0206	to	infinity	9	11,109

x^2 6,82858

p-value **0,0776**

Day 30:

Mean	0,00411
Std. Devn.	0,0238
Size	70

Class Interval			Actual	Expected
-infinity	to	-0,02	8	11,109
-0,02	to	-0,006	12	11,991
-0,006	to	0,004	13	11,9
0,0041	to	0,015	17	11,9
0,0146	to	0,028	12	11,991
0,0279	to	infinity	8	11,109

x^2 4,1874

p-value **0,2419**

Day 60:

Mean	0,00361
Std. Devn.	0,02535
Size	70

Class Interval			Actual	Expected
- infinity	to	-0,022	9	11,109
-0,022	to	-0,008	13	11,991
-0,008	to	0,004	11	11,9
0,0036	to	0,015	13	11,9
0,0148	to	0,029	14	11,991
0,029	to	infinity	10	11,109

x^2	0,62794
p-value	**0,8900**

Day 120:

Mean	0,00769
Std. Devn.	0,0305
Size	70

Class Interval			Actual	Expected
- infinity	to	-0,023	9	11,109
-0,023	to	-0,006	10	11,991
-0,006	to	0,008	20	11,9
0,0077	to	0,021	13	11,9
0,0211	to	0,038	10	11,991
0,0382	to	infinity	8	11,109

x^2	6,5433
p-value	**0,0880**