

# Insider Trading on the Stockholm Stock Exchange

## Sector Analysis

### **Abstract**

This research paper is based on data of insider transactions between January 2004 and June 2008 in six specific segments on the Stockholm Stock Exchange; the banking-telecom-, oil-, metal & mining-, machinery- and real estate sector. By using the method of event study, we find significant abnormal returns within six sectors for buy transactions and three sectors for sell transactions. We also find a significant difference in aggregated abnormal return between the sectors that have the highest and the lowest sample aggregated cumulative abnormal return. Furthermore, we test whether the inside investors who did the transaction within five days before the event date can obtain the abnormal return and whether outside investors who come into market and imitate the insiders' transaction behaviour on the event date will yield abnormal return. The results show that the inside investor can get an abnormal return within the majority of the sectors for buy transactions, for the outside investor the findings are inverted; an imitator will yield no abnormal return in the majority of the sectors on the exchange.

Authors: Feiyang Li (80344)  
Johan Nogeman (21115)  
Presentation: December 3, 2008  
Room 336  
Tutor: Ulf Axelson  
Discussants: Yuan Yuan (80359)

**Acknowledgements:** We first want to thank Finansinspektionen for providing us with the essential data in order to create this paper. We also want to express our gratitude towards our tutor Ulf Axelson who helped us along the path of conducting this thesis.

<b>1. INTRODUCTION</b>	<b>4</b>
<b>1.1 Purpose</b>	<b>4</b>
<b>1.2 Background</b>	<b>4</b>
<b>2. THEORETICAL BACKGROUND</b>	<b>5</b>
<b>2.1 Efficient market hypothesis</b>	<b>5</b>
2.1.1 Weak form	6
2.1.2 Semi-strong form	6
2.1.3 Strong form	6
<b>2.2 Irrationality</b>	<b>7</b>
<b>2.3 Signal effect</b>	<b>7</b>
<b>2.4 Previous studies</b>	<b>8</b>
2.4.1 Foreign studies	8
2.4.2 Swedish studies	9
<b>2.5 Law and Regulation</b>	<b>10</b>
<b>3. METHODOLOGY</b>	<b>12</b>
<b>3.1 Event studies</b>	<b>12</b>
<b>3.2 Event window</b>	<b>12</b>
<b>3.3 Estimation Window</b>	<b>12</b>
<b>3.4 Market Model</b>	<b>13</b>
<b>3.5 Hypothesis</b>	<b>14</b>
<b>3.6 Abnormal returns</b>	<b>14</b>
<b>3.7 Data</b>	<b>16</b>
3.7.1 Data collection	16

3.7.2 Historical price	17
3.7.3 Index value	17
3.7.4 Transaction data	17
<b>3.8 The definition of event</b>	<b>18</b>
<b>4. RESULT</b>	<b>20</b>
4.1 The Result for All Six Sectors	20
4.2 T-test of the SACAR between Sectors	21
4.3 Banking Sector	23
4.4 Telecommunication sector	24
4.5 Oil,Gas&Fuel sector	25
4.6 Metal&Mining Sector	27
4.7 Machinery Sector	28
4.8 Real Estate Sector	29
4.9 The Result of All Six Sectors Using Overall Market as Benchmark	31
4.10 The Abnormal Return to the Inside Investors	32
4.11 The Abnormal Return to the Outside Investors	34
<b>5. CONCLUSION</b>	<b>36</b>
5.1 Suggested Further Studies	38
<b>6. REFERENCES</b>	<b>40</b>
<b>APPENDIX</b>	<b>43</b>

# **1. INTRODUCTION**

## **1.1 Purpose**

The purpose with this research paper is to investigate whether insider transactions generate abnormal return within six specific sectors on the Stockholm Stock Exchange (SSE). Then we test if the difference in aggregated abnormal return between sectors is significant, whether the inside investor who execute the transaction within five days can get the abnormal return and whether the outside investors who enter the market on the event day will yield abnormal return by imitating the transaction behavior of insiders. The chosen specialization aims to bring deeper knowledge within the field of research.

## **1.2 Background**

Insider trading is an interesting parameter when analyzing and picking shares in order to strive for the maximal return. A lot of studies have been conducted throughout the years and different outcomes have been found. Some earlier research papers such as Pratt & Devere (1968), Jaffe (1974a, 1974b), Finnerty (1976), Summers & Sweeney (1998) and Seyhun (1998) all show the results that insiders earn abnormal return. Papers pointing in the opposite direction, thus that insiders do not earn abnormal return have also been published, e.g. Eckbo & Smith (1998) and Wahlström (2003).

We have selected six sectors on the SSE to investigate, namely Banking, Telecom, Oil, Metal & Mining, Machinery and Real Estate. The selection is based on a combination of data convenience, market capitalization and relevance. Through sector analysis we take the topic of insider trading to a new level, covering a greater amount of sectors and a longer period of time. In addition, different sectors might show differences in abnormal return considering the firm-specific character, which would be interesting to investigate further. Finally we would like to test the trading strategy after knowing the difference in abnormal return between sectors.

## 2. THEORETICAL BACKGROUND

Insider trading is known as transactions made by individuals who manage a particular company, directors and large shareholders, in line with Jaffe (1974). A vast amount of studies show that insider trading will generate abnormal return indicating that the strong form of market efficiency according to Fama (1970) does not hold. If “outsiders” by imitating the insiders can benefit from this anomaly, it means that markets are not semi-strong efficient either. These are two of the core ideas of the efficient market hypothesis, thus explaining the importance of this theory in our thesis. Insiders take private (non published) information into account when trading in his or her company’s shares according to Finnerty (1976), the same paper also points out that the companies from which insiders purchase shares are characterized by smaller size, having higher profitability and yielding a greater dividend than in companies where insiders sell shares.

### 2.1 Efficient market hypothesis

The central theory of market efficiency, Fama (1970), stresses three particular requirements to be fulfilled in order to have market efficiency. These requirements are critical for investors’ possibility of predicting future share price development;

*◇Market actors are assumed to act rational; value securities rationally and try to maximize profit*

*◇No buyer or seller could alone affect prices*

*◇All information are available to everyone, there are no transaction costs*

Further, Fama (1970) stresses three different forms of market efficiency, since no market is fully efficient and reflect all of the available information;

*◇The Weak form, current prices reflect all information in the historical development of the share prices. No profit from technical analysis, the study of historical share price information.*

*◇The Semi-strong form, the prices reflect all published information. No profit from investigating this information, thus, fundamental analysis is unprofitable.*

*◇The Strong form, all existing information are reflected by the share price. No abnormal return is possible to obtain, not even by insiders.*

### **2.1.1 Weak form**

The theory concerns weak market efficiency. One cannot utilize historical data of share prices in order to forecast forthcoming development. This theory was first presented by Samuelson (1965) and Mandelbrot (1966). Prices follow a random walk according to the hypothesis and it is impossible to earn superior profits just by observing past prices.

### **2.1.2 Semi-strong form**

The next level of market efficiency, the semi-strong form of efficiency, includes past prices as well as information and the facts are openly published; Fama (1970). The examples include announcements of a new share issue, annual reports, potential M&A activity and splits. One can check if the semi-strong hypothesis holds by studying the share price development before and after announcement of price affecting information and the speed with which the price adjusts to new information. The faster the price is adjusted, the more efficient is the market.

### **2.1.3 Strong form**

In this form prices do not only reflect the information from the two previous forms, but also reflect private information in the market; insider information. Consequently, nobody should be able to generate abnormal returns above the expected because of monopolistic access to information and that there would be no point for insiders to trade in order to take advantage of their position and information advantage. Ample evidence

show that insiders earn abnormal returns and there are investors, traders, scalpers who in fact do beat and have been beating market on a regular basis. That is somewhat incompatible in this form of market efficiency.

## **2.2 Irrationality**

The efficient market hypothesis requires rational investors. Baker et al. (2006) describe irrationality as leaders' problem to balance three competing goals;

*◇To maximize the fundamental value of the company.*

*◇To maximize the share price, which in an effective market is the same as the fundamental value.*

*◇To supply the long term investors by utilizing situations where the share-price differs from the fundamental value. This is possible by issuing instruments which is overvalued and by buying back those which are undervalued.*

The difficulty of balancing these goals could lead to irrational decisions and irrational investors.

## **2.3 Signal effect**

The relationship between transactions made by insiders and the share price is assumed through the signaling effect. If an insider is increasing his/her holdings, this could send a signal to the market that the insider is confident in the firm's future business and believes in a good return by holding the particular share. Thus, one could probably assume that the insider possesses information unknown to outsiders. If this is the case, the trades made by insiders ought to be a signal which affects the stock price towards the level where it would be if all investors had the same access to the insider information and knowledge about the company.

The particularly chosen direction implies a positive (negative) signaling effect dependent on if the particular person increase (decrease) his or her ownership. If the

person increases the holdings, this should in theory always be a signal of an undervalued company. The insider has the opportunity to invest the money elsewhere, but chooses shares in his or her own company; outsiders should interpret the purchase as a sign that the company in question is undervalued. However, selling off the particular stock could have a wider range of explanations than that the insider thinks of a negative share price development, e.g. due to tax issues and/or private reasons.

One problem concerning insider transactions is the lag between the actual change of the insider holdings and when it is published; and thus common knowledge. A person with insider's status must report to Finansinspektionen<sup>1</sup> (FI) within five banking days after a transaction.

## **2.4 Previous studies**

The quantity of studies that have been investigating the particular topic is comprehensive, some with slightly different approaches and aims. Some of the earlier research are commented upon and used as benchmarks in this thesis.

### **2.4.1 Foreign studies**

One very important article in the field of insider trading was presented by Jaffe (1974), and simply defines insider trading as trading carried out by the management, directors and large shareholders of a particular company. By examining stock return in the US 1962 – 1968, he concluded that insiders possessed and exploited exclusive information. This particular research was considered innovative within this area and when Finnerty (1976) afterwards performed a similar study in the US between 1969 and 1972, it came to the same conclusions. According to Finnerty (1976), insiders utilize private information when evaluating trading decisions in their company's stock. The insider's behaviour is dependent upon the beliefs of how this would affect the market value. Purchases are often conducted within small companies, with larger profit and dividend

---

<sup>1</sup> [www.fi.se](http://www.fi.se)

than the companies where insider persons choose to sell their stock. Vast amount of investigations have been conducted since then. Pope et al (1990), Seyhun (1992), and Richardson Pettit et al (1995) all presented research on this topic in the beginning of the 1990's. Pope et al (1990) discovered that abnormal returns could be earned from strategies based on directors' actions in the UK, when ignoring bid-ask spreads and transaction costs.

Within the topic, there were also researches pointing in other directions than the above mentioned. According to Seyhun, (1998) there is no direct price effect from the insider transactions. The same paper concludes that the size of the transaction could be important; large transactions hold more information than small dittos.

#### **2.4.2 Swedish studies**

Hjertstedt et al (2000) carried out an investigation in Sweden on data between January 1996 and August 1999 and found that insiders earn significant abnormal returns both when they purchase and sell shares on the SSE. Hjertstedt et al (2000) also showed that transactions done in smaller firms were more profitable than those in large firms, in accordance with research of Finnerty (1976), Lakonishok & Lee (2001) mentioned above.

Hjemgård et al (2002) did however not find any proof of abnormal return when imitating the transactions of insiders, when investigating the SSE January 1998 to February 2002. Johansson et al (2005) studied data between January 2002 and October 2004 from the Swedish exchange and found that insiders generate abnormal returns from buying, but not from selling. Furthermore, this result was indeed even more significant for small cap firms.

Private information could also lead to that more than one insider trade within the same event period. Research within this field has been carried out by Sjöholm & Skoog (2006) and shows that the effect could be stronger if e.g. the director and CFO make purchases in the same interval.

## 2.5 Law and Regulation

The highest authority of the SSE is FI. FI monitors the Swedish financial market and investigates suspicions concerning e.g. insider breaches and illegal share price effects in order to control that the regulations of insider transactions are maintained. If FI suspects a crime it will forward the case to prosecutor at the Swedish National Economic Crimes Bureau<sup>2</sup> (EBM). Below we stress the different characteristics of an insider. The law has in addition recently been extended.

The people who have good possibilities of obtaining confidential information in a company are considered as an insider according to Swedish law 2000:1087;

*◇Member/alternate member of the company's or the parent company' board*

*◇CEO or vice president of the company/parent company*

*◇Auditor/alternate auditor in the company/parent company*

*◇Member of general partnership which is the company's parent company, (limited partner excluded)*

*◇People with leading positions or the like whom normally can be presumed as having access to non-published information which could affect the share price*

*◇Individuals as according to point 1-3 above or others in leading positions of subsidiaries whom could get in contact with non-published information which could affect the share price*

*◇Large shareholders, (at least 10 percent of the capital or at least 10 percent of the voting rights (alone or together with other individual or legal entity kindred to the insider)*

---

<sup>2</sup> [www.ekobrottsmyndigheten.se](http://www.ekobrottsmyndigheten.se)

*◇Large shareholders are also individuals whom through their company/companies hold at least 10 percent of capital or voting rights in a company (thus no "own" holdings are needed).*

According to the regulation it is forbidden for an insider to trade in financial instruments if the individual possesses information not known to the public. Swedish companies with shares listed at Swedish stock market are responsible to inform who has an insider position in the company. The insiders are in turn responsible to inform their and kindred's holdings and changes (also include other instruments than shares). The insider must inform of changes in his or her holdings within five days and the FI then publish the information immediately. If the information does not reach FI in time, a fee of 10 percent of the transaction value must be paid by the insider (minimum SEK 15000 and maximum SEK 350 000).

### **3. METHODOLOGY**

#### **3.1 Event studies**

In order to test if there is abnormal return for insider transaction within each sector, we will use the method of event study. Theoretically, the event study includes four steps: first, the estimation window needs to be established and the normal return will be measured. Second, the event window needs to be established and the abnormal return will be measured based on the real return and the normal return derived from estimation window. Third, the abnormal return will be aggregated across time and events. Fourth, statistical method will be used to test if the aggregated abnormal return is statistically significant.

#### **3.2 Event window**

Since we are going to measure the effect of information release by the company, we need to set several days before the information releasing days. The reason is that we need to catch the potential “leaking” information anticipated by the market before the information releasing. We also need to set several days after the information releasing to measure the market reaction and interpretation to the information releasing by the company. During the period surrounding the information releasing, we will catch all the abnormal return compared with the normal return developed by the market return model. We use a time period of 10 days before the information release and 10 days after the information release and the actual event day. The reason is that it will take up to five days for listed company to report and register the transaction to *FI*. Furthermore, earlier research shows that the significant effect because of the information will happen within one trading week (five days).

#### **3.3 Estimation Window**

To estimate the normal return for the days within event window, we need to choose a long period before that to develop the model. In our work, we will choose six trading

months (namely, 129 trading days) before event window as the estimation window. It is important that the estimation window does not overlap the event window, since the model developed to calculate the normal return should not be influenced by the return within the event window; otherwise the parameters of the model will be biased. In practice, since we choose the event window to begin from -10 on the time line, with event date as 0, and to finish on +10, the estimation window will begin from -139 on the time line and finish in -11.

### 3.4 Market Model

In order to determine the abnormal return, we will estimate the *normal* return first. There are different statistical and economic models to estimate the normal returns. In our studies, we will use the market model suggested by Mackinlay et al (1997). The market model is a statistical model which relates the return of any given security to the return of the market portfolio linearly. We will use GICS sector indices (Global Industry Classification Standard), which is an international classification created to meet investor's demands for more precise, exhaustive and standardized average price development, to be the approximation of the market portfolio for each sector. The reason why we choose market model is that it removes the portion of the return that is related to variation in the market's return and the variance of the abnormal return is reduced. The market model has the following form:

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

Where  $R_{i,t}$  is the return of security  $i$  at time  $t$ ,  $R_{m,t}$  is the return of market portfolio approximated by GICS sector indices at time  $t$ ,  $\varepsilon_{i,t}$  is the zero-mean error term of the model.  $\alpha_i$  and  $\beta_i$  are the model parameters that will be measured from regression using the data in the estimation window. The beta value is a measure of sensitivity for the return of a specific security to the return of the whole market and the alpha value is the intercept in the regression that is specific for each company.

For each security, we will use the logarithm return, namely

$R_{i,t} = \ln\left(\frac{P_{i,t}}{P_{i,t-1}}\right)$ <sup>3</sup>, where  $P_{i,t}$  is the stock price of security  $i$  on day  $t$  and  $P_{i,t-1}$  is the

stock price of security  $i$  on day  $t-1$ . Although we can also use arithmetic returns,

namely,  $R_{i,t} = \left(\frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}}\right)$ , however, the logarithm return has several advantages. First,

by the central limit theorem, the distribution of logarithm returns should approach the normal distribution over long periods. Second, logarithm returns are additive, which aids in cases of cumulating returns.

### 3.5 Hypothesis

To test if there is an abnormal return in each sector, we need to establish the hypothesis first:

**H<sub>0</sub>**: No abnormal return can be found in each sector with inside transaction

**H<sub>1</sub>**: The abnormal return can be found in each sector with inside transaction.

We would like to emphasize that we do not establish the hypothesis to test the abnormal jointly, but to test each sector separately.

### 3.6 Abnormal returns

Under the event window, when we get the *normal return* developed by the market model, the difference between the normal return and the real return will be *abnormal return*, namely,  $AR_{i,t} = R_{i,t} - E(R_{i,t} | X_t)$ , where  $AR_{i,t}$  is the abnormal return for security  $i$  at time  $t$ .  $R_{i,t}$  is the real return and  $E(R_{i,t} | X_t)$  is the expected return under the conditioning information  $X_t$  for the normal performance model.

---

<sup>3</sup> We do not consider dividend payment in our studies.

The abnormal return observations must be aggregated to draw the overall inferences. Define  $CAR_i(t_1, t_2)$  to be the cumulative abnormal return for security  $i$  from  $t_1$  to  $t_2$ .

$$CAR_i(t_1, t_2) = \sum_{t_1}^{t_2} AR_{i,t}$$

From the definition of variance, we can calculate the variance of cumulative abnormal return.

$$Var[CAR_i(t_1, t_2)] = \sigma_i^2(t_1, t_2)$$

The above method is applied to one event and need to extend to aggregate many event observations. Define  $\overline{CAR}(t_1, t_2)$  as the cumulative average abnormal return from  $t_1$  to  $t_2$ . We can get  $\overline{CAR}(t_1, t_2)$  by aggregating  $CAR_i(t_1, t_2)$  for each security  $i$

$$\overline{CAR}(t_1, t_2) = \frac{1}{N} \sum_{i=1}^N CAR_i(t_1, t_2)$$

Like the method to get  $\overline{CAR}(t_1, t_2)$ , we can also use the variance of cumulative abnormal return to get variance of cumulative average abnormal return

$$Var[\overline{CAR}(t_1, t_2)] = \bar{\sigma}^2(t_1, t_2) = \frac{1}{N^2} \sum_{i=1}^N \sigma_i^2(t_1, t_2)$$

Under the assumption that the event window of the  $N$  securities does not overlap, which we will have the detailed description in the data part, the cumulative average abnormal return will have the normal distribution with mean of zero and variance of  $\bar{\sigma}^2(t_1, t_2)$ , namely  $\overline{CAR}(t_1, t_2) : N(0, \bar{\sigma}^2(t_1, t_2))$ , to standardize  $\overline{CAR}(t_1, t_2)$ , we will get the test statistics:

$$J_1 = \frac{\overline{CAR}(t_1, t_2)}{[\overline{\sigma}^2(t_1, t_2)]^{\frac{1}{2}}} : N(0,1)$$

The value of  $J_1$  will be evaluated against the value of 5% significance level. The value of 5% significance level of normal distribution is 1,96. If the result of test statistic is larger than 1,96, then the null hypothesis can be rejected.

### 3.7 Data

#### 3.7.1 Data collection

The source of data used in this paper is from the registration of insider transaction in *FI* between the period 2004 January and 2008 June. According to the regulation, the insiders have the responsibility to report their inside transaction to FI and the transaction information will then be disclosed to the market. The data contains the following information:

- 1, the daily stock price for the event companies within six sectors between 2000 and 2008;
- 2, the GICS sector indices for six sectors between 2000 and 2008: Banking sector, Telecommunication sector, Oil Gas&Fuel sector, Metal&Mining sector, Machinery sector and Real Estate sector
- 3, OMX30 index between 2000 and 2008
- 4, the insider transaction registration in FI

The daily stock price for the event companies within six sectors and GICS sector indices are taken from Thomson Datastream, whereas the insider transaction registration is from FI.

### **3.7.2 Historical price**

We gather the historical price of constituent companies from Thomson Datastream. As described before, we can calculate the stock return from the historical price and use the return to estimate the market model and calculate the abnormal returns. The stock prices that we gathered are between 2003-01-01 and 2008-07-01.

### **3.7.3 Index value**

In order to estimate the market model, we use GICS sector indices as the proxy of market return. The data was collected from Thomson Datastream between 2003-01-01 and 2008-07-01. GICS (Global Industry Classification Standard) is an international classification created to meet investors' demands for more precise, exhaustive and standardized average price development.

### **3.7.4 Transaction data**

The insider transaction registration is gathered from FI. In the files sent by FI, the information contains the name of the company, the name of the insider, the classification of transaction, the transaction amount, the transaction date and the transaction registration day. The information sent by FI helped to solve the time gap problem, which is a common problem in the earlier studies, between the transaction day and the registration day. As stated before, there will be zero to five days time gaps between the transaction day and registration day, thus making it difficult to fix the exact event day. Previous studies usually use an event window that is larger than five days to lighten the problem and guarantee that the registration day is contained in the event window. The method is, however, easy to suffer from systematic error since the exact event date is unclear. In our data, the registration date are both clearly specified, thus we do not need to solve the time gap problem.

From the big amount of insider transaction registration from FI, we filter out the transaction amount that is lower than 50000 SEK, however the majority transaction

amount is far larger than 50000 SEK. The previous studies show that the remained transaction event after filter will have the largest signaling effect for the studies.

### **3.8 The definition of event**

We define the event in our studies as one buy transaction or sell transaction done by one insider on a specific date.

According to the definition stated above, there will be huge amount of events. From the insider transaction registration, we also notice that different company insiders buy (sell) the same company's stock continuously within a few days. If we treat each transaction as an individual event, it will create several problems. First, the amount of events will be too large and the statistical software cannot handle the huge amount of data. Second, the event windows of transactions will overlap with each other, which cause the correlation between different event windows. The assumption of no overlap of event window allow us to use the method stated above to calculate the variance of aggregated sample cumulative abnormal returns without concern about covariance between individual samples CARs, since they are zero. If the event windows do overlap, the covariance between the abnormal return may differ from zero and the distributional results presented for the aggregated abnormal return are not applicable.

Because of the two reasons stated above, we need to merge the successive transaction on the same company stock to one "big event" so that the event windows do not overlap with each other. In practice, we use the first transaction of the successive transaction to represent the "big event" and its transaction date will be the event date. We would like to emphasize that we do not filter out those transactions, but to merge them together. The purpose is to avoid the event window overlap that causes severe problem for CAR and to lower the amount of events to a reasonable level.

There is also that the buy transaction and the sell transaction on the same company's stock happen on the same day. The reason is not clear and some previous studies interpret this behavior as tax consideration. This kind of transaction will create problem

both for buy transaction and sell transaction, since the buy transaction and the sell transaction is studied separately within each sector. It might happen that the sell transaction shows to have the positive stock price driving effect purely because of the buy transaction of same stock on the same day.

For this kind of transaction, we compare the amount of buy transaction and the sell transaction and see the net difference between them and judge it to be an actual buy transaction or an actual sell transaction.

## 4. RESULT

### 4.1 The Result for All Six Sectors

The statistics result in table 1 shows that the null hypothesis of no abnormal return is rejected in buy and sell transactions of Banking sector, buy transaction for Telecommunication sector, buy and sell transaction for Oil, Gas&Fuel sector, buy transaction for Metal & Mining sector, buy and sell transaction for Machinery sector, buy transaction for Real Estate sector. The null hypothesis of no abnormal return cannot be rejected in sell transaction of Telecommunication sector, Metal & Mining sector and Real Estate sector. The overall result is nearly in line with most of the earlier studies, which showed that the insider transaction will bring the abnormal return. Within all the statistical significant results, the two highest positive abnormal returns are 3,89% in Oil, Gas&Fuel sector whereas the highest negative abnormal return is -3,30% in Oil, Gas&Fuel sector.

To follow up the development of abnormal return within event window, we need to know the average abnormal return, noted as  $AAR$ . Unlike  $CAR_i(t_1, t_2)$  which is presented in methodology part,  $AAR$  is calculated by aggregating abnormal return across the event and dividing the number of events, whereas  $CAR_i(t_1, t_2)$  is calculated by aggregating abnormal return across the time and dividing the length of event window. After having  $AAR$ , we can derive the sample aggregated cumulative abnormal return, noted as  $SACAR$ , by accumulating  $AAR$  iteratively. Namely,  $SACAR_1 = AAR_1$ ,  $SACAR_2 = AAR_1 + AAR_2$  and so on. Undoubtfully, the  $SACAR$  on the final day of event window, namely on day +10, will have the exact same result as we listed in the above table, since  $AAR$  and  $SACAR$  tend to aggregate the abnormal return across the event, whereas the method presented in methodology part is developed from single event to multiple events, namely to aggregate the abnormal return across the time first.

Sector		Event window	SACAR	J-value	H <sub>0</sub> reject
<b>Banking</b>	Buy	21 days	0.82%	2.27371**	Yes
	Sell	21 days	-0.92%	-2.10616**	Yes
<b>Telecom</b>	Buy	21 days	3.88%	2.697809***	Yes
	Sell	21 days	-1.47%	-0.6998	No
<b>Oil, Gas, Fuel</b>	Buy	21 days	3.89%	2.380682**	Yes
	Sell	21 days	-3.30%	-2.39117**	Yes
<b>Metal, Mining</b>	Buy	21 days	2.51%	2.421074**	Yes
	Sell	21 days	-1.53%	-1.08396	No
<b>Machinery</b>	Buy	21 days	1.19%	2.300598**	Yes
	Sell	21 days	-1.25%	-2.04655**	Yes
<b>Real Estate</b>	Buy	21 days	2.30%	2.476423**	Yes
	Sell	21 days	-0.15%	-0.11149	No

Table 1. The result of abnormal return in all six sectors using GICS sector indices as benchmark. Each sector is divided into buy transaction and sell transaction. The third column shows the length of the event windows; the fourth column shows the sample aggregated cumulative abnormal return (SACAR). The J-value is also reported to show the statistical result. The last column reports whether the hypothesis will be rejected. The significance level is set to be 5%.

## 4.2 T-test of the SACAR between Sectors

The highest SACAR in buy transaction can be observed in Oil, Gas&Fuel sector at 3,89%, whereas the lowest SACAR in buy transaction can be observed in Banking sector with 0,82%.

Simultaneously, the highest SACAR in sell transaction can be observed in Oil, Gas&Fuel sector at -3.3%, while the lowest SACAR in sell transaction can be observed in Banking sector with -0,92%.

We will use T-test to test if SACAR in the two sectors are statistically different in buy transaction respective in sell transaction.

Independent Samples Test							
	Levene's Test for Equality of Variances		t-test for Equality of Means				
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
CAR Equal variances assumed	84,414	0,000	4,000	129	0,000	0,030761	0,007689
Equal variances not assumed			3,005	46,539	0,004	0,030761	0,010237

Table 2. The result of t-test of difference between SACAR (buy transaction) in oil,gas&fuel sector and the SACAR (buy transaction) in banking sector. The column “Levene’s Test for Equality Variance” shows the result whether the hypothesis of equal variance can be rejected. Since F-value turns out to be very significant with p-value at 0, the hypothesis of equal variance can be rejected, thus we should read the result of the second line. The column “t-test for Equality of Means” shows whether the SACAR of two sectors are significantly different. The t-value is 3,005 and the p-value is 0,004, indicating that it is highly significant in all significance level, therefore the hypothesis of equality of means can be rejected. We can say that the difference of SACAR (buy transaction) between the Oil,Gas&Fuel sector and the Banking sector is statistically different from 0.

Independent Samples Test							
	Levene's Test for Equality of Variances		t-test for Equality of Means				
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
CAR Equal variances assumed	23,751	0,000	2,221	92	0,029	0,023757	0,010694
Equal variances not assumed			2,141	50,017	0,037	0,023757	0,011098

Table 3. The result of t-test of difference between the SACAR (sell transaction) in oil,gas&fuel sector and SACAR (sell transaction) in banking sector. Similar to the table 1, the F-statistic of “Levene’s Test for Equality of Variance” shows that the hypothesis of equal variance can be rejected, thus we will read the second line in the table. In “t-test for equality of Means”, the t-value is 2,141 with the p-value 0,037, indicating that the hypothesis of equal mean between two sectors can be rejected in 5% level. We can say that the difference of SACAR (sell transaction) in oil,gas&fuel sector and that in banking sector is statistically difference from 0.

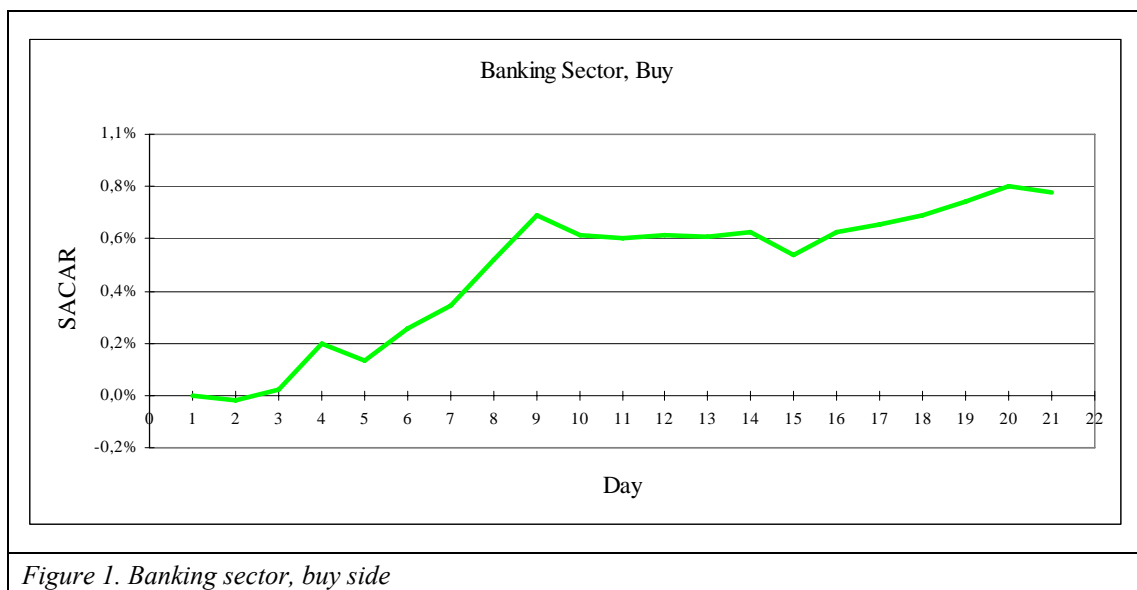
The pair-wise independent sample t-test between all six sectors in buy transactions and in sell transactions are listed in appendix.

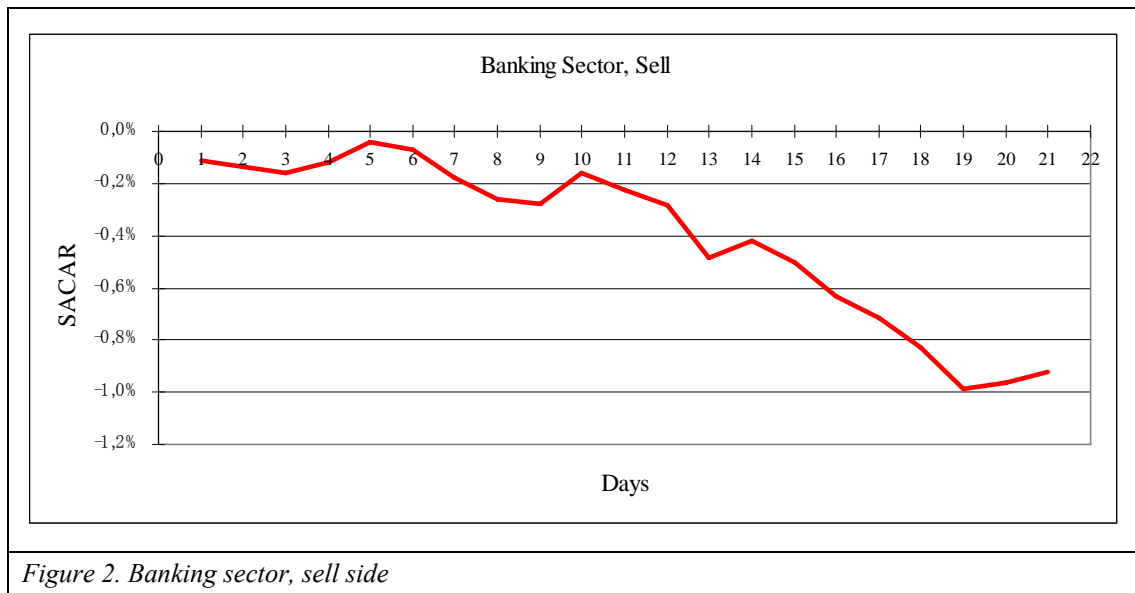
### 4.3 Banking Sector

Figure 1 and figure 2 show the development of Sample Aggregated Cumulative Abnormal Return (SACAR) during the event window.

In figure 1, the SACAR shows a minor negative return in day 2, 4, 9, 15 and 21, however, the overall trend shows an obvious positive abnormal return. After event day (day 11), SACAR does not show an obvious positive increase until five days after the event day (day 16); in day 15, it even shows a negative abnormal return. At last, the SACAR of buy transaction in banking sector arrives at 0,82%, which is relatively low compared with other sectors.

In figure 2, we show the SACAR development for sell transaction in banking sector. During the pre-event period (from day 1 to day 10), SACAR does not show an obvious down trend, whereas the trend become more observable 3 days after event day. The SACAR gets down from -0,42% to -0,989% within 5 days (day 3 to day 8). During the last two days, SACAR has a minor up trend.

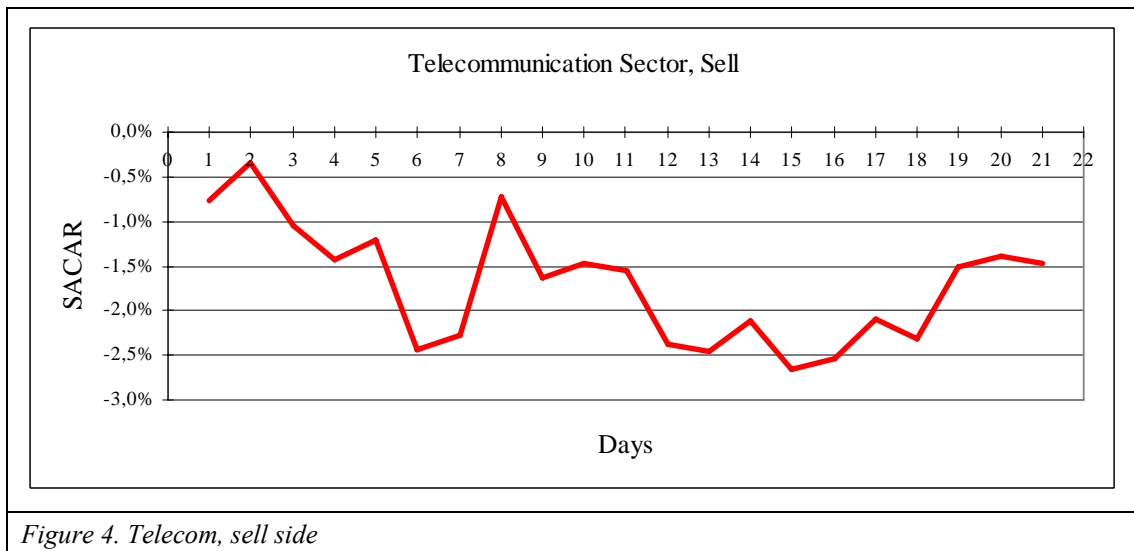
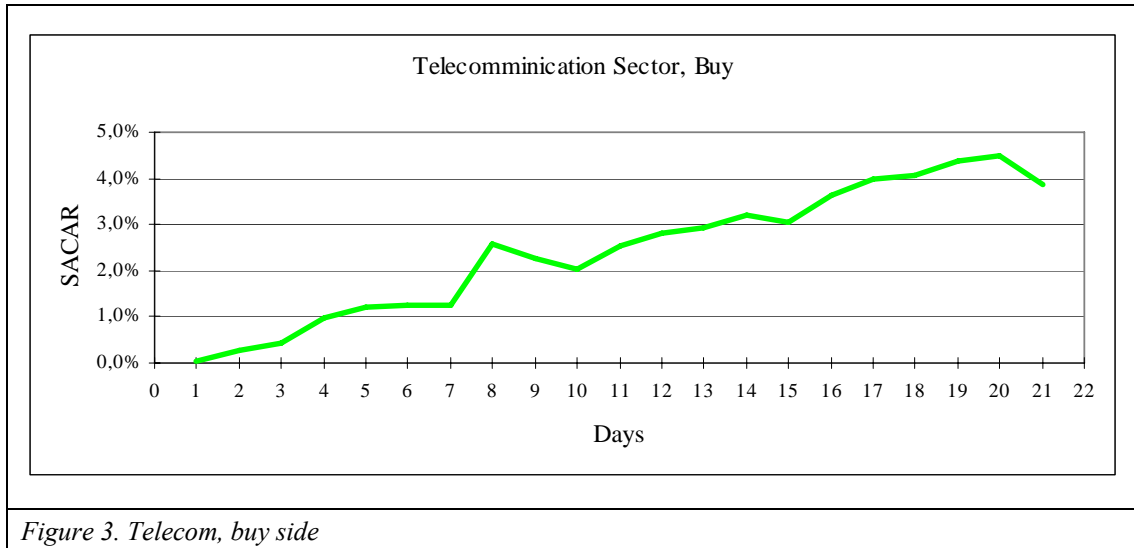




#### 4.4 Telecommunication sector

Figure 3 shows the SACAR development of buy transaction in telecommunication sector, the upward trend is quite stable. There is a drastic increase (from 1,248% to 2,596%) between day 7 and day 8. After the event day, the SACAR goes up as pre-event period and no obvious jump is observed. A decrease (from 4,498% to 3,885%) can be observed during the last day (day 21) and the SACAR arrives at 3,885% at last.

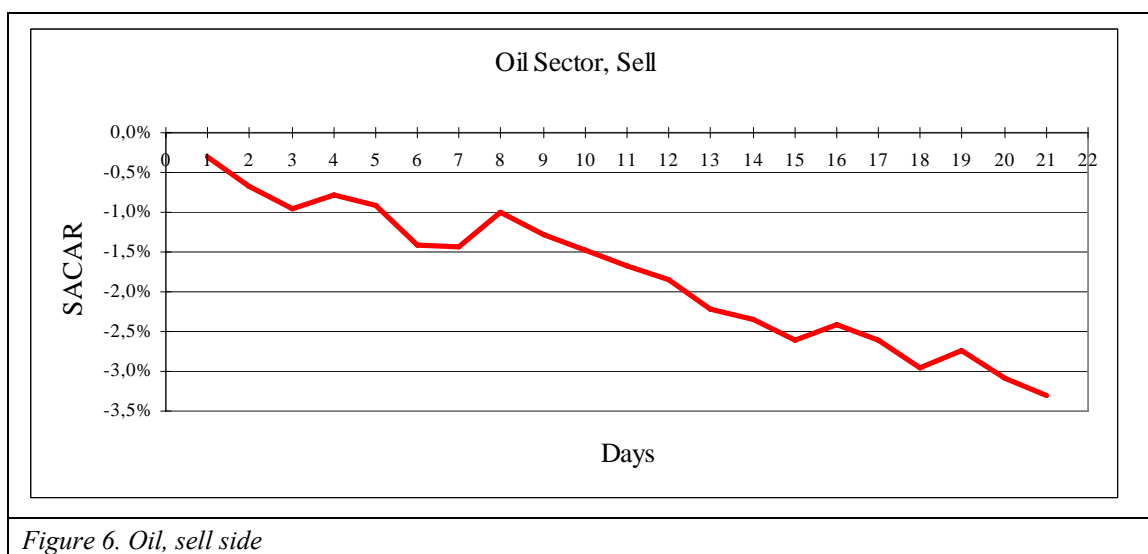
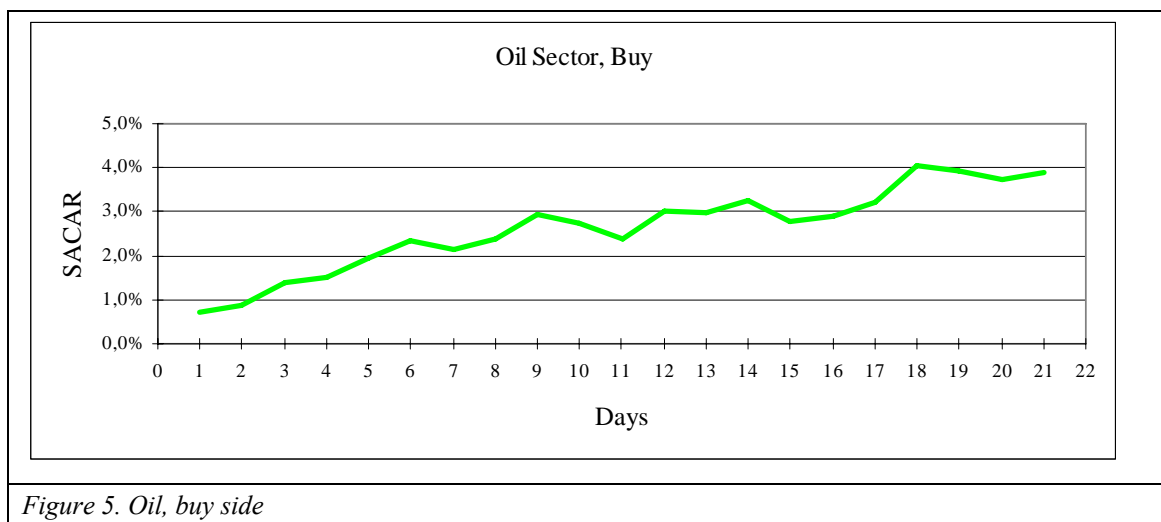
Figure 4 shows the trend of SACAR of sell transaction in telecommunication sector, the pattern does not show obvious overall upward trend or downward, but shows a fluctuation: from day 5 to day6, the SACAR decreases from -1,214% to -2,432%, whereas it increases from -2,283% to -0,72% from day 7 to day 8. After the event day, the fluctuation continues. One day after the event day (between day 11 and day 12), SACAR decreases from -1,543% to -2,372%, however, it goes up afterwards. Because of the fluctuation pattern, SACAR is finally not statistic significant.



#### 4.5 Oil,Gas&Fuel sector

Figure 5 shows the SACAR development of buy transaction in Oil,Gas&Fuel sector. During the pre-event period, SACAR has a stable increase from 0,717% to 2,946% (from day 1 to day9). A minor decrease can be observed between day 9 and day 11. One day after the event day (from day 11 to day 12), an obvious increase in SACAR (from 2,386% to 3,002%) can be seen. From day 12 to day 17, SACAR is around 3% without notable increase or decrease. The increase between day 17 and 18 makes SACAR to stay finally at nearly 4% (3,895%)

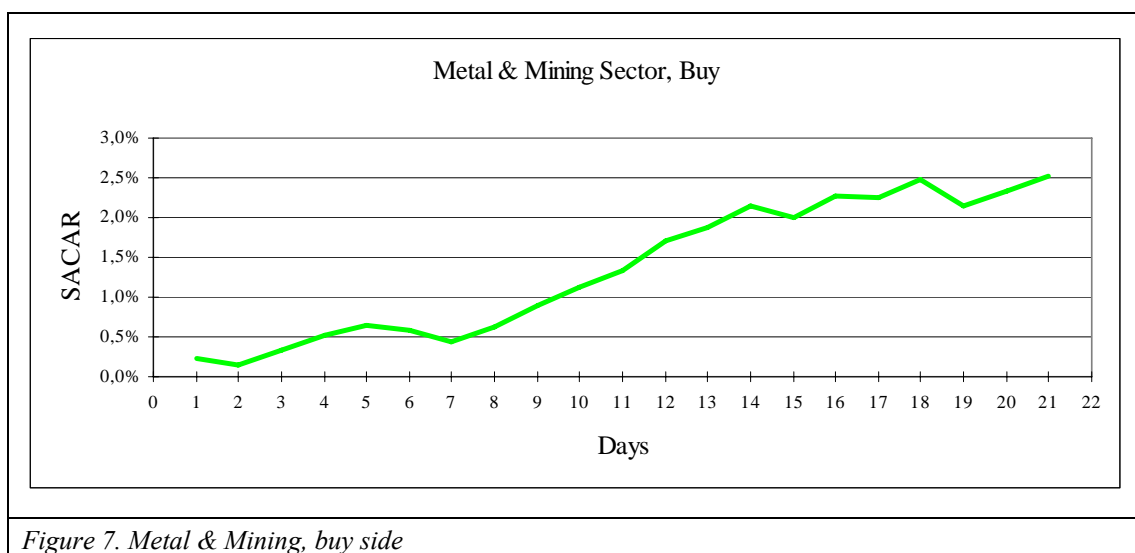
Figure 6 shows the SACAR of sell transaction in Oil,Gas&Fuel sector. From day 8 to day 15, we can observe a stable downward trend. SACAR decreases from -1% to 2,599%. We cannot observe a drastic decrease after the event day (day 11), but a decrease with nearly constant slope that began 3 days (day 8) before the event. Between day 15 and day 21, SACAR shows dominated decrease and two minor increases at day 16 and day 18.

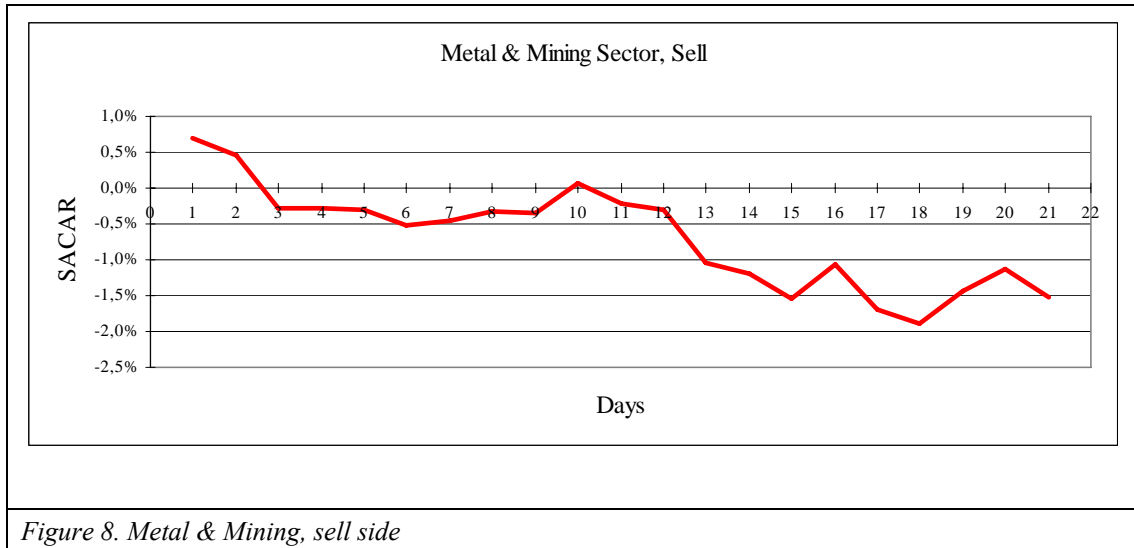


## 4.6 Metal&Mining Sector

Figure 7 shows the SACAR development of buy transaction in Metal & Mining sector. SACAR has a stable increase (from 0,428% to 2,146%) between day 7 and day 14. The slope is nearly the same, thus a sudden change after event day (day 11) cannot be observed. This pattern is quite similar to the SACAR pattern of sell transaction in oil sector. Between day 14 and day 21, continuous increase does not show any more, but a minor increase and decrease show up. The amount of SACAR increase is not very large either (from 2,146% to 2,515%).

Figure 8 shows the SACAR of sell transaction in Metal & Mining sector. We can observe an overall decrease trend of SACAR from the graph, especially from day 1 to day 3 (from 0,69% to -0,278%), however, SACAR has nearly no changes between day 3 and day 9 (from -0,278% to -0,346%). After the event day (day 11), the continuous decrease can be observed. A large decrease happens between day 12 and day 13 (from -0,313% to -1,052%). However, the decrease is not enough to bring out a significant SACAR result at 5% level.

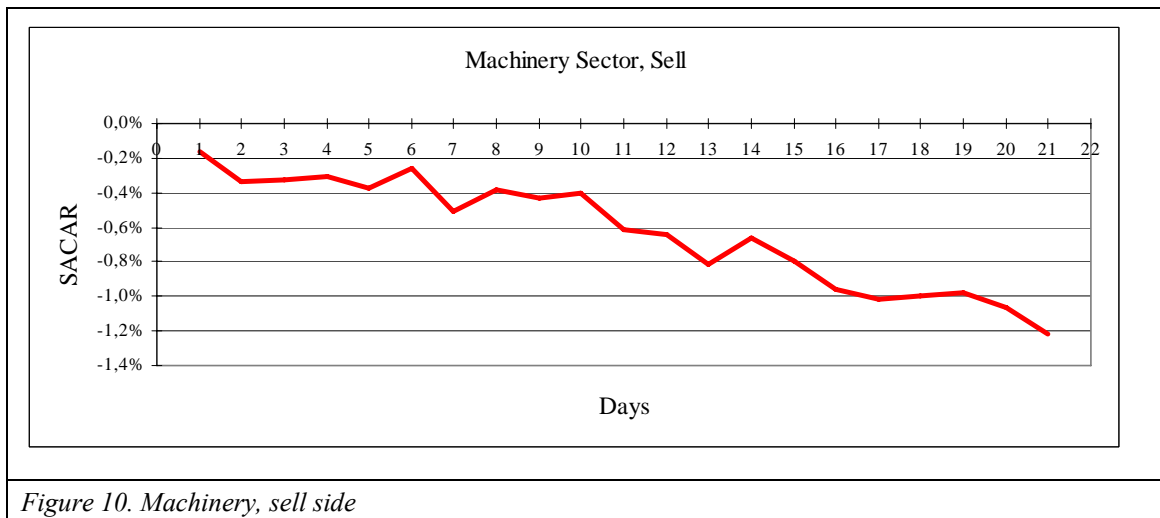
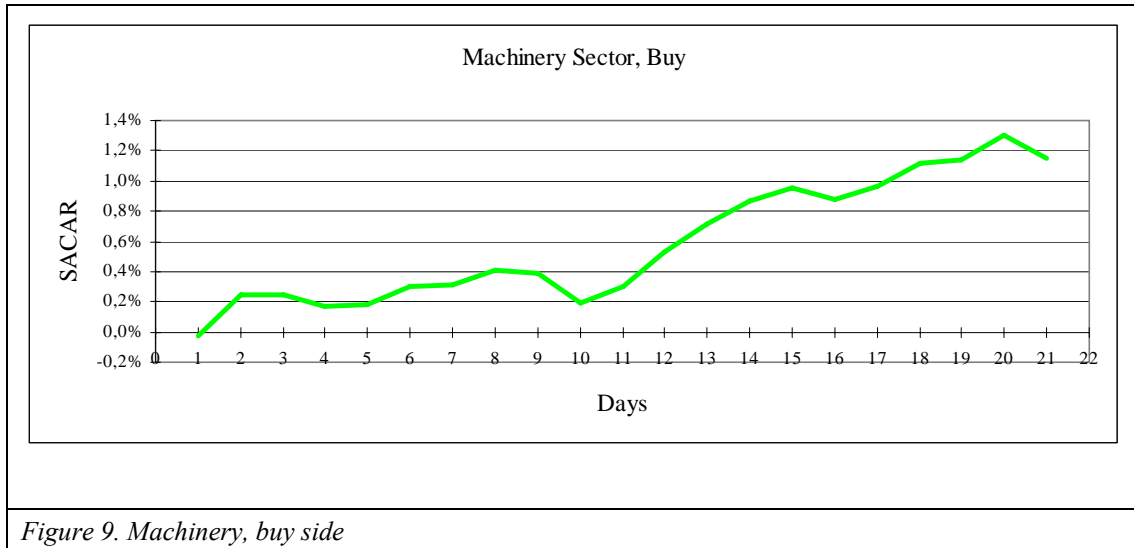




## 4.7 Machinery Sector

Figure 9 shows the SACAR development of buy transaction in Machinery sector. During the pre-event period, especially from day 2 to day 9, SACAR does not have a major change (from 0,246% to 0,385%). After event day (day 11), SACAR has an obvious increase from day 11 to day 15 (0,298% to 0,95%).

Figure 10 shows SACAR of sell transaction in Machinery sector. Compared with the pattern of sell transaction in Metal & Mining sector, the graphs are somewhat similar. In the graph of Machinery sector, we can observe several days' "pause" as well. During pre-event period, between day 2 and day 4, day 8 and day 10, the changes are quite small; SACAR is from -0,339% to -0,308% respective from -0,386% to -0,402%. After the event, between day 17 and day 19, the changes are small as well (around -1%). Although the pattern shows a general downward trend, the J-value of SACAR is just a bit higher than the critical value (-1,96).

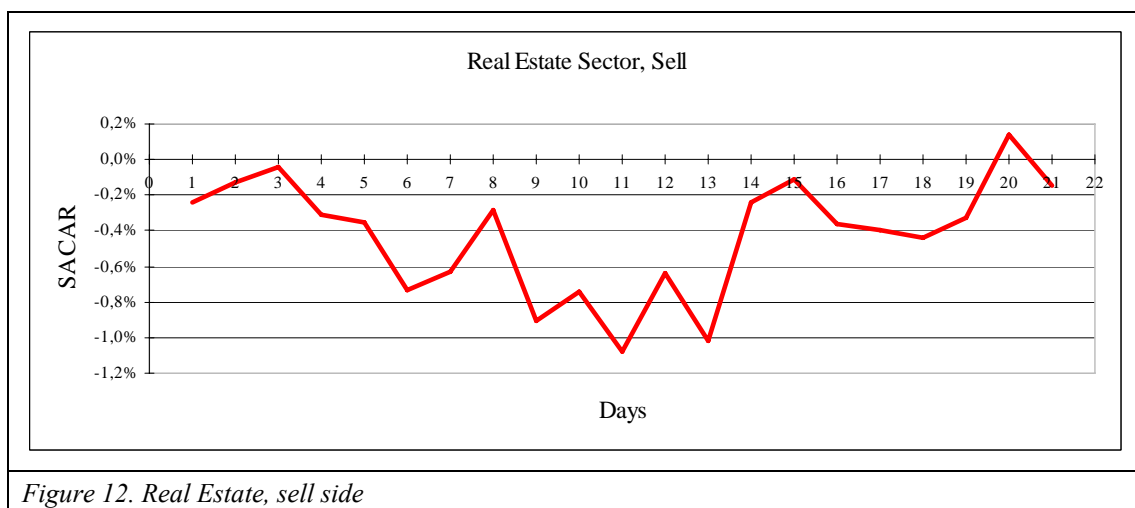
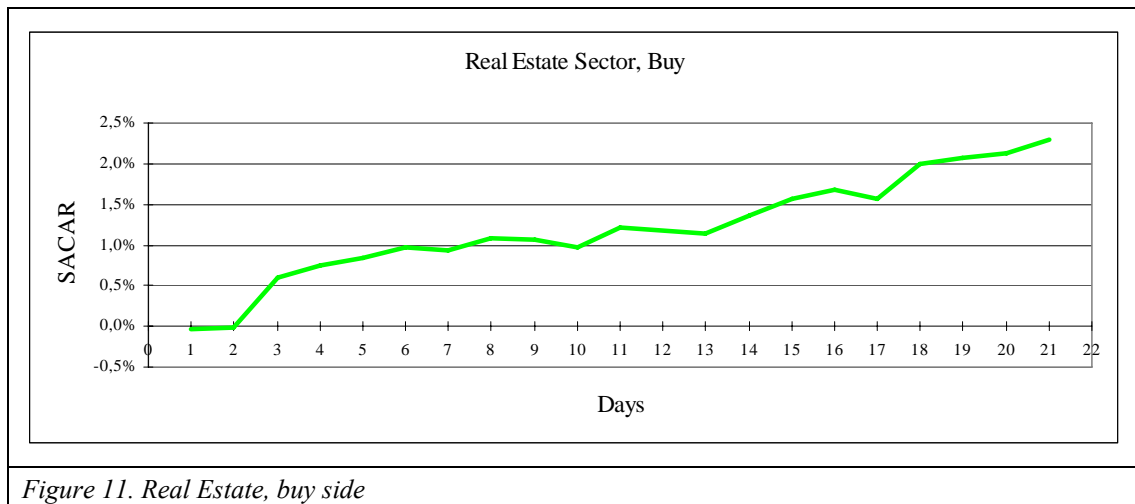


## 4.8 Real Estate Sector

Figure 11 shows the development of SACAR of buy transaction in Real Estate sector. During the pre-event period (from day 1 to day 10), SACAR grows from -0,025% to 0,978%. However, during two days after event day (day 11), SACAR shows a slow decrease from 1,223% to 1,133%. That is not observed in other sectors.

Figure 12 shows the SACAR of sell transaction in real estate sector. It is easy to see that there is no obvious trend in the pattern. From day 6 to day 14, SACAR shows a big jump in both increase and decrease similar to the pattern of “W”. From event day (day

11) to the following day, we can observe a drastic increase of SACAR from -1,082% to -0,634%, which is opposite to the expectation. The “W” pattern brings out an insignificant SACAR result at 5% level.



#### **4.9 The Result of All Six Sectors Using Overall Market as Benchmark**

The potential bias that uses GICS sector indices as benchmark might be that the abnormal return of one single big company that has heavy weight in GICS sector index might be underestimated. The extreme example is that if the GICS index in a certain sector constitutes only one big company, then the abnormal return of the event in this company will be always zero, since the benchmark is the performance of the company itself. Thus it is necessary to test the abnormal return using the overall market index as well. The statistics result in table 4 shows that the null hypothesis of no abnormal return is rejected in buy and sell transactions of Banking sector, buy transaction for Telecommunication sector, buy and sell transaction for Oil, Gas&Fuel sector, buy and sell transaction for Metal & Mining sector, buy and sell transaction for Machinery sector, buy transaction for Real Estate sector. The null hypothesis of no abnormal return cannot be rejected in sell transaction of Telecommunication sector and Real Estate sector. The overall result is nearly in line with the result using GICS sector index.

Sector		Event window	SACAR	J-value	H <sub>0</sub> reject
<b>Banking</b>	Buy	21 days	0.01%	2.88052 <sup>***</sup>	Yes
	Sell	21 days	-1.67%	-2.85819 <sup>***</sup>	Yes
<b>Telecom</b>	Buy	21 days	4.28%	2.918634 <sup>***</sup>	Yes
	Sell	21 days	-1.39%	-0.64562	No
<b>Oil, Gas, Fuel</b>	Buy	21 days	4.58%	2.6042 <sup>***</sup>	Yes
	Sell	21 days	-3.55%	-1.8364 <sup>*</sup>	No
<b>Metal, Mining</b>	Buy	21 days	5.75%	3.944847 <sup>***</sup>	Yes
	Sell	21 days	-4.40%	-2.51379 <sup>**</sup>	Yes
<b>Machinery</b>	Buy	21 days	2.81%	3.421801 <sup>***</sup>	Yes
	Sell	21 days	-1.58%	-2.04961 <sup>**</sup>	Yes
<b>Real Estate</b>	Buy	21 days	5.03%	3.099443 <sup>***</sup>	Yes
	Sell	21 days	0.45%	0.297694	No

Table 4. The result of abnormal return in all six sectors using OMX30 index as benchmark. Each sector is divided into buy transaction and sell transaction. The third column shows the length of the event windows; the fourth column shows the sample aggregated cumulative abnormal return (SACAR). The J-value is also reported to show the statistical result. The last column reports whether the hypothesis will be rejected. The significance level is set to be 5%.

#### 4.10 The Abnormal Return to the Inside Investors

In section 4.8, we show that the event of inside transaction can bring the abnormal return within some sectors, however, it is not for sure that the inside investors, who has done the transaction within five days before their registration and publishing in Finansinspektionen, can obtain the significant abnormal return. Therefore, we would like to test whether the insider investors who enter the market within five days before the announcement will get the abnormal return. The statistics result in table 5 shows that the null hypothesis of no abnormal return is rejected in the majority of the sectors

for buy transaction. The overall result shows that within the majority sector of buy transaction, there is abnormal return for inside investors, who have done the transaction within five days before publishing date and hold the shares for three trading weeks; however, the null hypothesis of no abnormal return can only be rejected within banking and oil sector for sell transaction.

Sector		Event window	SACAR	J-value	H <sub>0</sub> reject
<b>Banking</b>	Buy	15 days	0.61%	1.99868 <sup>**</sup>	Yes
	Sell	15 days	-0.80%	-2.16844 <sup>**</sup>	Yes
<b>Telecom</b>	Buy	15 days	2.92%	2.39837 <sup>**</sup>	Yes
	Sell	15 days	-0.03%	-0.01918	No
<b>Oil, Gas, Fuel</b>	Buy	15 days	2.39%	1.730016 <sup>*</sup>	No
	Sell	15 days	-3.30%	-2.82927 <sup>***</sup>	Yes
<b>Metal, Mining</b>	Buy	15 days	2.00%	2.274774 <sup>**</sup>	Yes
	Sell	15 days	-1.24%	-1.0419	No
<b>Machinery</b>	Buy	15 days	1.01%	2.315564 <sup>**</sup>	Yes
	Sell	15 days	-0.94%	-1.80867 <sup>*</sup>	No
<b>Real Estate</b>	Buy	15 days	1.55%	1.976879 <sup>**</sup>	Yes
	Sell	15 days	0.16%	0.146032	No

Table 5. The result of abnormal return to the inside investors is reported in table5. The buy transaction and sell transaction are divided within each sector. The third column shows the length of event window, since the inside investors have done their transactions within five days before the registration in Finansinspektionen, thus the total event window will be 15 days; the fourth column shows the sample aggregated cumulative abnormal return (SACAR). The J-value is reported in the fifth column to show the statistical result. The last column shows if the null hypothesis will be rejected. The significance level is set to be 5%.

#### **4.11 The Abnormal Return to the Outside Investors**

After testing the abnormal return for inside trading, we would also like to test the impact to the outside investors and test whether they can get the abnormal return by imitating the insider transaction. The statistics result in table 5 shows that the null hypothesis of no abnormal return is only rejected in sell transactions of Banking sector and buy transaction of Machinery sector. The abnormal return of sell transaction in banking sector is -0,76%, whereas the abnormal return of buy transaction in machinery sector is 0,96%. The overall result shows that if the outside investors imitate the same transaction behaviour as the inside investors on the event day and hold the shares in two trading weeks, they will not get abnormal return in the majority of sectors. Even within the banking sector and machinery sector that have the significant abnormal returns for the outside investors, the abnormal return might be cancelled out considering the transaction cost in reality.

Sector		Event window	SACAR	J-value	H <sub>0</sub> reject
<b>Banking</b>	Buy	11 days	0.17%	0.48001	No
	Sell	11 days	-0.76%	-2.40498 <sup>***</sup>	Yes
<b>Telecom</b>	Buy	11 days	1.87%	1.791469 <sup>*</sup>	No
	Sell	11 days	-0.01%	-0.00382	No
<b>Oil, Gas, Fuel</b>	Buy	11 days	1.14%	0.961086	No
	Sell	11 days	-1.81%	-1.81383 <sup>*</sup>	No
<b>Metal, Mining</b>	Buy	11 days	1.39%	1.848257 <sup>*</sup>	No
	Sell	11 days	-1.59%	-1.4977	No
<b>Machinery</b>	Buy	11 days	0.96%	2.659925 <sup>***</sup>	Yes
	Sell	11 days	-0.81%	-1.89301 <sup>*</sup>	No
<b>Real Estate</b>	Buy	11 days	1.32%	1.966247 <sup>**</sup>	Yes
	Sell	11 days	0.59%	0.624261	No

Table 6. The result of abnormal return to the outside investors is reported in table6. The buy transaction and sell transaction are divided within each sector. The third column shows the length of event window, since the outside begin to perform the transaction behavior on the event day, thus the total event window will be 11 days; the fourth column shows the sample aggregated cumulative abnormal return (SACAR). The J-value is reported in the fifth column to show the statistical result. The last column shows if the null hypothesis will be rejected. The significance level is set to be 5%.

## 5. CONCLUSION

The results show obviously that the inside transaction will bring the abnormal return to the buy transactions in all six sectors, whereas it brings the abnormal return to sell transactions in just three sectors (Banking sector, Oil,Gas&Fuel sector and Machinery sector). The decrease of share holdings by insider might be the signal that the stock is overvalued, however, other reasons might lead to this behaviour as well. The insider might need to sell the shares to cash in the money. With the tax consideration, the insiders might balance and match their gains and losses in different instruments to minimize the tax payments. The insider might also only take into account the historical purchasing price of the shares to gain the current profit, instead of considering the future gains even if the shares are not overvalued. Because of the various motivations of sell transaction except pure stock valuation consideration, the results are more complicated.

Comparing the abnormal return (SACAR) for each sector, we can see that the Banking sector has quite low abnormal returns (0,82% in buy transaction and -0,92% in sell transaction), whereas Oil,Gas&Fuel sector has relatively high (3,89% in buy transaction and -3,3% in sell transaction of Oil,Gas&Fuel sector). The t-test shows also that the difference of SACAR between Banking sector and Oil,Gas&Fuel sector is statistically difference from zero.

The result of low abnormal return for banking sector is quite surprising for us, since intuitively the insiders in banking sector should be more sensitive than other sectors, thus creating more abnormal return, however, the result is the opposite. One possible reason that might explain the phenomenon above is that banking sector is under a more severe supervision and monitoring than other sectors. As financial institutions, banks are more supervised by the relevant authorities and different analytical companies. The inside information taken by insider in banking sector might not be as “confidential” as other sectors, thus the abnormal return is smaller. Another reason might be that insiders

might not have as much inside information as other sectors because of the complexity and speciality of banking industry, since the service and production offered by banking sectors are often invisible and the performance of banking sectors are more tightly correlated with macroeconomic situation. Because of the less inside information, the abnormal return is lower correspondingly.

One possible reason that might explain a high abnormal return for Oil,Gas&Fuel sector and Telecommunication sector is the research and development investments. Compared with capital and financial investments, the investment of R&D contributes more to the information asymmetry, since the confidentiality and uniqueness of R&D makes it difficult for outsider to extract the information by trying to analyze and compare with other firms within the same sector, in another word, the R&D is more firm-specific, thus the corporate insider can get the relatively higher abnormal return especially within the sector of science and technology. This result is in line with the research of Aboody and Lev (2000).

Concerning the impact of insider transaction to the inside investors and outsider investors, we can see that the inside investors can obtain the abnormal return through the buy transaction in the majority of the sector, whereas the outsider cannot get the abnormal return in the majority of the sectors if they imitate the inside transaction on the publishing day, however, the sell transaction in banking sector, buy transaction in machinery sector and buy transaction in real estate sector show the significant result. The high negative abnormal return means that the outside investors will suffer a more severe loss than the normal condition without abnormal return if they do not imitate the behavior of insider. However, if the outside investors can short sell, then they can use this chance to cash in more than the normal case of non-existence of abnormal return. With the capital gained from short selling, the outside investors can imitate the buy behavior of insider to gain the positive abnormal return. However, in practice, the buy announcement and sell announcement are usually two different time points and this is especially true for the same sector. Unlike trading financial derivative, which can be

traded by short selling and longing other derivative simultaneously, the investor need to “wait” for the buy event or sell event (sometimes, the time interval is quite long). The two time points make it more complicated to measure investment strategy because of the time value of money, thus the discount rate need to be considered. Furthermore, the increased trading amount will increase the transaction fee in the real world. As we have mentioned, the existence of transaction fee might cancel out the yield and make the strategy to be valueless.

In total, our study concerning the legal inside transaction in six sectors of Swedish stock market shows that there are abnormal returns in all buy transactions and in half of the sell transactions. The insider can use their specific information to get abnormal return, whereas the outside investors who imitate the transaction behavior cannot get the abnormal return in the majority of the sector.

## 5.1 Suggested Further Studies

*◇To investigate more sectors on the SSE, and/ or conduct a research during a longer time period.*

*◇Capital insurances get more and more common<sup>4</sup> and a study concerning the impact of the capital insurances (with respect to insider trading) would be interesting. According to the Swedish Insurance Federation the new issue has increased by 139 percent in August 2008 compared to the year earlier statistics. This is a problem when it comes to the transparency of insiders transactions since holdings in a capital insurance does not have to be reported to authorities<sup>5</sup>; the*

---

4 Dagens Industri: “Kapitalförsäkringar ökar” 2008-08-22

5 Holdings in a capital insurance are actually owned by the insurance company and not the individual holding the insurance. Even though the problem remains a moral issue for the individual, this investment type could be utilized until (if at all) the FI amend the current regulation.

*Swedish FSA (FI). Currently FI is conducting an investigation upon the issue, and perhaps an outcome to tackle this grey zone of insider trading could be found in the near future<sup>6</sup>.*

---

6 Finansinspektionen: “Marknadsmissbruk och anmälningsskyldighet”

## 6. REFERENCES

Baker M and Wurgler J, 2006. "Investor Sentiment and the Cross-Section of Stock Returns". *The Journal of Finance* Volume 61 Issue 4, Pages 1645 – 1680.

Bernhardsson J, 2002. "Tradingguiden" *T Fischer & Co*

Campbell, J.Y, Lo, A.W and MacKinlay A.C (1997). "The Econometrics of Financial Markets" *Princeton University Press*

Dolley, J.C, 1933. "Characteristics and procedure of common-stock split-ups" *Harvard Business Review* 11 316-326

Eckbo, E.B, and Smith, D.S, 1998. "The Conditional Performance of Insider Trades", *Journal of Finance* 2, 467-498

Fama, E.F, 1970. "Efficient Capital Markets: A Review of Theory and Empirical Work", *Journal of Finance* 25, May, 383-417

Finnerty, J.E, 1976, "Insiders Activity and Insider Information – a Multivariate Analysis", *Journal of Financial Analysis and Quantitative Analysis* 11, 205-216

Finnerty, J.E, Lakonishok, J. and Lee I, 2001. "Are Insider Trades Informative?" *The Review of Financial Studies* Vol. 14, No. 1, 79-111

Givoly, D and Palmon, D, 1985. "Insider Trading and the Exploitation of Inside Information: Some Empirical Evidence", *Journal of Business* 58:69-87

Hansson, A and Hjermgård, M (2002), "Insider trading at Stockholm Stock Exchange" *Stockholm school of Economics*

Hjertstedt, L and Kinnander, J, (2000). "Insider Trading and Market Efficiency in Sweden" *Master Thesis, Stockholm School of Economics*

Jaffe, J.F, 1974a, "The Effect of Regulation Changes on Insider Trading", *Bell Journal of Economics and Management Science* 5, 93-121

- Jaffe, J.F, 1974b, "Special Information and Insider Trading", *Journal of Business* 47, 410-428
- Johansson, L and Knopp, M, 2005. "Insynshandel på den svenska aktiemarknaden – genererar insynspersoner abnormala avkastningar?" *University of Lund*
- Lorie, J.H and Niederhoffer, V, 1968, "Predictive and Statistical Properties of Insider Trading", *Journal of Law and Economics* 11, 35-53
- Mandelbrot B, 1966. "Forecasts of Future Prices, Unbiased Markets and Martingale Models" *Journal of Business*
- Peters, C and Rosén, S, 2008. "Kan oinformerade investerare imitera insiders?" *University of Uppsala*
- Pope, P.F, Morris, R.C and Peel, D.A 1990. "Insider Trading: Some Evidence on Market Efficiency and Directors Share Dealing in Great Britain", *Journal of Business Finance and Accounting* 17, 359-380.
- Pratt, S.P and DeVere, C.W, "Relationship Between Inside Trading and Rates of Returns for NYSE Common stocks, 1960-66", *Modern Developments in Investment Management* 268-279.
- Richardson Pettit R. and Venkatesh P.C, 1995. "Insider Trading and Long-Run Return Performance" *Journal Financial Management* Volume 24.
- Robert A.O, 1998. "Behavioral Finance and Its Implications for Stock-Price Volatility" *Financial Analysts Journal* March, Vol. 54, No. 2: 10-18
- Samuelson, Paul A, 1965. "Proof That Properly Anticipated Prices Fluctuate Randomly" *Industrial Management Review*, 6:2 p.41
- Seyhun, H.N, 1998. "Investment Intelligence from Insider Trading". *MIT press*
- Shiller, Robert J, 2002. "From Efficient Market Theory to Behavioral Finance". *Cowles Foundation Discussion Paper* No. 1385

Shleifer, A, 2000. "Inefficient Markets: An Introduction to Behavioural Finance",  
*Oxford: Oxford University Press*

Summers, S.L, and Sweeney, J.T, 1998. "Fraudulently misstated Financial Statements  
and Insider Trading: An Empirical Analysis", *The Accounting Review* 73, 131-146

Tirole J, 2006. "The Theory of Corporate Finance" *Princeton University Press*

Wahlström, G, 2003, "Legal Insider Trading and Abnormal Returns: Some Empirical  
Evidence from Sweden", *Financial Forum / Bank- En Financierwezen* 2003/6, 348-355

## APPENDIX

### Banking Sector

Event day	Buy		Sell	
	AAR	SACAR	AAR	SACAR
-10	-0.003%	-0.003%	-0.111%	-0.111%
-9	-0.017%	-0.021%	-0.024%	-0.136%
-8	0.044%	0.023%	-0.026%	-0.162%
-7	0.187%	0.210%	0.042%	-0.120%
-6	-0.068%	0.142%	0.080%	-0.039%
-5	0.129%	0.271%	-0.029%	-0.068%
-4	0.091%	0.362%	-0.109%	-0.177%
-3	0.185%	0.546%	-0.085%	-0.262%
-2	0.181%	0.727%	-0.016%	-0.278%
-1	-0.081%	0.646%	0.118%	-0.160%
0	-0.011%	0.635%	-0.062%	-0.222%
1	0.007%	0.641%	-0.064%	-0.285%
2	-0.005%	0.636%	-0.200%	-0.486%
3	0.022%	0.658%	0.066%	-0.420%
4	-0.095%	0.563%	-0.083%	-0.503%
5	0.093%	0.656%	-0.128%	-0.631%
6	0.030%	0.686%	-0.086%	-0.718%
7	0.040%	0.726%	-0.108%	-0.825%
8	0.057%	0.782%	-0.164%	-0.989%
9	0.059%	0.841%	0.025%	-0.964%
10	-0.023%	0.818%	0.042%	-0.922%

## Telecommunication Sector

Event day	Buy		Sell	
	AAR	SACAR	AAR	SACAR
-10	0,056%	0,056%	-0,756%	-0,756%
-9	0,211%	0,266%	0,415%	-0,341%
-8	0,152%	0,418%	-0,711%	-1,052%
-7	0,548%	0,966%	-0,387%	-1,439%
-6	0,252%	1,218%	0,225%	-1,214%
-5	0,020%	1,239%	-1,218%	-2,432%
-4	0,009%	1,248%	0,149%	-2,283%
-3	1,349%	2,596%	1,563%	-0,720%
-2	-0,332%	2,264%	-0,909%	-1,629%
-1	-0,247%	2,018%	0,160%	-1,468%
0	0,518%	2,535%	-0,075%	-1,543%
1	0,288%	2,824%	-0,829%	-2,372%
2	0,123%	2,947%	-0,078%	-2,450%
3	0,244%	3,191%	0,340%	-2,111%
4	-0,149%	3,042%	-0,546%	-2,657%
5	0,585%	3,627%	0,114%	-2,543%
6	0,373%	4,000%	0,441%	-2,102%
7	0,057%	4,057%	-0,205%	-2,306%
8	0,327%	4,383%	0,802%	-1,505%
9	0,115%	4,498%	0,110%	-1,394%
10	-0,613%	3,885%	-0,080%	-1,474%

## Oil Sector

Event day	Buy		Sell	
	AAR	SACAR	AAR	SACAR
-10	0,717%	0,717%	-0,302%	-0,302%
-9	0,155%	0,872%	-0,367%	-0,668%
-8	0,534%	1,406%	-0,279%	-0,947%
-7	0,097%	1,503%	0,174%	-0,773%
-6	0,448%	1,950%	-0,139%	-0,912%
-5	0,405%	2,355%	-0,491%	-1,403%
-4	-0,212%	2,143%	-0,031%	-1,434%
-3	0,250%	2,393%	0,434%	-1,000%
-2	0,554%	2,946%	-0,281%	-1,281%
-1	-0,190%	2,757%	-0,207%	-1,487%
0	-0,370%	2,386%	-0,185%	-1,672%
1	0,616%	3,002%	-0,171%	-1,843%
2	-0,019%	2,983%	-0,374%	-2,217%
3	0,252%	3,235%	-0,120%	-2,337%
4	-0,449%	2,786%	-0,262%	-2,599%
5	0,124%	2,911%	0,195%	-2,404%
6	0,321%	3,232%	-0,194%	-2,599%
7	0,827%	4,059%	-0,362%	-2,961%
8	-0,138%	3,921%	0,215%	-2,746%
9	-0,201%	3,720%	-0,337%	-3,083%
10	0,174%	3,895%	-0,214%	-3,297%

### Metal & Mining Sector

Event day	Buy		Sell	
	AAR	SACAR	AAR	SACAR
-10	0,229%	0,229%	0,690%	0,690%
-9	-0,075%	0,153%	-0,239%	0,451%
-8	0,181%	0,334%	-0,729%	-0,278%
-7	0,184%	0,518%	-0,008%	-0,287%
-6	0,120%	0,637%	-0,019%	-0,306%
-5	-0,052%	0,585%	-0,209%	-0,515%
-4	-0,157%	0,428%	0,055%	-0,460%
-3	0,196%	0,624%	0,129%	-0,331%
-2	0,273%	0,897%	-0,015%	-0,346%
-1	0,228%	1,125%	0,412%	0,066%
0	0,200%	1,326%	-0,274%	-0,207%
1	0,383%	1,709%	-0,106%	-0,313%
2	0,166%	1,875%	-0,739%	-1,052%
3	0,272%	2,146%	-0,150%	-1,202%
4	-0,147%	1,999%	-0,333%	-1,535%
5	0,273%	2,272%	0,476%	-1,058%
6	-0,024%	2,248%	-0,647%	-1,706%
7	0,240%	2,489%	-0,188%	-1,894%
8	-0,343%	2,146%	0,466%	-1,427%
9	0,192%	2,338%	0,304%	-1,124%
10	0,177%	2,515%	-0,404%	-1,528%

## Machinery Sector

Event day	Buy		Sell	
	AAR	SACAR	AAR	SACAR
-10	-0,028%	-0,028%	-0,161%	-0,161%
-9	0,274%	0,246%	-0,178%	-0,339%
-8	-0,004%	0,242%	0,012%	-0,328%
-7	-0,070%	0,171%	0,020%	-0,308%
-6	0,012%	0,183%	-0,062%	-0,370%
-5	0,112%	0,296%	0,110%	-0,261%
-4	0,014%	0,310%	-0,246%	-0,506%
-3	0,097%	0,407%	0,120%	-0,386%
-2	-0,022%	0,385%	-0,043%	-0,430%
-1	-0,198%	0,187%	0,028%	-0,402%
0	0,111%	0,298%	-0,207%	-0,609%
1	0,233%	0,531%	-0,032%	-0,641%
2	0,178%	0,709%	-0,170%	-0,811%
3	0,162%	0,871%	0,146%	-0,666%
4	0,078%	0,950%	-0,130%	-0,796%
5	-0,074%	0,875%	-0,165%	-0,960%
6	0,093%	0,968%	-0,053%	-1,013%
7	0,151%	1,120%	0,012%	-1,001%
8	0,024%	1,144%	0,021%	-0,980%
9	0,160%	1,304%	-0,088%	-1,068%
10	-0,158%	1,146%	-0,148%	-1,217%

## Real Estate Sector

Event day	Buy		Sell	
	AAR	SACAR	AAR	SACAR
-10	-0,025%	-0,025%	-0,237%	-0,237%
-9	0,006%	-0,019%	0,105%	-0,132%
-8	0,623%	0,604%	0,087%	-0,045%
-7	0,144%	0,748%	-0,264%	-0,309%
-6	0,085%	0,833%	-0,046%	-0,355%
-5	0,132%	0,965%	-0,377%	-0,733%
-4	-0,026%	0,939%	0,105%	-0,628%
-3	0,152%	1,090%	0,344%	-0,284%
-2	-0,021%	1,069%	-0,627%	-0,910%
-1	-0,091%	0,978%	0,169%	-0,742%
0	0,245%	1,223%	-0,341%	-1,082%
1	-0,044%	1,179%	0,448%	-0,634%
2	-0,046%	1,133%	-0,381%	-1,016%
3	0,222%	1,355%	0,774%	-0,242%
4	0,222%	1,577%	0,131%	-0,111%
5	0,101%	1,679%	-0,251%	-0,362%
6	-0,105%	1,573%	-0,031%	-0,393%
7	0,419%	1,992%	-0,043%	-0,436%
8	0,079%	2,071%	0,111%	-0,324%
9	0,063%	2,134%	0,460%	0,136%
10	0,166%	2,300%	-0,283%	-0,147%

	<b>Banking</b>	<b>Telecom</b>	<b>Oil</b>	<b>Metal&amp;Mining</b>	<b>Machinery</b>	<b>Real Estate</b>
<b>Banking</b>	-	2.155**	3.005***	2.217**	0.745	2.585**
<b>Telecom</b>		-	0.004	0.585	1.658*	0.71
<b>Oil</b>			-	0.967	2.802***	1.28
<b>Metal&amp;Mining</b>				-	1.363	0.172
<b>Machinery</b>					-	1.357
<b>Real Estate</b>						-

**Independent sample T-test between all six sectors in buy transaction**

	<b>Banking</b>	<b>Telecom</b>	<b>Oil</b>	<b>Metal&amp;Mining</b>	<b>Machinery</b>	<b>Real Estate</b>
<b>Banking</b>	-	0.298	2.141**	0.554	0.599	0.811
<b>Telecom</b>		-	0.756	0.016	0.128	0.482
<b>Oil</b>			-	0.904	1.976**	1.905*
<b>Metal&amp;Mining</b>				-	0.232	0.713
<b>Machinery</b>					-	1.101
<b>Real Estate</b>						-

**Independent sample T-test between all six sectors in sell transaction**