The Efficient Market Hypothesis and Insider Trading During the Recent Financial Crisis

Master Thesis International Management

Name : Sarah Wilhelmus

Student Number : s636928

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Examination Committee: Dr. M.R.R. van Bremen

Prof. dr. H.M. Prast

Faculty : Faculty of Economics and Business Administration

Department : Finance

Preface

It is my pleasure to present my master thesis *The Efficient Market Hypothesis and Insider Trading During the Recent Financial Crisis.* This master thesis will end my study at Tilburg University, at which I studied with a lot of pleasure for the last couple of years.

I would first like to thank my supervisor dr. van Bremen for his supervision, advice and comments. In addition I would like to thank professor dr. Prast for reviewing my thesis.

I would also like to thank all the professors from Tilburg University: they inspired me and taught me valuable lessons. Last but not least I would like to thank my family and friends who supported me during my study, including the development of this master thesis. I could not have done it without all their support.

Sarah Wilhelmus,

Tilburg, December 16, 2011

Abstract

The recent financial crisis has had a huge impact on everyone during the last few years, and especially on those who invested in the stock markets. Stock investors can obtain information from numerous sources, which makes that it is hard to pick out the valuable information and earn a significant abnormal return on the stock market. That is why the following problem statement has been formulated and researched in this thesis: *How can the past stock price movements and the insider trade information be used as a relevant information source in years of a crisis?*

First of all a time-series analysis has been performed to see if a weak form of market efficiency has been present during the years 2006-2010. Prove of the presence of a weak form of market efficiency was found for the years 2006, 2009, and 2010, but not for the years 2007 and 2008. These years showed significant correlation in some cases between the return and the individual lagged returns. For the year 2007, the correlation coefficients were simultaneously equal to zero, but this was not the case for the year 2008. In the year 2008, the past stock price returns could therefore be used -up to a certain extent- to predict the future stock price returns.

Furthermore, multiple event studies have been performed to calculate the average cumulative abnormal returns of the insiders and outsiders that copied the insider trades. Significant average cumulative abnormal returns have been found for the insiders that purchase or sell shares for mostly the longer holding periods, 126 and 251 days. No significant difference has been found between the average cumulative abnormal returns of directors, officers and CEOs. The presence of an information hierarchy has thus not been proved with this data.

Not only the average cumulative abnormal returns of the insiders turned out significant and positive, also the outsiders that imitated the insider trade one or two trading days later could have earned a positive and significant average cumulative abnormal return in some cases with a 126 or 251 day holding period. These returns are lower when adjusted for transaction costs and inflation, but they are still positive. Insider purchases and sales can thus be used to obtain positive cumulative abnormal returns in many cases when there is a holding period of 126 or 251 days.

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1. Introduction

During the last couple of years, many companies have fired a lot of people, stock prices have plunged, pension funds lost a lot of money, which resulted in pensions being cut or not adjusted for inflation, a lot of people are still without a job, countries like Greece and Spain are having huge deficits, Greece is on the edge of going bankrupt, and in some countries, like Spain, the unemployment rate is sky-high. The crisis can be felt by people all over the world.

It is not possible to point out a single and clear root cause of the crisis. According to Shiller (2008) the latest crisis is "the result of a speculative bubble in the housing market that began to burst in the United States in 2006 and has caused ruptures across many other countries in the form of financial failures and a global credit crunch" (p.1). Schwartz (2009) describes that at least three factors had a significant influence on the emergence of the financial crisis; the monetary policy that has led to the housing price boom, the use of new innovative investment instruments, which would later turn out to be with flaws, and lastly there is "the collapse of the market for some financial instruments" (Booth & Alexander, 2009, p.48). According to Reinhart and Rogoff (2008) the use of sub-prime mortgages and the falling housing prices in the United States are two of the most important reasons that caused the crisis. Reinhart and Rogoff (2008): "The 2007 United States sub-prime crisis, of course, has its roots in falling U.S. housing prices, which have in turn led to higher default levels particularly among less credit-worthy borrowers" (p.3). Some scholars even call the crisis the "sub-prime crisis" (Reinhart & Rogoff, 2008), (Shiller, 2008) and (Demyanyk & van Hemert, 2008). A sub-prime mortgage is a loan with high default risk (Demyanyk & van Hemert, 2008).

What started as a sub-prime crisis, ended up as a global crisis: it hit the economies and stock markets all over the world. As figure 1 below shows, the S&P 500 stock market fell down a lot during the crisis. On March 7, 2008, the S&P500 denoted a value of $1293.37, while almost a year later, on March 6, 2009, the S&P denoted a value of only $683.38, the S&P has lost almost half of its' value in just one year.

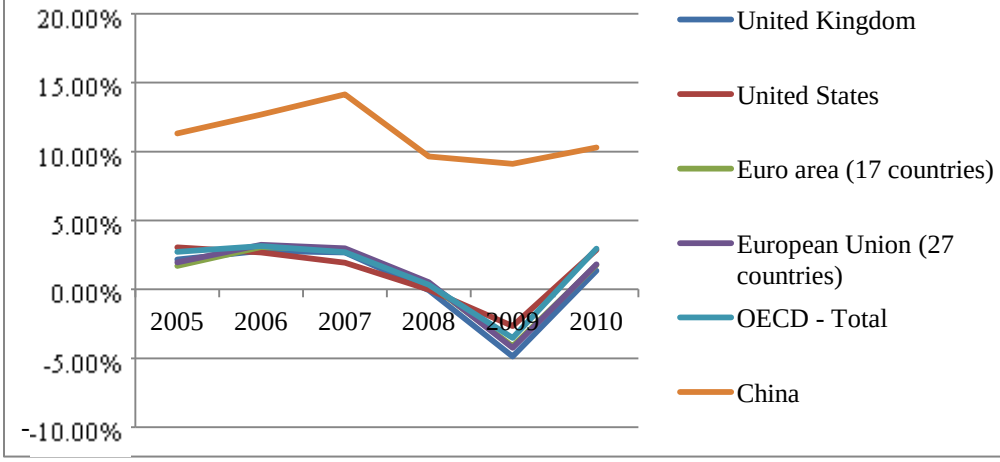
Figure 1 [1]

The value of the S&P 500 index from 2005 until 2010 in $

[1] google.com/finance

The mortgages became a real burden to the banks, not only was the economy going bad, they also had to write off a lot of their mortgages. In the end, multiple banks had to be bailed out all over the world, like Citigroup, and some banks even collapsed, like Lehman Brothers (Rozhnov, 2008). Furthermore, the economies went down all over the world. The Gross Domestic Product is used as an indicator for the economic performance of a country (Mankiw, 2003). Figure 2 and appendix A[2] show the growth in annual GDP of the countries all over the world. This figure shows that although the United States, Europe and the OECD coutries had negative GDP growth rates, China held its growing annual GDP, even though their GDP grew less during the crisis than in the years 2006 and 2007. The figure also shows that the economies of most countries started growing less in 2007 and even shrinked in 2008 and 2009. The growth in annual GDP started going up again in 2010. This gives a distorted picture though, because it looks as if the crisis is almost over in 2010. This is surely not the case though.

Figure 2
growth in annual gross domestic product in % for different countries for the years 2005-2010



Now – in 2011– the economies have still not recovered from the crisis. The debt of the United States is so high, that the maximum amount had to be increased to make sure that they could still pay off the interest on their bonds, the salaries of their civil servants, and that they could still pay for all the other government spendings. This measure had to be accompanied by a cut in government spendings to pay for the existing commitments, without increasing the current debt more and more (Sullivan, 2011). The United States bonds even lost their AAA rating (Brandimarte & Bases, 2011), which means that the bonds are indicated as more risky.

In Europe the crisis is more visible than before; Greece had to bailed out by the other countries from the European Monetary Union to prevent Greece from bankruptcy.

[2] http://stats.oecd.org/Index.aspx?DatasetCode=SNA_TABLE1

Even though Greece has already received a lot of money, they still need much more, and there is still a reasonable possibility that Greece will go bankrupt in the near future. Italy, Spain, and Ireland are also countries from the European Monetary Union that are having problems and might need help from the other countries. The countries of the European Monetary Union that are participating in the rescue fund are also having problems, because they have quite high deficits themselves, and need to justify to their citizens why they need to help the other countries with billions of euro's, while they have to cut costs in their own country at the same time. Moreover, companies are still firing lots of people and the unemployment rates have been high the last couple of years.

To decrease the possibility of a similar crisis, governments are working hard to develop new legislations. An example is Basel III (Waki & Bosley, 2011), the successor of Basel I and Basel II. Furthermore, the countries within the European Monetary Union are looking at the sanctions they can use against member countries that do not meet the requirements.

What is interesting to see during this crisis is the big volatility of the stock markets. Even when there is no news, stock markets are going up and down a lot every day. When there was a rumour that France would lose its' AAA rating, the shares of three major french banks lost a lot of their value (Economist, 2011). In the end it turned out that this was only a rumour. All in all this shows how big of an impact the crisis has on daily life and the stock market.

Information can be the key to a successful trading strategy. If you have all the information, you can better predict the future share prices and decide if you should buy or sell shares, or go long or short in options. However, not all information is always available to everybody. Insiders have more information than the outsiders, which are the normal traders, and may therefore earn higher returns than the outsiders. There is a difference between legal and illegal insider trading. Even though some of the insider trading is illegal, there are numerous examples of people being caught doing insider trading. In the Netherlands there is an example of a big case involving insider trading. Nina Brink, CEO of World Online sold her shares without making this public (retro.nrc.nl, 2000). In the United States there is the case of Martha Stewart who sold her shares in ImClone in 2001, after her broker supposedly passed on an insider tip (Crawford, 2004). If she would not have reacted on this tip, she would have lost only a really small part of her wealth. But in the end she did use the tip and sold her shares. This resulted in a jail sentence of five months and a fine (Crawford, 2004). Chapter two will go into more detail about both legal and illegal insider trading.

Although illegal insider trading is a very interesting subject, it is hard to detect and there is no existing database including this data. Illegal insider trading will therefore only be discussed briefly in the theoretical part, and not in the empirical part.

Insider trading plays a role in the efficient market hypothesis that was written down by Fama. A discussion that was lid up again by the recent financial crisis was about this efficient market hypothesis. In the New York Times (Nocera, 2009), Mr. Grantham, a respected strategist who works at an institutional management company, explains why he thinks that the efficient market hypothesis is more or less responsible for the financial crisis: Because almost all the financial leaders believed in (most of) the efficient market theory, it has "left our economic and government establishment sitting by confidently, even as a lethally dangerous combination of asset bubbles, lax controls, pernicious incentives and wickedly complicated instruments led to our current plight" (Nocera, 2009). Mr. Grantham also states that "the absolutely worst part of this belief set was that it led to a chronic underestimation of the dangers of asset bubbles breaking" (Nocera, 2009). Fama still believes in the theory though (Cassidy, 2010).

During the recent crisis there has been a lot of information every day, of which not even everything was true, like the rumor on August 2011 that the French sovereign debt would be downgraded (Regan & Harrison, 2011). When there is an information overflow, it is hard to distinguish the useful information from the information that is useless. It is therefore interesting to see if there is another way of knowing when to buy or sell shares, than watching and reading the business news.

1.1 Problem Statement and Research Questions

Information plays a key role in the efficient market hypothesis. If, for example, there is no weak-form of market efficiency present, information is not immediately incorporated in the stock prices, yesterday's returns are correlated with today's returns, and it might be profitable to look at the behavior of the stock prices – do a technical analysis, which will be explained in more detail in the next chapter -. If there is a weak form of market efficiency present, it might be beneficial for outsiders to imitate the insiders of a company. According to Seyhun (1985) insider trading studies showed that outsiders can earn significant abnormal returns when they imitate insiders. Seyhun (1985) did not find evidence in his research for this statement. During the years he studied, it took a lot longer before the outsiders got aware of the insider trade. In addition, his data came from a different time period though, namely the years 1975-1981. It is therefore useful to test it in a different time period. This might teach us different ways of processing information in years of crisis when there is a turbulent stock market, and looking at different information sources to earn positive abnormal returns.

This brings us to the following problem statement: *How can the past stock price movements and the insider trade information be used as a relevant information source in years of a crisis?*

The next chapters will answer the following main research questions:

Question 1: In which way can the past stock price movements be used as a relevant information source during the last financial crisis?

Question 2: In which way could insider trading be used to earn positive cumulative abnormal returns during the last financial crisis?

1.2 Structure of the Thesis

These two research questions will be answered in the next few chapters. The next chapter provides a review of the recent literature. Chapter three describes the hypotheses. Chapter four describes the data that are being used for the study, and how these data are collected. Chapter five will show the results of the time-series analysis and the event studies. Chapter six will give a conclusion. Lastly, chapter seven will describe the limitations of this study and will give some further research suggestions.

2. Literature Review

The stock markets have a long history. The first stock market started in 1682 in Germany (Hafer & Hein, 2007) and has developed a lot since. The stock market has been an important research subject for economists. This has resulted in multiple theories like the random-walk model and the efficient market hypothesis, which will be described later.

The stock markets react to news about the companies, as well as to news that is not firm-specific, like the consumer confidence index. The share prices are determined by the demand and supply of the shares and it "reflects all known information and represents the collective beliefs of all investors about the business' future prospects" (Barnes, 2009, p.4). An investor will buy shares if he thinks they are undervalued, and he will sell them if he thinks that the shares are overvalued (Barnes, 2009). The price of a share will go up if the demand goes up, and that the price will go down if the demand goes down. If the supply goes down, the opposite will happen; the price goes up. If the supply goes up, the price of the share will go down.

Previous research has shown though that it is really hard to predict future prices, even for investment advisers. Mishkin (2007) describes this in his book, explaining that a research done with investment advisers from San Francisco has shown that, on average, they do not even outperform an orangutan picking shares. If not even the investment advisers can predict which shares will do well in the future, who will be able to do that then?

2.1 Efficient Market Hypothesis

The efficient market hypothesis is a well known theory created by Fama in the 1960s, which is still being taught in business schools and universities all around the world. Fama (1965b) defines an efficient market as "a market where there are large numbers of rational, profit-maximizers actively competing, with each trying to predict future market values of individual securities, and where important current information is almost freely available to all participants" (p.56). The efficient market hypothesis proposes that "asset prices are always and everywhere at the correct price" (Cooper, 2008 p.9.)

Fama (1970, p.384) describes the "expected return theory" as follows:

$$E(\tilde{p}_{i,t+1}|\Phi_t) = [1 + E(\tilde{r}_{i,t+1}|\Phi_t)]\, p_{it} \qquad (1)$$

Where P_{it} = the price of a share of company i at time t

$\tilde{p}_{i,t+1}$ = the price of a share of company i at time t+1

$\tilde{r}_{i,t+1}$ = the one-period percentage return of a share of company i at time t-1

E= "the expected value operator" (Fama, 1970, p.384)

Φ_t= "symbol for whatever set of information is assumed to be fully reflected in the price at time t" (p.384) This formula means that "the information in Φ_t is fully utilized in determining equilibrium expected returns" (Fama, 1970, p.384). This formula assumes that all the information is reflected in the price of company i at time t ($p_{i,t}$) (Fama, 1970).

There are three different forms of market efficiency in the efficient market hypothesis (Bodie, Kane & Marcus, 2009):

1. The weak form
2. The semi-strong form
3. The strong form

The weak form of market efficiency claims that stock prices reflect all information that can be derived by examining the market trading data (Bodie et al., 2009). Since the current market price includes all past news, and it is not possible to predict future news, the old share price movements cannot be used to predict the future share price (Barnes, 2009). This implicates that the current share price is not correlated with the share price of yesterday (Barnes, 2009).

The semi-strong form of market efficiency states that all public information is reflected in the stock market prices (Fama, 1970). This means that the current stock prices are not only based upon the market trading data, but also upon other freely available information like the news of or rumors on a takeover.

Under a strong form of efficient market hypothesis, all relevant information, both public and non-public, is reflected in the price of the stocks (Bodie et al., 2009). Inside (non-public) information and insider trading are included in the strong form of market efficiency, and are explained in the next paragraph. It is important to note that the share price should reflect the new information almost instantly to be really efficient. In case of a semi-strong form of market efficiency, the stock market should also be efficient in the weak form.

In theory, it is not possible to earn abnormal returns in case of a strong form of market efficiency by either fundamental analysis or technical analysis, because information is incorporated in the prices almost instantly (Malkiel, 2005). A fundamental analyst looks at the financial statements and picks out the companies that they believe will do better than other companies, based on the forecast of the key financial information (Kohn, 2004).

A technical analyst looks at the past stock price behavior and the trading volume, and believes that he can predict the stock's future performance with this information (Kohn, 2004). Furthermore, inside information cannot be used to earn abnormal returns in case of a strong form of market efficiency, since all the public and non-public information is already included in the price. In case of a weak form of market efficiency, it is not possible to use a technical analysis to earn abnormal returns, because the share price return is not correlated with the share price return of the day before, and it is thus not beneficial to look at yesterday's share price. In case of a semi-strong form of market efficiency, a fundamental analysis cannot be used to earn abnormal returns; all the public information is reflected in the current share price. It is therefore not beneficial to analyze publicly available information, like financial statements.

The mathematical expression of the weak form of market efficiency is (Ross, Westerfield & Jaffe, 2005):

$P_{i,t} = P_{i,t-1}$ + Expected return + Random error$_t$ (2)

Where $P_{i,t}$ is the price of a share of company i at time t

$P_{i,t-1}$ is the price of a share of company i at time t-1.

To test the weak form of market hypothesis, the hypothesis H_0: $\rho_t = 0$ has to be tested (Summers, 1985). The serial correlation coefficient for lag τ can be calculated by (Fama, 1965a, p.69)

$$\rho_t = \frac{\text{Covariance}\,(u_t, u_{t-\tau})}{\text{Variance}\,(u_t)} \quad (3)$$

Where ρ_t = serial correlation coefficient

u_t = "the daily return of a share, defined as a percentage change in price from the closing price of day t-1 until the closing price of day t, and adjusted for dividends" (Fama, 1965a, p.69).

$u_{t-\tau}$ = "the daily return of a share, defined as a percentage change in price from the closing price of day t-1 until the closing price of day t, and adjusted for dividends, lagged for τ days" (Fama, 1965a, p.69).

To test the hypothesis H_0 that all the serial correlations coefficients are simultaneously equal to zero, the Ljung-Box test will be used (Borges, 2008, p.5).

Ljung-Box test: $Q_{LB} = n(n+2)\sum_{t=1}^{m} \frac{\hat{\rho}^2(t)}{n-t}$ (4)

Where $_{QLB}$ "is asymptotically distributed as a chi-square with m degrees of freedom" (Borges, 2008, p.5).

m= the maximum lag

n= the number of observations

The efficient market hypothesis has been discussed and questioned by different scholars. Bodie et al. (2009) state that the markets are very efficient, but that it is still possible to earn more money with a superior investment strategy.

Summers (1985) states that "failures to reject the hypothesis of market efficiency have been taken as evidence that portfolio managers cannot outperform the market to an important extent by trading using publicly available information" and that "evidence of market efficiency is often viewed as establishing that financial market prices represent rational assessments of fundamental values" (p.593). Others do in essence agree with the efficient market hypothesis, like Malkiel (2005), who says that many economists believe in efficiency, because they "view markets as amazingly successful devices for reflecting new information rapidly and, for the most part, accurately" (p.5).

Singal (2004) explains that there are three limitations concerning the efficient market hypothesis; the cost of information, the cost of trading and the limits of arbitrage. The cost of information limits the possibility of market efficiency, because in a case of a fully efficient market, "no investor or market participant has any incentive to generate or report new information because the value of that information is zero" (Singal, 2004, p.4). But "if no one has any incentive to react to new information, then it is impossible to reflect new information in prices" (Singal, 2004, p.4). In case of a time lag, participants can earn a positive return on their cost of obtaining and processing the information (Singal, 2004). As a result, the market is not fully efficient. The cost of trading is the third limitation, because the return of trading on the information must be higher than the cost of trading; else it is not beneficial to react on the information (Singal, 2004).

Mishkin (2007) also describes some evidence against the efficient market hypothesis. The evidence that he describes are the small firm effect, the January effect, market overreaction, excessive volatility, mean reversion and the fact that new information is not always immediately incorporated into stock prices (Mishkin, 2007). The small firm effect claims that the stocks of smaller firms, on average, earn a larger return than the stocks of bigger firms (Malkiel, 2005). The January effect states that "over long periods of time, stock prices have tended to experience an abnormal price rise from December to January that is predictable and hence inconsistent with random-walk behavior" (Mishkin, 2007, p.166). The market overreaction refers to the fact that the market can overreact to new information and it takes a while before the price goes back to the value it should have (Mishkin, 2007). Excessive volatility means that "fluctuations in stock prices may be much greater than are warranted by fluctuations in their fundamental value" (Mishkin, 2007, p.167). Mean reversion refers to the fact that stocks and returns of a firm tend to reverse towards a mean (Mishkin, 2007). The last anomaly that Mishkin (2007) describes is the fact the new information is not always immediately incorporated into the price of the stock, but that it will take a while.

The "random walk" theory is another important concept in the literature. In case of a random walk, "the price changes should be random and unpredictable" (Bodie et al., 2009). The essence of the random walk theory is that the stock prices of the past cannot be used to predict the stock prices in the future (Fama, 1965b, p.56). This is also the case when there is a weak form of market efficiency. The random walk theory consists of two different hypotheses: "(1) successive price changes are independent, and (2) the price changes conform to some probability distribution" (Fama, 1965a, p.35). Fama (1965a) uses the following expression to explain the independency of x_t:

$Pr(x_t = x|x_{t-1},x_{t-2},\ldots) = Pr(x_t=x)$

Which means that x_t will take the value x, "conditional on the knowledge that the previous price changes took the values x_{t-1}, x_{t-2} etc" (Fama, 1965a, p.35).

Malkiel (2003) explains the random walk as follows: the information is immediately incorporated in the stock prices; this means that the stock prices of tomorrow will only reflect the information that became available that day, and will thus not depend on stock price changes of the day before.

The random walk model gives the following formula (Fama, 1970):

$f(r_{i,t+1}|\Phi_t) = f(r_{i,t+1})$

Where $r_{i,t+1}$ stands for the return of company i at time t+1.

This random walk model means that the "entire distribution is independent of Φ_t" (Fama, 1970).

2.2 Inside Information

As is explained in the previous paragraph, inside information is an important concept concerning the strong form of market efficiency, and will be reviewed in this paragraph. Inside information is non-public information (sec.gov), this information is only known to insiders and not to outsiders. There are multiple definitions of an insider within the existing literature. Insiders are defined by Fidrmuc, Goergen and Renneboog (2006) as "managers and members of the board of directors of publicly traded corporations" (p.2931). Kohn (2004) defines insiders as "directors and officers of a corporation as well as professional advisers such as investment bankers, lawyers, and accountants" (p.644). Lakonishok and Lee (2001) define insider trading done in the United States as "transactions by top officers, directors, and large shareholders who own 10% or more of company's shares" (p.81). In this thesis, the definition by Lakonishok and Lee (2001) will be used, since the necessary data for this group of people can be found. The problem with the insiders defined by Kohn (2004) is that it is not possible to find the data concerning insider trading done by professional advisors.

Insiders have more information about their company than a normal investor (Fidrmuc et al. 2006). Under the strong-market hypothesis, in theory, it does not really matter if you are an insider or not, since all the relevant information, both public and non-public, is reflected in the price of the stocks (Bodie et al., 2009). If the strong form of market efficiency is not present though, it can be beneficial to act upon inside information. Especially during the financial crisis, when selling shares could save you from losing a lot of money, especially due to the fact that insiders do normally not own a well diversified portfolio (Singal, 2004). Buying shares done by the insider with the knowledge that the company would do well in the future, on the other hand, could yield a lot of money. In most countries, it is not allowed to trade on this inside information though, since it will give the insiders a benefit over other investors.

Inside information is crucial for insider trading, because it forms the basis of insider trading. Seyhun (1985) describes that some studies show that there is a difference between the qualities of inside information of different types of insiders; insiders that have more information of the overall firm are more successful in predicting future abnormal stock price changes than insiders that do not have the information about the overall firm. This hypothesis is called the "information hierarchy hypothesis" and is based "on the idea that an insider's position in the firm affects their access to information" (Gregory, Tharyan & Tonks, 2009, p.8). Seyhun (1985) tested this theory and looked at the differences between CEO's, other officers, and non-executive directors. In his study he found that more informed insiders – such as the chairman of the board of directors and officer-directors – "are more successful predictors of future abnormal stock price changes than officers or shareholders alone" (Seyhun, 1985, p.210). Jeng, Metrick and Zeckhauser (2003) look at the top-executives, the corporate officers, and the directors. In the end they can agree with the results of Seyhun (1985). Gregory et al. (2009) look at the distinction between executive and non-executive members of the board of directors, and find some support for the information hierarchy hypothesis.

2.3 Insider Trading

Options and shares make up a big part of the managerial compensation. Combined it accounted for 60% of a CEO's compensation in 2000-2005 for the data that was used by Frydman and Jenter (2010), and is therefore an important part of the earnings of the managers. Because the manager owns a lot of shares and options in the company he is working at, the portfolio of the manager is not quite diversified (Singal, 2004). When the -share price of the- company is performing badly, the manager can therefore lose a big part of his wealth. From the investors' perspective, this is good, because it ties the incentive of the manager with the incentive of the investors. From the managers' perspective this can be less advantageous when the company is performing badly. The manager can lose a lot of his wealth this way.

Both legal as illegal insider trading are present in today's trading environment. The Security and Exchange Commission defines legal insider trading as "Corporate insiders – officers, directors, and employees – buying and selling stocks in their own company. When corporate insiders trade in their own securities, they must report their trades to the SEC" [3]. Illegal insider trading is defined as "buying or selling a security, in beach of a fiduciary duty or other relationship of trust and confidence, while in possession of material, nonpublic information about the security. It may also include "tipping" such information, securities trading by the person "tipped", and securities trading by those who misappropriate such information"[4]. Kohn (2004) gives three arguments that explain why there are regulations against insider trading. The first one is that it is bad for the other investors, because they trade with the insider for an unfair price (Kohn, 2004). The second is that it can influence the liquidity of the market, because of the fact that it influences the market making (Kohn, 2004). Lastly, he says that insider trading done by insiders can be seen as theft from the company they work at, and as theft from the other shareholders (Kohn, 2004).

The regulations concerning insider trading differ per country. In the United Kingdom for example, it is not allowed to trade two months before the publication of preliminary, interim and final earnings announcements, or one month before quarterly earnings announcements (Fidrmuc et al. 2006). In the United States and the United Kingdom you have to report to the overseeing authority if you buy or sell shares (Fidrmuc et al. 2006). Furthermore, insiders cannot short-sell shares of their own company, they are prohibited to trade around announcement dates (mostly 30 days before the day of announcement and 14 days after the announcement), and lastly they sometimes need permission to trade the shares of the company they work at (Singal, 2004). It is also not allowed to tip off other people with the inside information that you have. Here it does not matter if you do it for your own gain or to help someone else earn a lot of money. It is quite hard to detect illegal insider trading though, especially when it involves an insider tipping off other people. The companies and governments are trying hard though to prevent illegal insider trading by imposing different regulations and punishing the people that are being caught.

Insider trading can also be seen as a signal to outside investors. The outside investors are, unlike the inside investors, not able to get the non-public inside information. Buying shares can indicate that the insiders that are involved think, or are in possession of information that indicates, that the share price will rise.

[3] http://www.sec.gov/answers/insider.htm
[4] http://www.sec.gov/answers/insider.htm

If the insider sells shares it can mean that he thinks, or is in possession of information that the share price will fall. This signal is less likely to be present when they sell shares though, because there can also be other reasons why the employee would sell his shares, like diversification (Fidrmuc et al., 2006).
It can also be the case that he needs this money to buy a house for instance. Buying shares is therefore seen as a more informative and stronger signal than selling shares (Fidrmuc et al., 2006). Lakonishok and Lee (2001) have also found that insider purchases can be informative, but that insider selling is not informative. Singal (2004) found that the share prices are performing better in months that insiders buy shares than in months that they sell shares.

According to Manne (1966), it can be seen as something positive if managers are doing insider trading, because it aligns the incentives of the – both prospective and practicing – managers and the shareholders (as cited in Dye, 1984). According to Fernandes and Ferreira (2009), "market professionals devote fewer resources to collecting information once they know there is a high probability of trading with insiders who have superior knowledge" (p.1).

A lot of studies have shown that insider trading gives higher abnormal returns. Betzer and Theissen (2009) found that insider trades done in Germany resulted in significant abnormal returns. Jeng et al. (2003) found that insider purchases have an abnormal return of more than 6% per year. Jaffe (1974) and Finnerty (1976) also found significant abnormal returns for insiders. Gregory et al. (2009) found a significant average cumulative abnormal return of 1.55% for a period of 20 holding days after a directors purchase shares and a significant cumulative abnormal return of 2.17% for a period of 20 holding days before the directors sell their shares. Lin and Howe (1990) found positive abnormal returns for insiders in over the counter markets, but these returns were quite low in the end during the high bid-ask spread. Furthermore, Singal (2004) found that some of the insiders that buy or sell shares do the same in the next month, implying that they do their trades in a period of a couple of months. Singal (2004) gives a possible reason for this; the insiders do this, because they do not want to give a big signal to the other investors in the market. If they would buy or sell a lot of shares at once, this could be considered as a stronger signal by the outsiders, than when the insider buys or sells only a small amount of shares.

Seyhun (1985) describes that multiple insider trading studies have shown that outsiders can earn significant abnormal returns by imitating the insider trades in some cases. Seyhun (1985) states that these studies show that outsiders can earn abnormal profits of 3% to 30%. Seyhun (1985) had a different outcome during his research though. He found that there are no positive abnormal returns for outsiders imitating insiders (Seyhun, 1985), which is in line with the efficient market hypothesis.

It is not possible to perfectly imitate the insiders as an outsider, since the trading done by the insiders is made public only one or more trading days later. It is therefore only possible to imitate the insiders with a delay of at least one trading day. In the study of Seyhun (1985) it took much longer before the outsiders became aware of the insider trades. In 31% of the transactions it took 90 days or more before the official summary of the trade became available to the outsiders (Seyhun, 1985).

There are also some downsides to being an insider. Kohn (2004) explains that there are many regulations for insiders, which can harm them due to the fact that they are an insider. One of these rules is that they are limited in their trading days, because they cannot trade around announcement dates (Kohn, 2004). This does not only apply to the insiders that work at the company, but also to big shareholders; if an investor or a company is a big shareholder of another company, and he or a representative of the company is on the board, he will be restricted in his possibilities to trade the shares (Kohn, 2004). This because it makes him/the company an insider and thus has to comply with the regulations for insiders (Kohn, 2004).

The abnormal returns are important when talking about the efficient market hypothesis and insider trading. Abnormal return is something different than the actual return. The following formula shows how the abnormal return is calculated (Jong, de and Goeij, de, 2010):

$$AR_{i,t} \approx R_{i,t} - NR_{i,t} \quad (5)$$

Where $AR_{i,t}$= the abnormal return of company i at time t

$R_{i,t}$= the actual return of company at time t

$NR_{i,t}$= the normal return of company i at time t

It should be noted that a positive abnormal return does not necessarily mean that the actual return is positive or vice versa (Singal, 2004), it only shows that the returns were higher or lower than expected by the model. One should keep this in mind when reading the next chapters.

To calculate the normal returns, the following CAPM model will be used (Jong, de, and Goeij, de, 2010):

$$NR_{i,t} = R_{ft} + \beta (R_{mt} - R_{ft}) \quad (6)$$

Where R_{ft} is the risk-free rate, and R_{mt}-R_{ft} is the market risk premium. The beta is the beta for the company's common equity, and is calculated as follows (Mishkin, 2007):

$$\beta = \frac{\mathrm{cov}(r_i, r_m)}{\mathrm{var}(r_m)} \quad (7)$$

Where r_i is the daily return of the asset including dividends, and r_m is the value weighted market return including dividends.

After calculating the abnormal returns, the cumulative average abnormal return can be calculated. The cumulative abnormal return is used to study performance over longer intervals and had the following formula (Jong, de, and Goeij, de, 2010):

$CAR_i=\sum_{t=t_1}^{t_2} AR_{it}$ (8)

To test the null hypothesis that the abnormal returns are significantly different from zero, H_0: $E(CAR_i)=0$, (Jong, de, and Goeij, de, 2010) the following t-test will be used (Barber and Lyon, 1996):

$T_{CAR}=\frac{\overline{CAR}_{i\tau}}{(\sigma(CAR_{i\tau})/\sqrt{n})}$ which can be rewritten as: $T_{CAR}=\sqrt{n}*\frac{\overline{CAR}_{i\tau}}{\sigma(CAR_{i\tau})}$ (9)

Where $\overline{CAR}_{i\tau}$ is the sample average of $CAR_{i\tau}$, $\sigma(CAR_{i\tau})$ is the standard deviation, and n is the number of observations.

The cumulative abnormal returns do not take into account the transaction costs that are involved when you trade the shares. Seyhun (1985) calculates the trading costs as "the bid-ask spread plus the commission fee for a round trip transaction". In his paper, Seyhun (1985) reports five different trading costs in percentages depending on the size of the company. It differs from 2.7% for companies greater than $1 billion to 6.8% for companies less than $25 million. Jaffe (1974) uses a transaction cost of 2%, of which 1% is for the brokerage fee for the purchase and sale of the shares and the other 1% represents the bid-ask spread.

Another important element that should be taken into consideration is the inflation rate, which is "the rate at which the general level of prices rise" (Bodie et al., 2009). The inflation rates of the United States for the years 2006-2010 are documented in chapter 4.

3 Hypotheses

Based on the previous literature review, the following hypotheses have been formulated:

Hypothesis (1): Due to the presence of at least a weak form of market efficiency, it has not been possible to use past stock price movements to predict future share price returns during the last financial crisis.
The weak form of market efficiency states that the stock prices of yesterday are not correlated with the stock prices of the next day. Multiple scholars, like Fama (1965), and Summers (1985) agree upon in their papers that there is indeed a weak form of market efficiency present. It is likely that this weak form of market efficiency has also been present before and during the recent crisis, which thus means that the past share price movements cannot be used to predict future share price returns.

Hypothesis (2): By imitating the transactions done by insiders, it has been possible to earn significant cumulative abnormal returns on average, during the last financial crisis.
As the literature shows (Betzer & Theissen, 2009) and (Jeng et al, 2003), insider trading can be beneficial. It can only be beneficial if there is no strong form of market efficiency present, because all the public and non-public information is already incorporated in the price in case of a strong form of market efficiency (Bodie et al., 2009). Looking at the current literature, Seyhun (1985) did not find evidence that it is beneficial for an outsider to imitate an insider, other insider trading studies did find evidence though that indicate that it is beneficial to imitate an insider in some cases. Since it is expected that there will only be a weak form of market efficiency, and that insiders will earn significant abnormal returns, as was the case in most studies (Jaffe (1974), Seyhun (1985), and Finnerty (1976)), it is likely to be beneficial to imitate the insider and earn significant cumulative abnormal returns as an outsider.

4 Data

To test the presence of a weak form of market efficiency, the data has to be collected first. The daily share prices of the S&P 500 companies from the 1st of January 2006 until the 31st of December 2010 are downloaded from the Center for Research in Security Prices (CRSP) database from the Wharton Research Database. This time period is chosen due to the fact that it includes both the crisis and the years of prosperity before the crisis. This sample gives a total of 600,968 observations, within 259 different industries, measured by the sic codes, and shows a maximum of 1259 different trading days per company. The data shows that some of the companies changed sic code over time.

In addition, the daily level of the S&P500 index is collected from the CRSP database. This sample has 1259 different trading days. Table 1 shows the arithmetic mean return in percentage per day for every year for the companies of the S&P500. The return is calculated by $\log(P_t)-\log(P_{t-1})$. This table gives an image of how the stock index has performed between the years 2006-2010. The table shows that the S&P500 had a positive return in almost every year, except in 2008. In 2008 it had a mean decline of 0.19% per day, with a minimum return of -9.47% a day and a maximum return of 10.96% a day.

Table 1
The mean daily percentage return of the S&P500
for the years 2006-2010.

Year	Mean
2006	0.04%
2007	0.01%
2008	-0.19%
2009	0.08%
2010	0.05%

To get a dataset that can be used for the insider trading analysis, the previous dataset has to be cut down. The companies that belong to industries that have less than 8000 observations will be deleted. This is the case for 248 industries. Next to that, the companies with less than 1259 observations (trading days) during the total observation period will be deleted. Ten different industries, measured by their sic code are left in the dataset. To narrow it down, four industries will be randomly selected. The sic codes that are selected are: 1311, 4911, 6020, and 7370. Some of the companies did not have any insider purchases or sales, and are deleted from the database. This leaves a total of 41 companies, which are listed in appendix B. The shares of these companies are quite liquid, with a mean daily trading volume of 6481172. With a minimum of 98858 trades in the shares of one company per day, and a maximum of 592924962 trades.

The insider trade information is gathered from the EDGAR database that can be found on the sec.gov website.

This governmental website documents all the legal insider trading activity that is reported to the SEC in a Form 4 filing. It is not possible to research the impact of illegal insider trading, since there is no database that records this. Furthermore, it is also hard to detect this illegal insider trading, so even if this would exist, it would be an incomplete dataset. Lastly, due to the fact that the illegal insider trading is not documented, outsiders cannot imitate these trades.

For every company, the volume, the name of the insider, the date of the transaction, the sic code, the function of the insider within the company, and the permno have been documented. The permno is a unique five digit number that represents the company. The functions of the insider are grouped into six different categories: CEO, officer, director, 10% shareholder, other, and unknown. When and insider has multiple functions, the most important one is listed. The CEO is seen as the most important function, followed by officer, director, 10% shareholder, other, and unknown. This order is chosen because of the possible presence of an information hierarchy, described by Gregory et al. (2009).

Lastly, the database will also state if the transaction involves a purchase or a sale of the shares. All the other transactions, like a "gift" or "option exercise" are excluded in this research. In the end this has resulted in a self constructed insider trading database. The insider purchases will be documented for the years 2006-2009. The original dataset containing the share prices of the stock goes until 2010. It is therefore chosen to list the insider purchases for the years 2006-2009 and not for the year 2010, because no abnormal return for the longer holding period, 251 and 126 days, can be calculated. The opposite is the case for the insider sales, which will be documented for the years 2007-2010, so the abnormal returns for the longer periods before the sales can be calculated (-250,0) and (-125,0).

What is noted before looking further into the data is that the amount of purchase filings is only a small amount of the total amount of filings. The amount of selling filings is substantially larger; this can be explained by the fact that a lot of the other filings contain "gifts". These gifts are shares given to the insider by the company, and can be sold by the insider. Table 2 shows the amount of observations for both insiders purchasing as well as selling shares, and the amount of trades done by directors, officers, and CEOs. "Unique number" reflects the number of purchases or sales done by insiders on different days. If, for example, multiple insider purchases are done on one trading day, only one of these transactions is taken into account in the "unique number of purchases".

Table 2
Number trades done by insiders, the number of trades done by directors, the number of trades done by officers, and the number of trades done by CEOs for the years 2006-2010.

	2006	2007	2008	2009	2010	Total
All Purchases by Insiders	86	89	136	85	0	396
Unique number of purchases	81	75	109	59	0	324
Purchases by directors	45	45	64	40	0	194
Unique number of purchases by directors	43	44	56	26	0	169
Purchases by officers	13	24	39	33	0	109
Unique number of purchases by officers	12	18	31	26	0	87
Purchases by CEOs	24	16	25	11	0	76
Unique number of purchases by CEOs	24	16	25	11	0	76
All sales by insiders	0	1073	710	720	867	3370
Unique number of sales	0	817	555	559	662	2593
Sales by directors	0	231	220	250	244	945
Unique number of sales by directors	0	217	201	241	239	898
Sales by officers	0	739	421	412	538	2110
Unique number of sales by officers	0	595	350	311	412	1668
Sales by CEOs	0	73	53	35	58	219
Unique number of sales by CEOs	0	62	50	34	57	203

To calculate the risk-free rate, the return of the one month Treasury Bill is needed. The dataset regarding the one month Treasury Bill is therefore gathered from the CRSP, U.S. Treasury and Inflation database from the Wharton Research Database, containing the daily return of the one month Treasury Bill. Table 3 shows the average daily yields in percentages of the one month Treasury Bill for the years 2006-2010.

Table 3
Average daily yields in percentages of the one month Treasury Bill for the years 2006-2010

Year	Yield
2006	.01312%
2007	.01205%
2008	.00652%
2009	.00452%
2010	.00404%

The table shows that the yield was much lower in the years 2008, 2009, and 2010. This can be explained by the presence of the crisis. Due to the crisis, more investors were looking for a more safe investment than shares, and thus wanted to invest in other, more safe financial products, like Treasury Bills. Because of the high demand for the Treasury Bills, the yield dropped. This was not only the case for the short term Treasury Bills, like the one month Treasury Bill, but also for the long term Treasury Bills, like the ten year Treasury Bill (Farrel, 2011).

The data concerning the inflation rate is gathered from the CRSP, U.S. Treasury and Inflation- Annual database from the Wharton Research Database. This database includes the consumer price index and gives the following annual inflation rates:

Table 4
Average yearly inflation rates in percentages
for the years 2006-2010

Year	Inflation Rate
2006	2.54%
2007	4.08%
2008	0.09%
2009	2.72%
2010	1.50%

5 Results

The data and formulas from the previous chapters will be used in this chapter to get the results. The weak form of market efficiency for daily returns, as well as the insider trading will be tested in this chapter.

5.1 Weak Form of Market Efficiency

To test for the weak form of market efficiency, a time-series analysis will be performed, as is taught in the *Empirical Methods in Finance* course. This shows if the return of the share is correlated with the return of the share of different trading days earlier – the return lags – and if the weak form of market efficiency holds up. When the return and the lagged returns are correlated, the old share price movements might have been used to predict future stock prices.

To construct table 5, the return of the S&P 500 is used, which is obtained from the CRSP database. To calculate the correlation coefficients, formula (3) is used: $\rho_t = \frac{\text{Covariance}\,(u_t, u_{t-\tau})}{\text{Variance}\,(u_t)}$. To test if the correlation coefficients are significant, the Durbin alternative test for serial correlation is being used.
To test if all the serial correlations coefficients are simultaneously equal to zero, formula (4): $Q_{LB} = n(n+2)\sum_{t=1}^{m} \frac{\hat{\rho}^2(t)}{n-t}$ will be used. To get the p-value of the Ljung-Box test, the chi-squared distributions are calculated, and the accompanying p-value is denoted. In this case there are nine different return lags, which means that there are nine degrees of freedom. The return is calculated by $\log(P_t)$-$\log(P_{t-1})$. The correlations of the return lag and the return are shown in table 5.

Table 5

Correlation coefficients of the return and the ten different return lags of the S&P500 with daily return for the years 2006-2010. Together with the number of observations, the Ljung-Box test and the p-value of the test. Where [A] means significant at a 1% level, [B] means significant at a 5% level.

	2006	**2007**	**2008**	**2009**	**2010**
Number of Observations	241	251	253	252	252
Lag 1	0.0053	- 0.1742	- 0.1545 [A]	- 0.1106	- 0.0508
Lag 2	- 0.1754	0.0160 [A]	- 0.1985 [A]	0.0346	- 0.0098
Lag 3	0.0318	0.0493 [A]	0.1498	- 0.0180	0.0116
Lag 4	0.0389	- 0.0861 [A]	- 0.0995 [B]	0.1031	- 0.0002
Lag 5	- 0.0409	- 0.0223 [A]	- 0.0505 [B]	0.0063	- 0.0161
Lag 6	- 0.0995	- 0.0532 [A]	0.0679 [B]	- 0.0369	- 0.0787
Lag 7	- 0.0283	- 0.0263 [A]	- 0.0622 [B]	- 0.0163	0.0685
Lag 8	- 0.1253	- 0.0583 [A]	0.0756 [B]	- 0.0163	- 0.1079
Lag 9	- 0.0448	0.0286 [A]	0.0129 [B]	- 0.0717	0.0662
Ljung-Box Stat	15.2634	12.4260	29.4474	7.7863	7.9438
P-Value	0.10	0.20	0.01	0.60	0.60

A correlation coefficient of 0 means that there is no correlation. A negative coefficient means that the returns are negatively correlated, and a positive coefficient means that the returns are positively correlated. The return and the lagged returns are not correlated in the years 2006, 2009, and 2010, as predicted by the current literature. The years 2006, 2009, and 2010 show almost no significant correlation between return and return lags. This would mean that, looking at these results, it is not possible to use the old share price movements to predict future share prices.

The table shows that the return and the individual lagged returns in the years 2007 and 2008 are correlated. The Ljung-Box test shows that the correlation coefficients of year 2007 are simultaneously equal to zero though. The correlation coefficients of 2008 are not simultaneously equal to zero. One of the explanations of the significant serial correlation in year 2008 could be that the negative correlations are significant due to mean reversion (Mishkin, 2007). When the correlation coefficients are positive and significant, this might be explained by the fact that the new information is not always immediately incorporated into the stock price (Mishkin, 2007). The table shows that the coefficients are mostly decreasing as the lag increases, which means that the return tends to be less correlated with the lagged return when the lag increases.

This is not the first study that finds significant correlations though. Lo and Mackinlay (1999) also found significant correlation for weekly and monthly holding period returns.

The table shows that there has been at least a weak form of market efficiency during the years 2006, 2009, and 2010, and that it is not possible to predict future share prices by looking at the previous share price movements in these years. This means that, in these years, no significant abnormal returns could have been earned for the S&P500 during these years by looking at the market prices (doing a technical analysis). The table shows that the return and the lagged returns are correlated in the years 2007 and 2008, although the correlation coefficients of 2007 are not simultaneously equal to zero though. So *Hypothesis (1): Due to the presence of at least a weak form of market efficiency, it has not been possible to use past stock price movements to predict future share price returns during the last financial crisis* is true - at least for the S&P500 - for the years 2006, 2009, and 2010. But hypothesis (1) is not fully supported by the results of the years 2007 and 2008.

5.2 Testing Insider Trading

With the collected dataset, the daily risk-free rate is calculated. To calculate the risk-free rate, the one month Treasury bill is used.

The average daily return of the one month Treasury bill of the time period January 1st 2006 – December 31st 2010 was 0.00768%. Table 3 shows that there is quite some difference between the yields during the years, that is why the average daily return of the one month Treasury Bill per year will be used for each year.

Now that the risk-free rate is known, the betas can be calculated for every company with formula (7):

$$\beta = \frac{\mathrm{cov}(r_i, r_m)}{\mathrm{var}(r_m)}$$

Although the beta of a company should not change much over the years, the betas of the companies are calculated for every year, to prevent that a difference in the beta will influence the results. The table in appendix C gives an overview of all the betas of the companies that are still in the sample.

Now that the betas are known, the expected returns can be calculated for every company for every day. This is done with the CAPM model, formula (6):

$NR_{i,t} = R_{ft} + ß_i (R_{mt} - R_{ft})$

Where the value-weighted market return including dividends will be used as the expected market return.

The actual daily return will be calculated by the return without dividends, plus the amount of dividend at the ex-dividend date; $R_{i,t} + div_{i,t}/P_{i,t}$. The ex-dividend date is chosen, since on this day the stock price should, in theory, drop with the amount of dividend that will be paid out on the dividend pay-out date (Campbell and Beranek, 1955). It is not possible to obtain the return by the formula $\log(P_t)-\log(P_{t-1})$, because this formula does not take into account the possibility of a stock split or a stock repurchase. It is also not possible to use the formula log(the 251st lag of (number of shares outstanding * price)) – log(number of shares outstanding * price), which does take into account the stock split or repurchase, because the data shows that in some cases the price of the shares do not change when the number of shares outstanding changes a lot.

When the expected return is calculated, the abnormal return can be calculated for every company for every day. This will be done by using formula (5):

$AR_{i,t} \approx R_{i,t} - NR_{i,t}$

Positive abnormal returns do not necessarily mean that the investors or insiders have profited from buying or selling their shares.

If there are positive abnormal returns, it only means that they have done better than expected by the model. As can be seen in table 2, the dataset contains 2593 unique observations for insiders selling shares and 324 unique observations for insiders buying shares.

With unique observations is meant that there can be multiple transactions on one day for the same company, but only one of them is used to calculate the cumulative abnormal return. The volume of trades is not taken into account while calculating the cumulative abnormal returns of the next tables.
The daily abnormal returns are now being used to calculate the cumulative abnormal return of the insiders. To see how high the cumulative abnormal returns are, the cumulative abnormal returns for different periods are calculated. The periods that are used to calculate the cumulative abnormal return for purchases are equal to most of the periods used by Betzer and Theissen (2009); (-20,-1), (-10,-1), (0,10), (0,20). Where 0 is the day that the trade took place. In addition, the periods (0,125) and (0,250) are also used to calculate the cumulative abnormal returns, to see what the cumulative abnormal returns over a longer period are. The same periods are used to calculate the cumulative abnormal returns for sales, but then the other way around. This means that the following periods are used: (-250,0), (-125,0), (-20,0), (-10,0), (1,10), (1,20).

Table 6A shows the average cumulative abnormal returns in percentages for the years 2006-2009 for shares that are purchased by insiders for the different holding periods. Table 6B shows the average cumulative abnormal returns in percentages for the years 2007-2010 for the shares that are being sold by insiders for the different holding periods. The average cumulative abnormal return is calculated by taking the average of the cumulative abnormal return of the different holding periods. The t-values, calculated by formula (9): $T_{CAR}=\sqrt{n}*\frac{\overline{CAR}_{i\tau}}{\sigma(CAR_{i\tau})}$, show the significance of the cumulative abnormal returns per year in tables 6A and 6B.

Table 6A

Average cumulative average abnormal returns in percentages of the different holding periods for insider purchases done by the insiders of the 41 companies for the years 2006-2009. Where 0 is the day that the insider purchased his shares. The t-statistics for the cumulative abnormal returns are shown in parentheses. Where [A] means significant at a 1% level, [B] means significant at a 5% level, and [C] means significant at a 10% level

	2006	2007	2008	2009
CAR(-20,-1)	- 1.68% [A]	- 2.48% [A]	1.17%	- 7.77% [A]
	(-2.3771)	(-2.4935)	(0.8449)	(-4.1158)
CAR(-10,-1)	- 0.27%	- 1.75% [A]	- 1.19%	- 3.64% [A]
	(-0.4257)	(-3.0436)	(-1.1966)	(-2.4026)
CAR(0,10)	- 0.17%	0.23%	3.96% [A]	- 1.90%
	(-0.3327)	(0.4568)	(3.3554)	(-1.4517)
CAR(0,20)	- 0.16%	- 0.21%	6.18% [A]	- 1.13%
	(-0.2716)	(-0.3198)	(3.2941)	(-0.9282)
CAR(0,125)	2.35% [C]	5.47% [B]	24.31% [A]	6.69% [C]
	(1.7949)	(2.1152)	(5.9965)	(1.7998)
CAR(0,250)	7.57% [A]	24.25% [A]	30.69% [A]	5.40% [B]
	(3.8372)	(5.3799)	(7.6862)	(2.1644)

Table 6A shows that in the days before the purchase by insiders, the average cumulative abnormal returns are negative and significant in five out of eight cases. In two cases the average cumulative abnormal returns are negative and insignificant, and in one case it is positive and insignificant. In the short time period after the purchase (0,10) and (0,20), there are only two significant average cumulative abnormal returns, which are in 2008. In the other six cases, the average cumulative abnormal returns are insignificant.

Looking at long holding periods (0,125) (0,250), shows that the average cumulative abnormal returns are positive and significant – although at different significance levels – in all cases. This shows that insiders earn, on average, a positive and significant cumulative abnormal return when they will sell their shares 125 or 250 days later. The fact that the average cumulative abnormal returns are negative before the insider purchases shares (in case of significant average cumulative abnormal returns), and are positive (when significant) after the insider buys the shares, may indicate that the insider times his purchases well.

The average cumulative abnormal return for the periods (0,125), and (0,250) for the year 2008 and the period (0,250) for the year 2007 are quite high. This might be explained by the fact that the returns differ a lot every day. One example is Huntington Bancshares Inc, which had a return of 50.07% on the 14th of October 2008, while the CAPM model predicted a return of - 1.4%.

Another example is a return of 28.29% on the shares of AES Corp. on the November 7 2008, while it should have had a return of 3.22% according to the CAPM model. In most cases, there were more high returns than high losses during the periods after the insiders bought their shares. Since the daily abnormal returns are added together to get the cumulative abnormal return, this cumulative abnormal return may turn out quite high. This explains the high average cumulative abnormal returns for the year 2008. In the year 2007, only 17 out of 75 insiders had a negative cumulative abnormal return for the period (0,250).

Furthermore, the papers that look at the average cumulative abnormal returns do this for a shorter holding period than the (0,125) and the (0,250) that are being looked at in this thesis, like Gregory et al. (2009). Some of the papers are also looking at the abnormal returns instead of the average cumulative abnormal returns. This will give totally different numbers. The average abnormal return was 11.82% in 2007 and only 0.53% in 2008 for the (0,250) holding period. This means that, if the average abnormal return of the holding period would have been calculated instead of the average cumulative abnormal return, the average abnormal return would have been almost 0% in 2008 for the (0,250) period instead of the average cumulative abnormal return of 30.69% for that same period. When calculating the average abnormal return for the 251 holding days period, the actual return is calculated, in case of a purchase, as log(shares outstanding$_{t+250}$ * price$_{t+250}$)) – log(shares outstanding$_t$ * price$_t$). This formula has been taken to adjust for stock splits or share repurchases. The results are not really reliable though, since some of the prices do not change when the number of outstanding shares changes a lot. It is therefore chosen to look at the average cumulative abnormal returns instead of the average abnormal returns.

Table 6B

Average cumulative average abnormal returns in percentages of the different holding periods for insider sales done by the insiders of the 41 companies for the years 2007-2010. Where 0 is the day that the insider purchased his shares. The t-statistics for the cumulative abnormal returns are shown in parentheses. Where [A] means significant at a 1% level, [B] means significant at a 5% level, and [C] means significant at a 10% level

	2007	**2008**	**2009**	**2010**
CAR(-250,0)	10.28% [A]	31.37% [A]	27.02% [A]	10.70% [A]
	(15.9116)	(26.1014)	(22.4454)	(10.9198)
CAR(-125,0)	8.04% [A]	18.65% [A]	13.29% [A]	6.21% [A]
	(6.3459)	(3.6553)	(2.9637)	(3.1050)
CAR(-20,0)	3.21% [A]	3.64% [A]	2.81% [A]	1.86% [A]
	(14.2581)	(8.5685)	(7.6452)	(7.5665)
CAR(-10,0)	2.06% [A]	2.19% [A]	2.01% [A]	1.04% [A]
	(11.8736)	(6.5717)	(7.0185)	(5.8251)
CAR(1,10)	0.50% [A]	0.84% [A]	0.01%	- 0.37% [A]
	(3.4155)	(3.0933)	(0.0377)	(-2.6499)
CAR(1,20)	1.08% [A]	1.67% [A]	0.80% [A]	- 0.47% [B]
	(4.9663)	(4.6989)	(2.6405)	(-2.2599)

Table 6B shows that for the all the different holding periods before the sales by insiders, the average cumulative abnormal returns are positive and significant. For the periods (-20,0) and (-10,0), they are slightly higher than the average cumulative abnormal returns that are found by Gregory et al. (2009).

In the two periods after the sales (1,10) and (1,20), the average cumulative abnormal returns are negative and significant for the years 2010. For the years 2007-2009, the average cumulative abnormal returns of the same periods are positive and significant in five out of six cases. What can be seen in the table is that the positive average cumulative abnormal returns after the sale are lower than in almost the same periods before the sale, when adjusted for the amount of days. This observation, combined with the observation that the average cumulative abnormal returns are positive and significant before the insider sells his shares may indicate that the insiders time the selling of shares well, just like table 6A might indicate that the insiders time their purchase well. It should again be stressed that positive average cumulative abnormal returns does not mean that the insiders are also having a positive real return. This only means that the shares of the insiders are having higher returns than predicted by the CAPM model. It can therefore also mean that the returns are negative, but that the returns are less negative than expected by the model.

5.3 Testing the Information Hierarchy Hypothesis

To see if there is proof for the information hierarchy hypothesis, it will be tested if the information hierarchy is present in this data. Tables 7A and 7B show the average cumulative abnormal returns in percentages for the years 2006-2009 for the purchases of shares done by directors, officers, and CEOs and the average cumulative abnormal returns in percentages for the years 2007-2010 for the sale of shares done by directors, officers, and CEOs. This is done to see if it makes a difference which insider is trading shares. As is stated in chapter two, it can be interesting to look at the different functions of the insider (information hierarchy), to see which group earns a higher cumulative abnormal return on average. Seyhun (1985) grouped the officers and directors together, but in this case there will be looked at directors, officers and CEOs separately, to see if this makes a difference. To calculate this, the same periods are used as was used to calculate the average cumulative abnormal returns for table 6A and table 6B; (-20,-1), (-10,-1), (0,10), (0,20) (0,125), and (0,250) for the purchase of shares, and (-250,0), (-125,0), (-20,0), (-10,0), (1,10), and (1,20) for the selling of shares. The next two tables will show if it makes a difference if you look at the trading done by directors, officers, and CEOs.

Table 7A

Average cumulative abnormal returns in percentages for the different holding periods for the years 2006-2009 for insider purchases done by directors, officers, and CEOs of the 41 companies. Where 0 is the day that the insider purchased his shares. The t-statistics for the cumulative abnormal returns are shown in parentheses. [A] means significant at a 1% level, [B] means significant at a 5% level, and [C] means significant at a 10% level

	Directors				**Officers**				**CEOs**			
	2006	**2007**	**2008**	**2009**	**2006**	**2007**	**2008**	**2009**	**2006**	**2007**	**2008**	**2009**
CAR(-20,-1)	-2.23% [A]	-2.18% [C]	-3.97% [B]	-4.69%	0.05%	-7.72% [A]	0.52%	-7.28% [B]	-0.90%	-1.84%	5.14% [C]	-7.75%
	(-2.4850)	(-1.7341)	(-2.2334)	(-1.5545)	(0.0128)	(-3.2267)	(0.1633)	(-2.2971)	(-0.8624)	(-1.0390)	(1.7354)	(-1.2200)
CAR(-10,-1)	-0.46%	-1.39% [C]	-3.89% [A]	-4.09%	0.99%	-4.34% [A]	-0.33%	-1.71%	0.14%	-1.31%	0.14%	-0.18%
	(-0.6678)	(-1.9545)	(-3.0474)	(-1.4684)	(0.2808)	(-2.9547)	(-0.1536)	(-0.6015)	(0.1436)	(-1.1125)	(0.0798)	(-0.0301)
CAR(0,10)	-0.71%	-0.45%	3.46% [B]	-2.86%	0.54%	0.74%	5.57% [B]	-1.28%	0.38%	-0.04%	4.06% [C]	-1.35%
	(-1.0639)	(-0.6533)	(1.9744)	(-1.3153)	(0.4013)	(0.8033)	(2.0426)	(-0.5936)	(0.4023)	(-0.0335)	(1.8972)	(-0.3584)
CAR(0,20)	-0.55%	-1.44%	6.54% [A]	-0.04%	-0.16%	0.44%	9.09% [B]	-1.21%	0.09%	1.65%	8.79% [A]	0.70%
	(-0.6644)	(-1.4956)	(2.4564)	(-0.0225)	(-0.0811)	(0.3980)	(2.0339)	(-0.6556)	(0.0848)	(1.4957)	(2.9197)	(0.1716)
CAR(0,125)	3.42% [C]	1.86%	34.92% [A]	-3.60%	8.62% [B]	-3.65%	34.00% [A]	5.73%	-2.46% [B]	20.87% [A]	15.83% [B]	13.16%
	(1.8155)	(0.5444)	(5.6792)	(-0.7158)	(1.9825)	(-0.8871)	(3.5303)	(1.0078)	(-1.9153)	(4.3907)	(2.0722)	(1.0922)
CAR(0,250)	11.75% [A]	17.25% [A]	42.64% [A]	1.13%	11.44%	17.70%	42.46% [A]	5.58%	-1.85%	46.03% [A]	18.25% [A]	8.96%
	(4.5148)	(2.8888)	(6.4845)	(0.2845)	(1.5165)	(1.5587)	(4.6533)	(1.6204)	(-0.6546)	(9.2770)	(2.4553)	(1.4135)

Table 7A shows that the average cumulative abnormal returns for the directors are negative and significant in most of the periods before the purchase of the shares. For the officers, the average cumulative abnormal returns are mostly negative, but only significant in three out of eight cases. For the CEOs, the average cumulative abnormal returns are insignificant in most cases. In the short term periods after the purchase, the average cumulative abnormal returns are positive and significant in 2008 for the directors, the officers, as well as the CEOs. In the other years, the average cumulative abnormal returns for the director are negative, but not significant. For the officers and CEOs they are negative in some cases and positive in other cases, but not significant.

For the longer holding periods after the purchase of the shares, (0,125) and (0,250), the average cumulative abnormal returns are positive and significant in 2006 and 2008 for the directors, and positive and significant in 2007 for the (0,250) period. The average cumulative abnormal returns are positive and significant in the year 2008 for the purchases done by officers with a holding period of (0,125) and (0,250). In 2009 it is positive and significant for the (0,125) period. The average cumulative abnormal returns of the CEOs are positive and significant in 2007 and 2008 for the (0,125) and (0,250) periods. In 2006 they are negative, but only significant for the (0,125) period.

Looking at the longer holding periods shows that it changes which group has a higher cumulative abnormal return on average. In 2008, the directors and officers had a higher average cumulative abnormal return for the periods (0,125) and (0,250). But in the year 2007, the CEOs had a substantially higher average cumulative abnormal return than the director for the period (0,250). It is therefore not possible to say which group of insiders, on average, gets the highest cumulative abnormal return when buying shares. Table 8 A will take a closer look at the differences.

Table 7B

Average cumulative abnormal returns in percentages for the different holding periods for the years 2007-2010 for insider sales done by directors, officers, and CEOs of the 41 companies. Where 0 is the day that the insider sold his shares. The t-statistics for the cumulative abnormal returns are shown in parentheses. [A] means significant at a 1% level, [B] means significant at a 5% level, and [C] means significant at a 10% level

	Directors				**Officers**				**CEOs**			
	2007	**2008**	**2009**	**2010**	**2007**	**2008**	**2009**	**2010**	**2007**	**2008**	**2009**	**2010**
CAR(-250,0)	6.62% [A]	27.26% [A]	26.09% [A]	2.45% [C]	11.61% [A]	34.04% [A]	29.05% [A]	14.91% [A]	8.83% [A]	22.74% [A]	19.52% [A]	15.72% [A]
	(5.8222)	(13.1527)	(13.6854)	(1.6760)	(14.7315)	(23.8741)	(18.6387)	(11.6558)	(5.9649)	(6.1236)	(4.1551)	(4.8847)
CAR(-125,0)	6.03% [A]	17.47% [C]	10.93%	0.61%	8.94% [A]	19.27% [A]	15.34% [A]	8.98% [A]	6.88% [A]	9.68%	19.00%	7.65%
	(2.9240)	(1.6894)	(1.4687)	(1.1398)	(5.7274)	(3.3222)	(2.9654)	(3.0834)	(2.5200)	(0.9158)	(0.7582)	(1.4151)
CAR(-20,0)	2.85% [A]	3.07% [A]	2.13% [A]	1.01% [A]	3.48% [A]	3.74% [A]	3.79% [A]	2.41% [A]	3.18% [A]	2.86% [C]	2.72% [C]	2.76% [A]
	(5.5385)	(4.1779)	(3.7506)	(2.6707)	(13.1809)	(7.6036)	(7.6588)	(7.3197)	(4.7287)	(1.6416)	(1.7795)	(4.0669)
CAR(-10,0)	2.46% [A]	1.23% [B]	1.56% [A]	0.59% [B]	2.21% [A]	2.69% [A]	2.88% [A]	1.49% [A]	1.77% [A]	1.80%	1.27%	0.97%
	(6.2261)	(2.0827)	(3.2063)	(2.0596)	(10.7222)	(7.0826)	(7.9720)	(6.2017)	(3.0650)	(1.3573)	(1.2079)	(1.4748)
CAR(1,10)	-0.35%	1.00% [B]	-0.30%	-0.75% [A]	0.64% [A]	0.64% [B]	0.09%	-0.20%	-0.11%	1.69%	-0.09%	0.57%
	(-1.1894)	(2.0727)	(-1.0214)	(-3.6353)	(3.8507)	(2.0074)	(0.3359)	(-1.0588)	(-0.1732)	(1.4466)	(-0.1334)	(1.4399)
CAR(1,20)	-0.53%	1.97% [A]	-0.17%	-1.00% [A]	1.44% [A]	1.59% [A]	1.02% [A]	-0.15%	-0.51%	1.51%	2.04%	1.07%
	(-1.3100)	(3.1971)	(-0.3917)	(-3.4821)	(5.5688)	(3.8391)	(2.4632)	(-0.5136)	(-0.6736)	(0.8809)	(1.4282)	(1.5323)

Table 7B shows positive and significant average cumulative abnormal returns for the periods before the selling of the shares in the years 2007-2010 in most cases for the directors, as well as the officer. For the CEOs they are not significant in a few cases. In 2010 the average cumulative abnormal returns for the two periods after the sale (1,10) and (1,20) are mostly negative for the directors, but positive and significant in the year 2007. For the officers, the average cumulative abnormal returns are positive and significant in the years 2007, 2008, and 2009 for the period (1,20). The average cumulative abnormal returns are positive and significant for the period (1,10) for the officers in the years 2007 and 2008. For the CEOs, none of the average cumulative abnormal returns is significant in this period.

Table 7B shows that the officers are having slightly higher average cumulative abnormal returns than the directors and the CEOs in most cases. This would mean that it is better to look at the selling behavior of officers than directors or CEOs. To see if there really is a significant difference, a two-sample t-test for significant difference in means will be done. T-test (Nieuwenhuis, 2009): $T = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$ (10)

Tables 8A, B, and C show the average cumulative abnormal returns for the directors, the officers, and the CEOs for the years 2006-2010 and the t-test for the differences. Only the periods after the insider purchase and before the insider sell are taken into account here, because these periods show the average cumulative abnormal returns that the insider could have earned.

Table 8A

Average cumulative abnormal returns in percentages for the different holding periods for the years 2007-2010 for insider sales done by directors and officers of the 41 companies, and the t-tests to test the significance of the difference in means. 0 is the day that the insider purchased his shares (in case of an insider purchase), or sold his shares (in case of an insider sale).[A] means significant at a 1% level, [B] means significant at a 5% level, and [C] means significant at a 10% level

	Buy				Sell			
	(0,10)	**(0,20)**	**(0,125)**	**(0,250)**	**(-10,0)**	**(-20,0)**	**(-125,0)**	**(-250,0)**
2006								
Director	- 0.71%	- 0.55%	3.42% [C]	11.75% [A]	0	0	0	0
Officer	0.54%	- 0.16%	8.62%	11.44%	0	0	0	0
T-test for difference	0.9502	0.2057	1.2590	- 0.0439	0	0	0	0
2007								
Director	- 0.45%	- 1.44%	1.86%	17.25% [A]	2.46% [A]	2.85% [A]	6.03% [A]	6.62% [A]
Officer	0.74%	0.44%	- 3.65%	17.70%	2.21% [A]	3.48% [A]	8.94% [A]	11.61% [A]
T-test for difference	1.0346	1.2803	- 1.0301	0.0347	- 0.5607	1.0911	2.5315 [A]	3.6078 [A]
2008								
Director	3.46% [B]	6.54% [A]	34.92% [A]	42.64% [A]	1.23% [B]	3.07% [A]	17.47% [C]	27.26% [A]
Officer	5.57% [B]	9.09% [B]	34.00%	42.46% [A]	2.69% [A]	3.74% [A]	19.27% [A]	34.04% [A]
T-test for difference	0.6530	0.4904	- 0.0810	- 0.0167	2.0822 [B]	0.7540	0.8438	2.6975 [A]
2009								
Director	- 2.86%	- 0.04%	- 3.60%	1.13%	1.56% [A]	2.13% [A]	10.93%	26.09% [A]
Officer	- 1.28%	- 1.21%	5.73%	5.58%	2.88% [A]	3.79% [A]	15.34% [A]	29.05% [A]
T-test for difference	0.5165	- 0.4605	1.2291	0.8462	2.1872 [B]	2.2121 [B]	2.2825 [B]	1.2010
2010								
Director	0	0	0	0	0.59% [B]	1.01% [A]	0.61%	2.45% [C]
Officer	0	0	0	0	1.49% [A]	2.41% [A]	8.98% [A]	14.91% [A]
T-test for difference	0	0	0	0	2.5407 [A]	2.9394 [A]	7.4931 [A]	6.8015 [A]

Table 8B

Average cumulative abnormal returns in percentages for the different holding periods for the years 2007-2010 for insider sales done by CEOs and officers of the 41 companies, and the t-tests to test the significance of the difference in means. 0 is the day that the insider purchased his shares (in case of an insider purchase), or sold his shares (in case of an insider sale). [A] means significant at a 1% level, [B] means significant at a 5% level, and [C] means significant at a 10% level

	Buy				Sell			
	(0,10)	**(0,20)**	**(0,125)**	**(0,250)**	**(-10,0)**	**(-20,0)**	**(-125,0)**	**(-250,0)**
2006								
Officer	0.54%	- 0.16%	8.62% [B]	11.44%	0	0	0	0
CEO	0.38%	0.09%	- 2.46% [B]	- 1.85%	0	0	0	0
T-test for difference	- 0.1122	0.1277	- 2.8421 [A]	- 1.9108 [C]	0	0	0	0
2007								
Officer	0.74%	0.44%	- 3.65%	17.70%	2.21% [A]	3.48% [A]	8.94% [A]	11.61% [A]
CEO	- 0.04%	1.65%	20.87% [A]	46.03% [A]	1.77% [A]	3.18% [A]	6.88% [A]	8.83% [A]
T-test for difference	- 0.5119	0.7727	3.9010 [A]	2.2870 [B]	- 0.7141	- 0.4140	- 1.4733	- 1.6593 [C]
2008								
Officer	5.57% [B]	9.09% [B]	34.00% [A]	42.46% [A]	2.69% [A]	3.74% [A]	19.27% [A]	34.04% [A]
CEO	4.06% [C]	8.79% [A]	15.83% [B]	18.25% [A]	1.80%	2.86% [C]	9.68%	22.74% [A]
T-test for difference	- 0.4370	- 0.0565	- 1.4784	- 2.0568 [B]	- 0.6502	- 0.4867	- 2.8909 [A]	- 2.8414 [A]
2009								
Officer	- 1.28%	- 1.21%	5.73%	5.58%	2.88% [A]	3.79% [A]	15.34% [A]	29.05% [A]
CEO	- 1.35%	0.70%	13.16%	8.96%	1.27%	2.72% [C]	19.00%	19.52% [A]
T-test for difference	- 0.0155	0.4281	0.5580	0.4696	- 1.4426	- 0.6648	0.9617	- 1.9251 [C]
2010								
Officer	0	0	0	0	1.49% [A]	2.41% [A]	8.98% [A]	14.91% [A]
CEO	0	0	0	0	0.97%	2.76% [A]	7.65%	15.72% [A]
T-test for difference	0	0	0	0	- 0.7700	0.4847	- 0.6610	0.2430

Table 8C

Average cumulative abnormal returns in percentages for the different holding periods for the years 2007-2010 for insider sales done by CEOs and directors of the 41 companies, and the t-tests to test the significance of the difference in means. 0 is the day that the insider purchased his shares (in case of an insider purchase), or sold his shares (in case of an insider sale). [A] means significant at a 1% level, [B] means significant at a 5% level, and [C] means significant at a 10% level

	Buy				Sell			
	(0,10)	**(0,20)**	**(0,125)**	**(0,250)**	**(-10,0)**	**(-20,0)**	**(-125,0)**	**(-250,0)**
2006								
Director	- 0.71%	- 0.55%	3.42% [C]	11.75%	0	0	0	0
CEO	0.38%	0.09%	- 2.46% [B]	-1.85%	0	0	0	0
T-test for difference	0.9989	0.5034	- 2.6990 [A]	-3.7299 [A]	0	0	0	0
2007								
Director	- 0.45%	- 1.44%	1.86%	17.25%	2.46% [A]	2.85% [A]	6.03% [A]	6.62% [A]
CEO	- 0.04%	1.65%	20.87% [A]	46.03% [A]	1.77% [A]	3.18% [A]	6.88% [A]	8.83% [A]
T-test for difference	0.2946	2.1102 [B]	3.2452 [A]	3.7071 [A]	- 0.9828	0.3918	0.5287	1.1835
2008								
Director	3.46% [B]	6.54% [A]	34.92% [A]	42.64% [A]	1.23% [B]	3.07% [A]	17.47% [C]	27.26% [A]
CEO	4.06% [C]	8.79% [A]	15.83% [B]	18.25% [A]	1.80%	2.86% [C]	9.68%	22.74% [A]
T-test for difference	0.2177	0.5592	- 1.9476 [C]	- 2.4579 [A]	0.3910	- 0.1130	- 2.1558 [B]	- 1.0622
2009								
Director	- 2.86%	- 0.02%	- 3.45%	1.32%	1.56% [A]	2.13% [A]	10.91%	26.09% [A]
CEO	- 1.35%	0.70%	13.16%	8.96%	1.27%	2.72% [C]	19.00%	19.52% [A]
T-test for difference	0.3475	0.1618	1.2738	1.0286	- 0.2473	0.3641	2.0896 [B]	- 1.2942
2010								
Director	0	0	0	0	0.59% [B]	1.01% [A]	0.61%	2.45% [C]
CEO	0	0	0	0	0.97%	2.76% [A]	7.65%	15.72% [A]
T-test for difference	0	0	0	0	0.5495	2.3247 [A]	3.4094 [A]	3.8924 [A]

Table 8A shows that there is no significant difference between the average cumulative abnormal return of the officers and the directors in case of an insider purchase. In case of an insider sell there are some significant differences between the average cumulative abnormal return of the directors and the officers. In those cases, the officers earn a higher cumulative abnormal return than the directors on average. This would mean that, in case of an insider selling, a higher average cumulative abnormal return is earned by the officers than the directors.

Table 8B shows that there is significant difference between the average cumulative abnormal return of the officers and CEOs in the periods (0,125) and (0,250) in the years 2006-2007, and in the period (0,250) in the year 2008. Although there is a significant difference, it is not possible to say which group earns, on average, a higher cumulative abnormal return, since the average cumulative abnormal return is higher for the CEO in some cases, and higher for the director in other cases. In case of an insider selling shares, there are some significant differences, in which the officers earn a higher average cumulative abnormal return than the CEOs, but this is only the case for period (-250,0) in the years 2007, 2008, and 2009.

Table 8C shows some significant differences between the average cumulative abnormal return of the directors and the CEOs in some cases for both insiders purchasing and insiders selling shares. In some cases, the CEOs have a higher average cumulative abnormal return and in some cases it is higher for the directors. It is therefore not possible to say that one of these two groups earns, on average, a higher cumulative abnormal return. The average cumulative abnormal returns of the insiders that sell shares also show some significant differences for most of the periods in 2010, and period (-125,0) in the years 2008-2010. In most of these cases the CEOs earn a higher average cumulative abnormal return. This is not the case in 2008 though, and in all other cases the difference is not significant. It is therefore not possible to say which of the two groups earn a higher cumulative average return on average.

Table 8A and 8B shows some evidence that the officers earn a higher average cumulative abnormal return than the directors and CEOs. This is only the case for some of the cumulative abnormal returns though concerning an insider sell. In addition, it is primarily the case for some of the longer holding periods. Furthermore, 8C does not show significant differences between the average cumulative abnormal returns of the CEOs and officers. No convincing proof of the presence of an information hierarchy is therefore found in this data.

5.4 Testing Outsider Trading

After calculating the average cumulative abnormal returns for the insiders, it will now be calculated if it is beneficial for outsiders to follow the insiders. The insider trading filings will be done one or more trading days after the transaction. It is therefore not possible to trade exactly simultaneously with the insider. The next two tables therefore look at the first trading day after the insider trade. The same holding periods are used as in tables 6A and B, only the time periods before the insider purchase and after the insider sale are omitted. For the purchases, this will give the following periods: (1,11), (1,21), (1,126), and (1,251). For sales, the following periods are calculated: (-249,1), (-124,1) (-19,1), and (-9,1).

Table 9A

Average cumulative abnormal returns in percentages of the different holding periods for outsiders imitating insider purchase one day after the insider purchase is done for the 41 companies for the years 2006-2009. Where 1 is the first trading day after the insider has purchased his shares. The t-statistics for the cumulative abnormal returns are shown in parentheses. [A] means significant at a 1% level, [B] means significant at a 5% level, and [C] means significant at a 10% level

	2006	**2007**	**2008**	**2009**
CAR(1,11)	-0.13%	-0.08%	4.02% [A]	-0.87%
	(-0.2821)	(-0.1543)	(3.6863)	(-0.7868)
CAR(1,21)	-0.12%	-0.31 %	6.16% [A]	-0.39%
	(-0.2135)	(-0.4429)	(3.4771)	(-0.3232)
CAR(1,126)	2.18% [C]	5.77% [B]	24.09% [A]	7.36% [B]
	(1.6481)	(2.2130)	(5.8482)	(1.9911)
CAR(1,251)	7.26% [A]	24.45% [A]	30.11% [A]	6.96% [A]
	(3.6484)	(5.5481)	(7.5130)	(2.8068)

Table 9A shows that the outsider can earn positive average cumulative abnormal returns on the longer term (1,126) and (1,251) if he buys the shares the day after the insider has purchased the shares. For the years 2008, all the periods that are being looked at after an insider purchase show a positive and significant average cumulative abnormal return. For the other years, the shorter periods (1,11) and (1,21) show negative but insignificant cumulative abnormal returns, which means that the average cumulative abnormal returns are not significantly different from 0.

The cumulative abnormal returns are not much different than the cumulative abnormal returns of the insiders. The data shows that the average cumulative abnormal returns are negative on average on the day that the insider has bought shares. Again, it should be stressed that the fact that the outsider could earn positive average cumulative abnormal returns does not mean that the actual returns are positive as well. Furthermore, these cumulative abnormal returns do not yet include the transaction costs. When the average abnormal return is calculated instead of the average cumulative abnormal return, the average abnormal return would have been 12.61% in 2007 and 0.90% in 2008 for the holding period (1,251). This would mean that the average abnormal return of 2008 is around 0%. But, as explained on page 29, these results are less trustworthy, and are therefore not taken into account.

Table 9B

Average cumulative abnormal returns in percentages of the different holding periods for outsiders imitating insider sales one day after the insider sell is done for the 41 companies for the years 2007-2010. Where 1 is the first trading day after the insider has sold his shares. The t-statistics for the cumulative abnormal returns are shown in parentheses. [A] means significant at a 1% level, [B] means significant at a 5% level, and [C] means significant at a 10% level

	2007	**2008**	**2009**	**2010**
CAR(-249,1)	10.50% [A]	31.84% [A]	27.30% [A]	10.80 [A]
	(11.0076)	(26.2929)	(22.6892)	(11.0076)
CAR(-124,1)	8.33% [A]	19.25% [A]	13.65% [A]	6.37% [A]
	(6.6541)	(4.1831)	(3.0957)	(3.4218)
CAR(-19,1)	3.37% [A]	4.19% [A]	2.98% [A]	2.06% [A]
	(14.6942)	(9.7345)	(8.0262)	(8.5830)
CAR(-9,1)	2.12% [A]	2.59% [A]	2.30% [A]	1.17% [A]
	(12.1775)	(7.8439)	(7.7667)	(6.4868)

Table 9B shows that the average cumulative abnormal returns are positive and significant in every case. It is a lot harder though to time imitating insiders that are selling shares than to time imitating insiders that purchase shares, because in case of insiders selling shares it is not known when the shares were being purchased. The average cumulative abnormal returns are slightly higher than the average cumulative abnormal returns of the insiders. This would theoretically mean that the insiders could have had a higher cumulative abnormal return if he had bought his shares one day later, sold it one day later, or both. This difference is quite small though.

The insider trades that are in this database are not always filed the next trading day. In some cases – which can be seen for example in some cases concerning Microsoft and Symantec – the filings are delayed for more trading days. Most of the insider trades are filed one or two trading days after the exercise date. Tables 10A and 10B therefore show the average cumulative abnormal returns for the outsiders that react on the insider trade two trading days after the insiders have purchased or sold shares. The holding periods that are looked at are (2,12), (2,22), (2,127), and (2,252) for insider purchase. For insider sales the periods are (-248,2), (-123,2), (-18,2), and (-8,2).

Table 10A

Average cumulative abnormal returns in percentages of the different holding periods for outsiders imitating insider purchase two days after the insider purchase is done for the 41 companies for the years 2006-2009. Where 2 is the second trading day after the insider has purchased his shares. The t-statistics for the cumulative abnormal returns are shown in parentheses. [A] means significant at a 1% level, [B] means significant at a 5% level, and [C] means significant at a 10% level

	2006	2007	2008	2009
CAR(2,12)	-0.45%	0.16%	4.13% [A]	0.30%
	(-1.0070)	(0.3052)	(3.7553)	(0.2551)
CAR(2,22)	0.013%	-0.16%	5.66% [A]	0.38%
	(0.0231)	(-0.2205)	(3.1798)	(0.28812)
CAR(2,127)	2.11%	5.88% [B]	23.39% [A]	8.10% [A]
	(1.6324)	(2.2980)	(5.6937)	(2.3650)
CAR(2,252)	7.25% [A]	25.35% [A]	30.21% [A]	7.65% [A]
	(3.22657)	(5.7142)	(7.4457)	(3.2266)

Table 10B

Average cumulative abnormal returns in percentages of the different holding periods for outsiders imitating insider sales two days after the insider sell is done for the 41 companies for the years 2007-2010. Where 2 is the second trading day after the insider has sold his shares. The t-statistics for the cumulative abnormal returns are shown in parentheses. [A] means significant at a 1% level, [B] means significant at a 5% level, and [C] means significant at a 10% level

	2007	2008	2009	2010
CAR(-248,2)	10.50% [A]	31.86% [A]	27.00% [A]	10.84% [A]
	(16.1387)	(26.5208)	(22.6582)	(11.0768)
CAR(-123,2)	8.31% [A]	19.26% [A]	13.65% [A]	6.34% [A]
	(6.4152)	(4.2742)	(3.0007)	(3.1787)
CAR(-18,2)	3.27% [A]	4.25% [A]	2.88% [A]	1.93% [A]
	(14.4395)	(9.9119)	(7.8056)	(7.8607)
CAR(-8,2)	2.02% [A]	2.70% [A]	2.06% [A]	1.01% [A]
	(11.7003)	(8.4347)	(7.3665)	(5.5437)

Table 10A shows positive and significant average cumulative abnormal returns for the longer holding periods (2,127) (2,252) for the year 2008, just as in table 9A, the cumulative abnormal returns do not differ much from the cumulative abnormal returns of the insiders. In some cases they are slightly higher and in other cases they are slightly lower. The same counts for table 10B.

Tables 9A, 9B, 10A, and 10B show that in many cases it can be beneficial to imitate insider trading. As said before, this is easier done for insider purchases than for insiders that are selling their shares, since it is not known when these shares are bought.

These average cumulative abnormal returns should be adjusted for inflation and trading costs though. When adjusted for these costs, the average cumulative abnormal returns are still significant and positive for the longer periods for outsiders that imitate insiders selling shares. For the outsiders that imitate insiders who purchase shares there are no positive cumulative abnormal returns in the shorter holding periods and primarily the average cumulative abnormal returns for the periods (1,126) and (2,127) in year 2008 and the periods (1,251) and (2,252) in the years 2007 and 2008 are high and significant.

Overall, these tables partly confirm hypothesis (2), which stated: *By imitating the transactions done by insiders, it has been possible to earn significant cumulative abnormal returns on average, during the last financial crisis.* The, on average, positive cumulative abnormal return can be obtained by imitating insiders purchasing and holding the shares for a longer period (126, 251 days), with a purchase delay of one or two days. Or by selling the shares one or two days after the insider has sold his shares. This means that the sum of the abnormal returns within the holding periods is, on average, positive and significant for the longer holding periods. Even when adjusted for transaction costs and the inflation is taken into account, most of the longer holding periods still show significant cumulative abnormal returns on average. For the shorter holding periods the hypothesis is only true for a couple of the holding periods and years.

6 Conclusions

This thesis has shown some results that are in line with the existing papers and theories, but there are also some results that deviate from the expected results. Table 5 shows that in the years 2006, 2009 and 2010 there has been at least a weak form of market efficiency. What is remarkable is that the data has shown that the return and the lagged returns of the S&P500 were correlated in some cases. This means that there has not been a weak form of market efficiency present during all the years that have been observed. This result rejects *hypothesis (1): Due to the presence of at least a weak form of market efficiency, it has not been possible to use past stock price movements to predict future share price returns during the last financial crisis,* and means that the past share price movements could have been used to predict future share prices in some cases. Some explanations may be the mean reversion effect and the fact that new information is not immediately incorporated into the stock price.

Tables 6A and 6B have shown that the insiders earn a positive and significant average cumulative abnormal return in most cases, especially when the holding period is longer (126 and 251 days). The average cumulative abnormal returns are so high in the longer periods due to some of the high daily abnormal returns. When the abnormal return for the insider purchases for the years 2007 and 2008 are calculated for the period (0,250), the average abnormal return is quite lower than the average cumulative abnormal return. Tables 6A and 6B also showed signs that the insiders timed their trades quite well. In case of a purchase, the significant average cumulative abnormal returns were negative in the periods before the purchase, and the significant average cumulative abnormal returns were positive in the periods after the purchase. In case of an insider sell, the average cumulative abnormal returns were lower or negative in the short periods after the sell than in the short periods before the sell.

Tables 8A 8B and 8C tested the presence of an information hierarchy in the sample. No convincing proof has been found that one of the three groups has significantly higher average cumulative abnormal returns than the other groups. The presence of an information hierarchy is therefore not found in this dataset.

Tables 9A, 9B, 10A, and 10B show that the average cumulative abnormal returns are positive and significant for outsiders if they imitate the insider trade one or two days after the insider has traded shares in the year 2008. It is also positive and significant in most of the longer holding periods of 126 and 251 days for the other years. If the average cumulative abnormal returns are adjusted for transaction costs and inflation, it will go down, but for the longer holding periods it will still be positive.

Hypothesis (2): By imitating the transactions done by insiders, it has been possible to earn significant cumulative abnormal returns on average, during the last financial crisis, is therefore true for the longer holding periods in most cases, and in some cases for the shorter holding periods.

Overall it can be said that the results of 2008 deviate from the existing literature and the results of the other years. This can be seen in all the tables of chapter 5. The results concerning the serial correlation were different than in the other years, and the average cumulative returns for both insiders as well as outsiders have been much higher in the year 2008. 2008 was the year that the crisis has struck the stock market a lot, as table 3 has shown, the average daily return in 2008 was -0.19%, while all the other years the average daily return was positive. Table 4 shows that the inflation has been very low in the United States in the year 2008, with an inflation rate of only 0.09%, while the inflation rate of the other years range from 1.50% in 2010 to 4.08% in 2007.

To sum up, *hypothesis (1): Due to the presence of at least a weak form of market efficiency, it has not been possible to use past stock price movements to predict future share price returns during the last financial crisis* is only partly accepted, and *Hypothesis (2): By imitating the transactions done by insiders, it has been possible to earn significant cumulative abnormal returns on average, during the last financial crisis* is accepted for the longer holding periods and only partly accepted for the shorter holding periods.

7 Limitations

When reviewing the results, it is important to keep in mind that the results about insider trading come from a dataset containing four different industries and 41 companies. It is therefore not possible to say that the results from this research are true for every company that is listed on the S&P500 or any other stock exchange.

What one should also keep in mind is that this thesis is looking at a specific time period in the past. Every trading day is different, and so is every crisis. It is therefore not possible to say that the results will be the same for every time period crisis or that it will be the same for any other days.

Moreover, the results in tables 5-10 contain cumulative abnormal returns, which is something different than the actual return. It can be the case that the cumulative abnormal returns are quite high, but that the actual returns are negative. This only means that the stock is performing better than expected by the CAPM model. It can therefore look as if it is beneficial to imitate insider trading, but can turn out to be unbeneficial. If you really want to invest in a stock, it can mean that you should imitate the insider, since they have positive cumulative abnormal returns. The cumulative abnormal returns are also different than the abnormal returns. The abnormal return calculates the actual return minus the expected return for a day or period, while the cumulative abnormal return is calculated by adding up the abnormal returns of a particular period. In addition, the CAPM model is used here as a benchmark model to calculate the normal returns. When another benchmark model will be used, the results will possibly be different than the results in this thesis.

Furthermore it is important to realize that the relative percentage increase and decrease differs per share price. If the price of a share decreases on the first day with $1 and increases the following day with $1, the percentage increase is higher than the percentage decrease, so the cumulative percentage will be positive, while in the end it will end up at the same share price, so the real percentage increase is 0%.

Another limitation in this thesis is that it is not clear how long the insiders will hold on to their shares. This thesis only looked at hypothetical holding periods, but it may well be the case that the insiders will hold on to their shares a lot longer or shorter. Calculating the return of an insider sell is even harder to calculate, since it is not known in this database when the shares are exactly bought. Only hypothetical purchasing dates are taken into consideration while calculating the cumulative abnormal returns, which can deviate a lot from the actual purchasing dates.

One last remark concerns the share prices and returns that are taken into consideration for this thesis. The share prices may change every second during a trading day. The data takes into consideration only one price per day, the closing price. The price that the insiders or outsiders have paid or received may therefore deviate from the price that has been taken into consideration. A strategy that would have given these results is to buy the shares just before the trading day ends, and then sell them at the end of the holding period, again just before the trading day ends.

7.1 Further Research Suggestions

It would be interesting to see what the average cumulative abnormal returns for the real holding periods are. To test this, one should find out the real purchase and selling dates of all the shares, and the real prices. This study would then also show if there is a difference between the holding period of shares during a crisis and when there is no crisis. It would also give a truer picture of the actual average cumulative abnormal returns.

Another possible research would involve calculating the real returns of the insider trades and the outsiders who imitate these insiders. This thesis only looked at the average cumulative abnormal return, but a positive cumulative abnormal return will not always mean a positive real return, and a real return is why investors want to invest their money in the stock market. One can also look at the abnormal returns of the periods instead of the cumulative daily abnormal returns of the different holding periods.

This thesis only had a sample of insiders from 41 different companies that traded shares between the years 2006-2010. This is only a small part of the S&P500. It would be a good thing to enlarge the dataset or to use companies from a different set of industries to see if the results will be the same.

Moreover, the study done in this thesis can be done for more stock exchanges and time periods. It can for example be performed for the FTSE-100 or the AEX indices. This will be interesting to see if there is a difference between the results of this thesis, which used an American dataset, and a study that is performed with a European dataset. As a different time period, another crisis period can be chosen for example.

One final suggestion is to do this study with a different benchmark model than the CAPM model. This study uses the CAPM model to calculate the normal returns. There are also other benchmark models to calculate the normal returns. These other models might possibly give different results than this thesis.

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Appendices

Appendix A: Gross Domestic Product Per Country

Country	2005	2006	2007	2008	2009	2010
Australia	3.08	3.56	3.83	1.45	2.28	2.58
Austria	2.46	3.60	3.73	2.18	-3.89	1.96
Belgium	1.71	2.69	2.92	1.00	-2.75	2.18
Canada	3.02	2.82	2.20	0.69	-2.77	3.21
Chile	5.56	4.59	4.60	3.66	-1.68	5.20
Czech Republic	6.32	6.81	6.13	2.46	-4.15	2.35
Denmark	2.45	3.39	1.58	-1.12	-5.21	1.75
Estonia	9.43	10.56	6.92	-5.06	-13.90	3.11
Finland	2.92	4.41	5.33	0.92	-8.20	3.12
France	1.83	2.47	2.29	-0.08	-2.73	1.48
Germany	0.75	3.37	2.66	0.99	-4.72	3.63
Greece	2.28	5.17	4.28	1.02	-2.04	-4.47
Hungary	3.17	3.63	0.77	0.83	-6.69	1.17
Iceland	7.48	4.60	5.95	1.37	-6.90	-3.47
Ireland	6.02	5.32	5.63	-3.55	-7.58	-1.04
Israel	4.87	5.70	5.31	4.23	0.80	4.61
Italy	0.66	2.04	1.48	-1.32	-5.22	1.30
Japan	1.93	2.04	2.36	-1.17	-6.29	3.94
Korea	3.96	5.18	5.11	2.30	0.32	6.16
Luxembourg	5.43	4.97	6.64	1.44	-3.64	3.52
Mexico	3.28	5.06	3.36	1.53	-6.01	5.50
Netherlands	2.05	3.39	3.92	1.88	-3.92	1.77
New Zealand	3.25	2.23	2.86	-1.07	0.79	2.50
Norway	2.74	2.28	2.73	0.73	-1.71	0.35
Poland	3.62	6.23	6.79	5.13	1.61	3.80
Portugal	0.76	1.44	2.39	-0.01	-2.51	1.33
Slovak Republic	6.66	8.50	10.52	5.83	-4.78	4.02
Slovenia	4.01	5.85	6.83	3.66	-8.08	1.21
Spain	3.61	4.02	3.57	0.86	-3.72	-0.14
Sweden	3.16	4.30	3.31	-0.61	-5.33	5.69
Switzerland	2.64	3.63	3.64	2.10	-1.88	2.55
Turkey	8.40	6.89	4.67	0.66	-4.83	8.95
United Kingdom	2.17	2.79	2.68	-0.07	-4.87	1.35
United States	3.06	2.67	1.94	-0.02	-2.67	2.85
Euro area (17 countries)	1.70	3.06	2.85	0.43	-4.13	1.77
European Union (27	1.96	3.23	2.98	0.52	-4.23	1.81
OECD - Total	2.72	3.14	2.71	0.34	-3.52	2.96
China	11.31	12.68	14.16	9.63	9.11	10.30
Russian Federation	6.38	8.15	8.54	5.24	-7.89	4.03
South Africa	5.28	5.60	5.57	3.58	-1.68	2.85

source: http://stats.oecd.org/Index.aspx?DatasetCode=SNA_TABLE1

Appendix B: Companies That Are Used to Construct the Insider Trading Database

AES CORP
ADOBE SYSTEMS INC
AMAZON COM INC
AMERICAN ELECTRIC POWER CO INC
ANADARKO PETROLEUM CORP
APACHE CORP
AUTODESK INC
CABOT OIL & GAS CORP
CENTERPOINT ENERGY INC
CHESAPEAKE ENERGY CORP
CITRIX SYSTEMS INC
COGNIZANT TECHNOLOGY SOLS CORP
COMPUWARE CORP
DTE ENERGY CO
DENBURY RESOURCES INC
DEVON ENERGY CORP NEW
DOMINION RESOURCES INC VA NEW
EDISON INTERNATIONAL
ELECTRONIC ARTS INC
ENTERGY CORP NEW
EOG RESOURCES INC

FISERV INC
HUNTINGTON BANCSHARES INC
INTUIT INC
MICROSOFT CORP
NRG ENERGY INC
NEWFIELD EXPLORATION CO
NORTHEAST UTILITIES
NORTHERN TRUST CORP
OCCIDENTAL PETROLEUM CORP
ORACLE CORP
PPL CORP
PINNACLE WEST CAPITAL CORP
PIONEER NATURAL RESOURCES CO
PROGRESS ENERGY INC
RANGE RESOURCES CORP
SOUTHERN CO
SOUTHWESTERN ENERGY CO
SYMANTEC CORP
TECO ENERGY INC
ZIONS BANCORP

Appendix C: Betas of All the Companies in the Dataset

Company Name	Overall beta	Beta 2006	Beta 2007	Beta 2008	Beta 2009	Beta 2010
AES CORP	1.3114	0.5671	1.2103	1.2275	1.5340	1.4953
ADOBE SYSTEMS INC	1.1153	1.2930	0.8483	1.1134	1.2167	1.0167
AMAZON COM INC	1.1258	1.7239	1.3727	1.1936	0.8454	1.0611
AMERICAN ELECTRIC POWER CO INC	0.6791	0.6015	0.8670	0.7351	0.5369	0.6327
ANADARKO PETROLEUM CORP	1.4910	1.5042	1.0514	1.4625	1.3315	1.5807
APACHE CORP	1.2809	1.2762	1.1043	1.3316	1.2381	1.2926
AUTODESK INC	1.1608	1.5593	1.1197	1.0900	1.1241	1.4615
CABOT OIL & GAS CORP	1.4704	1.9678	1.1288	1.4625	1.5349	1.4662
CENTERPOINT ENERGY INC	0.7457	0.4565	0.8184	0.8243	0.5566	0.7956
CHESAPEAKE ENERGY CORP	1.4754	1.2736	0.8129	1.6188	1.5398	1.2064
CITRIX SYSTEMS INC	1.0296	1.5157	1.0399	1.0329	0.9543	1.0134
COGNIZANT TECHNOLOGY SOLS CORP	1.2669	1.8207	1.2087	1.3648	1.0329	1.1893
COMPUWARE CORP	1.0006	0.7074	1.0434	1.0318	0.9236	1.1129
DTE ENERGY CO	0.6955	0.4338	0.9174	0.7128	0.6259	0.7064
DENBURY RESOURCES INC	1.7071	1.7610	1.1814	1.8491	1.6857	1.4895
DEVON ENERGY CORP NEW	1.2449	1.5888	1.0064	1.2763	1.2622	1.1471
DOMINION RESOURCES INC VA NEW	0.6298	0.5693	0.6781	0.6984	0.4585	0.6894
EDISON INTERNATIONAL	0.7952	0.7193	1.0720	0.8402	0.6601	0.7179
ELECTRONIC ARTS INC	1.0285	1.0506	1.0113	0.9843	1.0904	1.0703
ENTERGY CORP NEW	0.6852	0.4521	1.0263	0.7469	0.4818	0.6979
EOG RESOURCES INC	1.2790	1.8504	0.9573	1.2818	1.2867	1.3233
FISERV INC	0.8781	0.9378	0.8849	0.8897	0.8463	0.8716
HUNTINGTON BANCSHARES INC	1.9284	0.8338	1.4192	1.5642	3.1600	1.5910
INTUIT INC	0.8230	1.0185	0.9367	0.8307	0.7048	0.9140
MICROSOFT CORP	0.9073	0.7267	0.9369	0.9503	0.8561	0.8489
N R G ENERGY INC	1.1212	0.8410	1.0348	1.3517	0.8354	0.8630
NEWFIELD EXPLORATION CO	1.4833	1.6381	0.9620	1.4556	1.6780	1.4712
NORTHEAST UTILITIES	0.6189	0.5232	0.8014	0.6931	0.3877	0.7019
NORTHERN TRUST CORP	1.4176	1.0602	1.3317	1.5152	1.4769	1.0340
OCCIDENTAL PETROLEUM CORP	1.3625	1.3690	1.2697	1.5017	1.2316	1.1050
ORACLE CORP	0.9369	0.9443	1.1754	0.9743	0.8138	0.8758
PPL CORP	0.7358	0.6243	0.9656	0.7976	0.6153	0.5913
PINNACLE WEST CAPITAL CORP	0.6224	0.4402	0.7057	0.6392	0.5667	0.6725
PIONEER NATURAL RESOURCES CO	1.5191	1.1180	0.9284	1.4570	1.8514	1.5709
PROGRESS ENERGY INC	0.5801	0.4767	0.8292	0.6477	0.4097	0.5164
RANGE RESOURCES CORP	1.3741	1.8620	1.1392	1.3829	1.3435	1.4422
SOUTHERN CO	0.4706	0.5215	0.6754	0.5253	0.3048	0.4455
SOUTHWESTERN ENERGY CO	1.5759	2.1973	1.1376	1.8497	1.2182	1.2908
SYMANTEC CORP	0.8999	0.7595	0.7324	0.9344	0.9010	0.9180
TECO ENERGY INC	0.8204	0.6861	0.8648	0.8465	0.7260	0.9309
ZIONS BANCORP	1.7189	0.7024	1.1366	1.3703	2.8008	1.6665