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Insider Trading and Information Flows: A Cause for Concern?

-An Empirical Analysis of the Norwegian Market

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Abstract

This paper examines the returns to the aggregate portfolio of insider trades in Norway and the connection between insider trading and the asset management industry during the period January 2008 until July 2012. I find strong evidence that the aggregate insider does not earn abnormal returns, but instead realises inferior returns relative to non-insiders. This result is attributed to a number of different factors including that insiders often trade purely for liquidity or diversification purposes; there is evidence that insiders follow contrarian investment strategies; and insiders are subject to a number of behavioural biases. Extending the study of insider trades to the asset management industry I find that Norwegian mutual funds affiliated with a financial conglomerate significantly outperform non-affiliated funds, and substantial evidence that insider trades, and hence information flows, can account for this difference in performance. These findings are in general robust to both the estimation method and the model used for the analysis, and have important implications for insider trading and the asset management industry.

Foreword

This paper is the culmination of my Master of Science in Economics and Business Administration at the Norwegian School of Economics (NHH). I would like to thank my supervisor Francisco Santos for his insightful advice and guidance throughout the process of writing this thesis. In addition I would not have been able to complete this master programme without the steadfast support of my family and friends, so to them a sincere thank you as well.

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1 Introduction

The main tool that an investor can employ in their attempt to realise abnormal returns in financial markets is information, that and for an appropriate fee the assistance of professional fund managers. However, if the flow of information to the investor is compromised, and the professionals do not manage said investors' assets on an equal playing field, is it ever possible for the private investor to consistently earn fair returns relative to more informed investors? And do some investment funds have an inherent advantage over others?

What is being referred to above is the use of inside information. It is generally considered that if some sections of investors are able to exploit private information in order to obtain superior returns, then this puts other investors at a disadvantage. Thus, in the majority of developed financial markets around the world there is some form of legislation in place to protect investors against the use of inside information. The reference to professionals not playing on an equal field concerns the asset management industry, and specifically whether or not the use of inside information is prevalent in this specific area.

This papers aims to straddle between the two main areas mentioned above: insider trading and the performance of professionally managed mutual funds in Norway. With respect to insider trading the intention is to evaluate whether insiders performance is superior to that of the uninformed investor, and with respect to the performance of mutual funds the goal is to assess whether funds that are associated with a financial conglomerate (affiliated funds) outperform independent funds (non-affiliated funds).

The study of insider trades follows, to some extent, the methodology laid out in Eckbo and Smith (1998). They assess the performance of an aggregate portfolio of insider trades in the Norwegian market using conditional asset pricing models. To that end the first requirement for this study is to create a portfolio of insider holdings for all publicly listed companies on the Oslo Exchange All Share Index for the period January 2008 to July 2012. This portfolio of insider holdings is then used to create

two separate insider returns portfolios, one reflecting insider ownership levels and the other reflecting insider value levels.

To assess the performance of these insider portfolios the unconditional CAPM and Carhart (1997) models are used, in addition to the conditional versions of these models. Using these models I find that the insider portfolios reported alphas of between -0.025 and -0.04, which are economically and statistically significant values. The only exception to this is the conditional Carhart model, which reports alphas that are not significantly different from zero.

The above results provide strong evidence that insiders do not in fact outperform uninformed investors, with their performance at best equal to them. This is consistent with Eckbo and Smith (1998), but in contrast to the results of Bris (2005) and Durnev and Nain (2007) who find evidence of positive insider returns in Norway. The finding that insiders do not outperform uninformed investors is reassuring on some levels, but also begs the question as to why they do not realise abnormal gains. I conclude that this lack of insider profit is derived from a combination of factors: insiders often trade purely for liquidity or diversification purposes; there is evidence that insiders follow contrarian investment strategies; and insiders are subject to a number of behavioural biases.

In their paper Eckbo and Smith (1998) argue that because the average mutual fund outperforms the insider portfolios, this is further evidence that there are no abnormal returns to insider trading. I propose an alternative view that inside information can flow through to mutual funds, and thus be utilised to improve their performance.

However, first to allow parity with the Eckbo and Smith study I carry out a similar comparison of the performance of mutual funds and the insider portfolios. To assess the difference in performance it is first necessary to create an equal weighted portfolio of mutual fund returns, and then to create a difference portfolio by going long the equal weighted portfolio of mutual fund returns and short the insider portfolio returns. The performance of this difference portfolio is tested using the same models as the insider portfolio. I observe that the average mutual fund significantly outperforms the

insider portfolios with alphas ranging from 0.021 to 0.037, though again there is zero difference reported for the conditional Carhart models.

The final stage of the analysis consisted of testing the hypothesis that inside information is used to allow affiliated mutual funds to attain superior returns, compared to their non-affiliated counterparts. Once again it is required that a difference portfolio is created, this time going long the affiliated funds and going short the non-affiliated funds, and defining affiliation as in Massa and Rehman (2008). This portfolio is analysed in the same manner as the difference between the average mutual fund and the insider portfolios. From the analysis I find strong evidence that affiliated funds outperformed non-affiliated funds with significant alphas of around 0.002 for all models.

Having shown that affiliated funds perform better than non-affiliated funds, it is then necessary to test whether this difference is caused by inside information. In order to test this the two insider portfolios are added separately as independent variables in each of the models. From this I find that all of the alphas reduce, with many now only significantly different from zero at the 10% level, and all others zero. Furthermore the insider portfolio coefficients are highly significant in the models, indicating strong evidence that inside information is responsible for the difference in performance. Given the close ties between mutual funds and the financial conglomerates that own them, it is not necessarily surprising that information passes from one to the other. However, this is certainly an issue for those deciding to invest in mutual funds, as clearly this may represent a form of insider trading that is not being monitored at present.

The analysis in this paper adds to current literature on the topic with several important and unique findings: namely the negative performance of the insider portfolios, that funds affiliated with financial conglomerates outperform their non-affiliated counterparts, and that this superior performance of affiliated funds is explained by inside information. These results are in general robust to the type of model, and methodology used to estimate the model.

Thus, to answer the questions posed at the beginning of this section: it is possible for private investors to earn fair returns since there is evidence that the aggregate insider portfolio underperforms when all publicly available information is accounted for; and investment funds affiliated with a financial conglomerate seem to have an inherent advantage relative to independent funds, due to the pervasiveness of inside information in affiliated funds.

The reminder of the paper is structured as follows: Section 2 provides a literature review on insider trading and flows of information in mutual funds, Section 3 presents the hypotheses, Section 4 outlines the methodology used in the analysis, Section 5 summarizes the data used, Section 6 presents the results, and Section 7 discusses the implications and concludes.

2 Literature Review

2.1 Insider Trading

Insider trading has long been a topic of tremendous contention in both academic circles and in financial markets. Much of the academic discussion on the subject focuses on whether or not insider trading should be regulated, or whether insiders should be able to use the additional information for investment decisions. Outwith this area, discussion is usually focussed on the substantial fines and prison sentences that are handed out to individuals found guilty of insider trading. Citing the case of Raj Rajaratnam[1]who was sentenced to 11 years in prison and fined over $150 million in 2011, it is evident that insider trading is still a key area of interest for both finance academics and professionals.

This section of the literature review will endeavour to cover the academic scope of insider trading, with reference to past studies on the topic, legal definitions, and with a focus on Norway. A good starting point is to consider the definition of unlawful insider trading; Bainbridge (2000) states that insider trading is the trading of securities while in possession of material non-public information.

While the definition of insider trading is broadly consistent across many developed market economies, whether or not insider trading is good for financial markets is often debated. At an intuitive level, inside information it seems is equivalent to an advantage to those working within corporations, and therefore it is possible that, if unregulated, it could have the effect of discouraging investment from non-insiders (Hanson, 2008). The reasoning behind this is that investors without inside information may believe that they will never realise superior returns when competing against other, informed, investors with vastly superior information. Leland (1992) finds that whether or not insider trading is detrimental to a market is dependent upon the economic environment, however, it is noted that factors are identified that favour the prohibition of insider trading.

[1] Raj Rajaratnam was found guilty of organising a complex web of connections within his hedge fund, Galleon Group, in order to acquire and profit from inside information (Hilzenrath, 2011).

Traditional insider trading studies often utilise an event study methodology, such as in the early study by Jaffe (1974), who finds that insiders earn significant abnormal returns. These event studies empirically measure how a stock price reacts to a specific event; in the case of Jaffe (1974) the impact of insider trades on stock prices in the months after the insider trade is the measure of interest. Many subsequent studies followed this methodology and found similar results in both the UK, King et al (1988), and Germany, Betzer and Theissen (2009), to name but two other countries where the same evidence of insider trading was prominent. These findings pose significant doubts as to the effectiveness of insider trading regulation given the existence of abnormal profits to insiders. From this, we can surmise that either many of the studies that have tackled insider trading have employed an incorrect approach, or that regulation is ineffective in preventing insiders from realising abnormal returns.

Firstly, the effectiveness of regulation shall be considered in relation to insider trading abnormal returns. Bris (2005) considers insider trading laws on a global scale, and arrives at several important results: the introduction of insider trading regulation increases both the profitability, and the occurrence of insider trading, and that more severe penalties reduce the incidence of illegal insider trading. Of paramount importance to this paper, Bris notes that it is worse to have regulation that fails to prosecute those who violate, than no law at all, and cites Norway as an example of this situation. Another global study into insider trading regulation by Durnev and Nain (2007) finds that on average insider trading regulation is effective in reducing the incidence of illegal insider trading and private information trading. Once again this study aligns Norway with countries characterised by lax regulation on insider trading such as the Philippines and Italy. From these studies we can infer that regulation is effective when enforced correctly, but can cause more harm than good when enforcement of regulation is poor, since insiders are not punished for their actions, but are able to gain higher returns due to the presence of regulation.

It seems that insider trading is strongly affected by the level of regulation within a market. A reasonable question deriving from this finding is what is the correct level of regulation? Acharya and Johnson (2010) provide a theoretical model that finds that the as the number of insiders in a market increases, so regulation must become stricter in order for the market to remain in equilibrium. Therefore in smaller markets, such

as Norway, it may be optimal to have lower levels of regulation than more developed markets such as the US and the UK. This finding could explain why Norway was noted as lacking in regulation previously.

As stated already it is most common for academic studies to apply event study methodology when examining insider trading. However, Eckbo and Smith (1998) argue that this method is incorrect: although event studies are good at testing whether insiders trade prior to large changes in stock prices, they do not consider the actual holding periods of investors, and therefore cannot estimate the expected gains from insider trading. Instead Eckbo and Smith use a portfolio of insider returns and find no evidence of insider abnormal returns. However, as Inci et al (2010) state, no other studies have confirmed this finding of Eckbo and Smith. This could be down to the unique methods used in the study by Eckbo and Smith, or the characteristics of the Norwegian market, nevertheless it steers research into a study of the Norwegian market and insider trading.

Insider trading is undoubtedly still an issue in financial markets and there are arguments for several different methods in which to test for its prevalence, and whether or not insider regulation is necessary or not. Nonetheless there does seem to be some general consensus that illegal insider trading does occur in practice, what is less clear is how this affects both investors and financial markets.

2.2 Information Flows and Mutual Funds

The concept of information flows in financial markets is imperative to the understanding of why insider trading is important, and is one of the longest standing notions in academic finance. Information flows are the main component of the efficient markets hypothesis as developed by Fama (1970). Fama defines an efficient market as one in which prices fully reflect available information, and in addition to this he proposes three separate versions of the hypothesis: weak form, semi-strong form, and strong form. What is key, in relation to insider trading, is the difference between the semi-strong form and the strong form of the hypothesis: the strong form of the hypothesis states that prices should reflect all information, both public and private, whereas only public information is present in the semi-strong form.

Accordingly, in markets that enforce insider trading regulation it should be expected that they are at best semi-strong form efficient. But if markets are found to be strong form efficient this could indicate that private information is determining prices.

There have been many studies carried out assessing market efficiency in financial markets. Finnerty (1976) was one of the earliest studies relating insiders and market efficiency, and concludes that due to the ability of insiders to earn abnormal returns the strong form of the efficient market hypothesis must be rejected. This insight is consistent with the previous statement that in the presence of insider regulation it should not be feasible to have a strong form efficient market. There have also been several further studies confirming this rejection of strong form efficient markets, such as the Chan et al (1997) study of market efficiency in 18 different countries, which finds that equity markets are characterised by weak-form efficiency. It seems that the empirical evidence is consistent with the notion that inside information is not integrated into market prices. Consequently, the use of inside information to trade constitutes an advantage to those that can gain from it, and a disadvantage to all other actors in the market.

This concept of the advantage of additional, non-public, information becomes very important when mutual funds are taken into consideration. Of the multitude of studies into mutual funds it is often found that after expenses are taken into account, on average mutual funds do not outperform the benchmark index (Aragon and Ferson, 2006). This presents a puzzle in the academic environment, why do investors continue to flock to active mutual funds when they would be better off holding either the benchmark index or a passive fund. One explanation is offered by Berk and Green (2004) who develop a new model, and find that differential ability across fund managed does exist, and is rewarded. Another explanation offered for this anomaly is that investments by mutual funds improve the informativeness of stock prices (Jiang et al, 2012). The logic behind this is that stocks that are heavily weighted by active mutual funds outperform their underweighted counterparts, and that once this view becomes publicly available the performance increase dissipates. Therefore, Jiang et al argue that the failure to split up mutual fund performance into active and passive portfolios is the reason that studies fail to recognise the value that fund managers add.

The main point that can be taken from the Jiang et al study cited above is that mutual funds have access to some information set that is not available to the market as a whole. Since this information is not available to the whole market it can be deduced that this information is private, if we assume that financial markets are characterised by the semi-strong form of the efficient markets hypothesis. This leads to the pertinent question of whether or not mutual funds are utilising inside information to improve their performance.

An interesting study that relates directly to the question stated above is carried out by Massa and Rehman (2008), and deals with the information flows between mutual funds and banks. Massa and Rehman find that mutual funds affiliated with financial conglomerates, such as banks, realise significantly higher returns after investing in stocks that have received loans from the financial conglomerate. This finding demonstrates how privileged, inside, information can flow through different channels in order to result in a performance advantage to certain affiliated funds. Adding weight to the concept that information flows in mutual funds can lead to performance advantages Lee (2014) studies the relationship between affiliated funds of funds and regular funds, finding that investor behaviour is driven by information flows. Massoud et al (2011) extend this analysis into the hedge fund industry, finding that some hedge funds offer loans to firms, and subsequently take up positions in these firms based on private information.

Information flows are of critical importance to financial markets; they are the key to the pricing of securities and the drivers of activity in markets. From the literature noted above, it seems that there is a strong possibility that insider information is utilised by mutual funds in a manner that gives them superior performance through privileged information. Clearly, further examination is required to see if these results are consistent across markets and time horizons.

3 Hypotheses

This section outlines the hypotheses that I concentrate on in this paper, and also some motivation as to why the study of insider trading is both necessary and interesting.

3.1 Motivating The Study of Insider Trading

Investors trade based upon the information set that they have available at any point in time. In an unconditional world all investor decisions are based on the risk return trade off as determined by some of the models that will be described in the methodology section. In contrast in a conditional world investors have access to all publicly available information when making any investment decisions. Therefore it is natural to assume that investors in a conditional world have an advantage relative to investors with just an unconditional information set. Further to this if any investors have access to further private information, informed investors, then this could constitute an advantage relative to the unconditional and conditional, uninformed, investors. Hence, it would be expected that in the absence of market restrictions and legislation that informed investors would outperform uninformed investors due to the larger information set that they are able to utilise. Yet, in nearly every financial market around the world there are restrictions in place that prohibit the use of private information as a basis for trading.

The expectation of superior insider performance, as stated above, can be summarised in mathematical terms. For simplicity only the conditional case will be used to represent uninformed investors. First let $r_{i,t+1}$ denote the excess return[2] on asset i at period $t+1$. Then it is necessary to consider the conditional expected return $E(r_{i,t+1}|Z_t)$, where Z_t is the set of all publicly available information at time t. As stated already investors in a conditional world have access to all publicly available information and thus trade utilising this entire information set, Z_t. Hence the expected return of uninformed investors is simply the conditional expected return already stated.

[2] Excess Returns are simply the return of an asset minus the risk free rate.

Informed investors have access to private information and consequently have a larger information set than Z_t on which to base trades. The information set available to informed investors is denoted I_t. Since informed investors have a larger information set then they should be able to take advantage of any instance when:

$$r_{i,t+1} - E(r_{i,t+1}|Z_t) > 0 \quad (1)$$

That is when the realised returns are greater than the conditional expected returns, abnormal returns are created that informed investors can obtain.

Thus from Eckbo and Smith (1998) informed investors have the ability to "buy low and sell high" and therefore the returns to these informed investors are at least as great as those to uninformed investors:

$$E(r_{i,t+1}|Z_t, I_t) - E(r_{i,t+1}|Z_t) \geq 0 \quad (2)$$

The analysis that follows in this paper will at its centre consider this very relation above.

3.2 Hypotheses

I propose two separate hypotheses that this paper will deal with in due course. The first derives from equation 2 above, and updates the study by Eckbo and Smith (1998) in assessing the performance of insiders in the Norwegian market. This hypothesis is that due to the fact that insiders have a larger information set than non-insiders they should outperform them on an aggregate level.

The second hypothesis that I propose attempts to connect insider trading and the asset management industry. Eckbo and Smith (1998) argue that because Norwegian mutual funds outperform insiders that this is evidence against the prevalence of insider trading. In contrast to this I propose that mutual funds are themselves privy to insider information, and combine this with their superior investment knowledge to achieve abnormal returns. Concentrating on a subset of the mutual fund industry I hypothesise

that mutual funds affiliated with financial conglomerates will outperform non-affiliated funds, and that this is due to the leakage of inside information from the financial conglomerates to these funds.

4 Methodology

In section of the paper I describe the empirical analysis that is used to investigate insider trading and mutual fund performance in Norway.

4.1 Price Series

The majority of data gathered for this study is retrieved in monthly and price series format. Therefore it is necessary to convert this into a more appropriate form for the analysis that is performed. In order to analyse the data in any meaningful way it is necessary to convert the monthly price series into monthly returns. They are converted in the following manner:

$$R_{it} = ln\left(\frac{P_{it}}{P_{it-1}}\right) \tag{3}$$

where R_{it} is the return on asset i's in month t, P_{it} is the price of asset i in month t, and P_{it-1} is the price of asset i in month $t-1$, i = the relevant asset, t is the relevant month, and Ln is the natural logarithm. Log returns are chosen over arithmetic returns as over long time periods it has been shown that log returns approximate the normal distribution (Fergusson and Platen, 2006). That log returns are likely to follow a normal distribution helps satisfy some of the assumptions that are necessary in order to carry out regression analysis later.

4.2 Portfolio Definitions

Throughout this paper the majority of analysis concerns the performance of a variety of different portfolios. In this section of the methodology each of these portfolios is defined clearly, and it should be noted that these portfolios are used as the dependent variables in the models defined in sections 4.3 and 4.4.

4.2.1 Insider Portfolio

The insider portfolio plays an important role throughout the study, and is therefore specified using two separate methods. The first step is to define how weights are allocated to firms, and following Eckbo and Smith (1998) the value weights, w_{it}^{h}, and the ownership weights, w_{it}^{s}, are defined in the following manner:

$$w_{it}^{h} = h_{it} / \sum_{i=1}^{N_p} h_{it} \tag{4}$$

$$w_{it}^{s} = (s_{it}/S_{it}) \Big/ \sum_{i=1}^{N_p} (s_{it}/S_{it}) \tag{5}$$

where N_p is the total number of insider shares in the portfolio, h_{it} is the total market value of all insiders' holdings in firm i at the end of month t, S_{it} is the total number of shares outstanding in firm i at the end of month t, s_{it} is the number of shares held by insiders in firm i at the end of month t. These weights are constructed in such as manner so as to sum to one, and to assign any firm without insiders a value of zero.

These vectors of weights derived from equations 4 and 5 are assigned to the excess returns of each firm, for each month, to construct the excess return on the insider portfolio as:

$$r_{p,t+1} = \sum_{i=1}^{N_p} w_{it} r_{i,t+1} \tag{6}$$

where $r_{p,t+1}$ is insider portfolio p's return over month $t+1$ in excess of the risk free rate, and w_{it} is either the value or ownership weights; each will be used to create a separate time series of returns. Therefore equation 6 yields two different series of aggregate insider returns. These series of returns act as the dependent variable in all of the models considered.

4.2.2 Mutual Funds vs. Insider Portfolios

As a bridge between the two hypotheses of this paper a comparison of the performance of the insider portfolios against the set of mutual funds is carried out. An equal weighted portfolio of all mutual funds is compared to each of the two insider portfolios, and tested using the models outlined later in this section. In the results only the alphas will be reported since this is the only concern for this part of the study.

The return for the average mutual fund is given by:

$$r_{ALL,t} = \frac{\sum_{\gamma=1}^{G_t} W_{ALL,t} r_{\delta t}}{G_t} \tag{7}$$

where $r_{ALL,t}$ is the equal weighted portfolio of all fund returns at time t, $W_{ALL,t} = 1/G_t$ is the weight allocated to any fund at time t, $r_{\delta t}$ is the return of fund δ at time t, and G_t is the number of funds at time t.

The next step is to create a difference portfolio, and since it is assumed that the mutual funds outperform the insider portfolios, as in previous studies, then this is done in the following manner:

$$r_{DIFF,t} = r_{ALL,t} - r_{p,t} \tag{8}$$

where $r_{DIFF,t}$ is the return on the difference portfolio at time t, and $r_{p,t}$ is the return for either the value or ownership insider portfolio as defined previously. Therefore from equation 8 a long position is taken up in the average mutual fund portfolio and a short position in the insider portfolios. Consequently there are two versions of the difference portfolio, one that uses the value insider portfolio, and one that uses the ownership insider portfolio.

4.2.3 Fund Affiliation

The final portfolio that I define considers the interaction between insider trading and mutual fund performance. This paper draws on the study by Massa and Rehman

(2008) that finds evidence that information flows from financial conglomerates to mutual funds. Therefore, as noted earlier, I hypothesise that mutual funds that are affiliated with financial conglomerates will outperform non-affiliated funds due to a leakage of information from the financial conglomerate to the mutual fund. Following the methodology of Massa and Rehman an affiliated fund is defined as a mutual fund that is directly owned by a financial conglomerate that is a lending bank. In this case a lending bank refers to the fact that the financial conglomerate lends to businesses, and not just individuals.

Following the definition of an affiliated fund from above, I checked the ownership of each fund in the sample and allocate those that are owned by financial conglomerates that are lending banks to the affiliated fund group, and those that are not owned by these financial conglomerates to the non-affiliated fund group. Once funds have been defined as either affiliated or non-affiliated, portfolios of these two groups of funds are created. In this case equal weighted portfolios[3] are used, these are created in the following manner:

$$r_{A,t} = \frac{\sum_{\gamma=1}^{N_t} W_{A,t} r_{\gamma t}}{N_t} \tag{9}$$

$$r_{NA,t} = \frac{\sum_{\lambda=1}^{M_t} W_{NA,t} r_{\lambda t}}{M_t} \tag{10}$$

where $r_{A,t}$ is the equal weighted portfolio of affiliated fund returns at time t, $r_{NA,t}$ is the equal weighted portfolio of non-affiliated fund returns at time t, $W_{A,t} = 1/N_t$ is the weight allocated to affiliated funds at time t, $W_{NA,t} = 1/M_t$ is the weight allocated to non-affiliated funds at time t, $r_{\gamma t}$ is the return of fund γ at time t, $r_{\lambda t}$ is the return of fund λ at time t, γ is the set of affiliated funds, λ is the set of non-affiliated funds, N_t is the number of affiliated funds at time t, and M_t is the number of non-affiliated funds at time t. For these equal weighted portfolios the number of funds in the affiliated or non-affiliated is allowed to vary over time; this means that the set

[3] It should be noted that from Fama (1998) the use of equal-weighted portfolios could produce different results from the use of value-weighted portfolios.

of funds is not restricted by selection bias due to the introduction of new funds, or the closing down of older funds.

Since the hypothesis is that affiliated funds will outperform non-affiliated funds a convenient approach to assess this is to go long one portfolio and short the other. In this case this is done in the following manner:

$$r_{F,t} = r_{A,t} - r_{NA,t} \tag{11}$$

where $r_{F,t}$ is the return on what will be known as the fund portfolio at time t. Therefore from equation 11 a long position is taken up in the affiliated portfolio and a short position in the non-affiliated portfolio.

The keen investor might cite the finding of positive abnormal performance for the fund portfolio as a viable investment strategy. However this is not plausible in reality due to short-selling constraints in most markets, and even more so than that, the enormous fees associated with buying into so many mutual funds. Thus such a result could not be used to create investment strategies, only to observe the difference in how the groups of mutual funds perform.

A final extension to the analysis of the fund portfolio is to include the insider portfolios, defined earlier in equation 6, as additional independent variables. Thus either the ownership or value weighted insider portfolios are added into the models one at a time. If these variables are significant then this indicates that the difference in returns between affiliated and non-affiliated funds is driven, in some manner, by insider trades.

It is not simply a case of just throwing the insider portfolios into the regression model and assuming this is relevant to explaining the returns of the fund portfolio. First the argument must be made from an asset pricing perspective as to why the insider portfolios are a relevant risk factor.

From an intuitive perspective the inclusion of an insider trading portfolio to explain variations in asset prices makes sense: if it is assumed that insiders trade based upon private information then this should have the effect of moving an asset price closer to its intrinsic value. Lakonishok and Lee (2001) use a similar proxy for insider trades as an independent variable in order to test the predicative ability of insiders. Due to the likelihood that the insider portfolio affects asset prices, and the fact that similar methods have been used previously, it seems reasonable to use the insider portfolio as a risk factor in the analysis.

4.3 Unconditional Analysis

A number of different models are employed in this paper, the simplest of which are the unconditional models. Unconditional models have some of the most constraining assumptions, such as constant betas, but are nonetheless useful, and widely used, in many academic studies. Therefore the study follows the norm and begins with the most popular performance measure to date, the CAPM.

4.3.1 CAPM

The Capital Asset Pricing Model (CAPM), put forward by Sharpe, Lintner and Treynor[4], enables financial performance to be measured relative to some absolute standard. The CAPM is specified in the following manner:

$$R_{it} = \alpha_i + \beta_i\left(r_{mt} - r_{ft}\right) + \varepsilon_{it} \tag{12}$$

where R_{it} is the excess return of asset i at time t, β_i is the regression estimate of the risk premium for asset i, r_{mt} is the returns on the market (the Oslo Exhange All Share Index), r_{ft} is the risk free rate as described in the data section, ε_{it} is the error term for asset i at time t, and α_i is the alpha for asset i, the excess return of the fund not attributable to the risk premium; with i the relevant asset.

[4] Sharpe (1964), Lintner (1965), and Treynor (1961, 1962).

The α_i coefficient from equation 7 is the most important factor here. When this value is positive it indicates that the asset has outperformed the relevant index over the period concerned, and a negative alpha indicates underperformance relative to the market index. Another variable of interest in this equation that could prove notable is the β_i term. This measures how risky the asset is relative to the market index: the higher the beta the higher the level of risk. Therefore any differences in betas between the different insider portfolios could represent different insider trading strategies.

4.3.2 Fama and French (1993) Three Factor Model

The CAPM model, though seminal in finance theory, was found to have several distinguishing characteristics that suggest it may have been misspecified. Fama and French (1993) tackle this misspecification by creating a three factor model that extends the CAPM by including a size factor, *SMB,* and a book-to-market value factor, *HML*[5]. The Fama and French model is defined as:

$$R_{it} = \alpha_i + \beta_{1i}(r_{mt} - r_{ft}) + \beta_{2i}SMB + \beta_{3i}HML + \varepsilon_{it} \qquad (13)$$

with R_{it}, α_i, r_{mt}, r_{ft}, and ε_{it} the same as in the CAPM model and $\beta_{1i}, \beta_{2i}, \beta_{3i}$, the estimated coefficients for the risk premium, *SMB*, and *HML* respectively. The interpretation of the α_i is the same as in the CAPM case, and the interpretation of the betas is similar as well.

4.3.3 Carhart (1997) Model

Although the Fama and French three factor model improved upon the accuracy of the CAPM model it did not take into account the momentum effect found by Jegadeesh and Titman (1993). Carhart (1997) proposes extending the Fama and French (1993) three factor model by adding in an additional momentum, MOM, factor to account for the momentum effect. The new four factor model has the following form:

[5] For details on how these factors are create see Ødegaard (2011)

$$R_{it} = \alpha_i + \beta_{1i}(r_{mt} - r_{ft}) + \beta_{2i}SMB + \beta_{3i}HML + \beta_{4i}MOM + \varepsilon_{it} \qquad (14)$$

where all the factors are as in the Fama and French three factor model with the additional terms β_{4i} and MOM, representing the estimated coefficient for the momentum factor and the momentum factor respectively. Now when Carhart's four factor model is used to assess security performance any abnormal returns due to the size effect, book-to-market value effect and the momentum effect have been taken into account. Note that in the actual analysis instead of using both the Fama and French three factor model and Carhart's extension, only the Carhart model will be estimated.

4.4 Conditional Analysis

All of the models considered in the above section on unconditional analysis are subject to a number of biases due to the assumptions underlying the model. Of these the most important is that the unconditional models assume that the relationship between risk and excess returns is constant over time, constant betas. Evidently this is unlikely to be the case and was recognised as early as Jensen (1972). However, Jensen took the view that any variation from this is due to market timing ability or superior information in the context of fund performance. Ferson and Schadt (1996) argue to the contrary and state that abnormal performance as a result of publicly available information should not account for superior ability on the part of a fund manager.

Jagannathan and Wang (1996) give an intuitive reasoning as to why betas should vary over time. The relative risk of any one firm's cash flow is likely to fluctuate with the state of the economy; a prime example of this would be firms increasing their leverage during periods of recession, and thus causing their market betas to rise correspondingly. Therefore, the beta of any firm is likely to depend on the publicly available information at that point in time, and consequently will vary throughout the business cycle. In order to account for this Jagannathan and Wang utilise a

conditional model that incorporates information variables that are thought to affect the state of the economy[6] and thus allow betas to vary over time.

The conditional CAPM is the simplest version of the conditional model although it can be extended easily to the Fama French and Carhart models as well[7]. For simplicity a general conditional model is specified, which can easily be applied to create the conditional CAPM, Fama French or Carhart models. This general model is specified following the methodology of Cochrane (2005) and using scaled information variables:

$$R_{it} = \alpha_i + \boldsymbol{X}_t + \varepsilon_{it} \tag{15}$$

where $\boldsymbol{X}_t = \boldsymbol{b}'(\boldsymbol{f}_t \otimes \boldsymbol{z}_t)$, $\boldsymbol{b}'$ is the set of relevant betas, $\boldsymbol{f}_t{}' = (f_{1t}, f_{2t}, \dots f_{Nt})$ is the set of N risk factors[8], and $\boldsymbol{z}_t{}' = (1, z_{1t}, z_{2t}, \dots z_{Mt})$ is the set of M information variables. Clearly depending on the model the number of risk factors will vary: one in the CAPM, and three in the Fama French model for example. In contrast the number of information variables will be fixed at $M = 3$ for all the models used, and the variables themselves will be the same as those used in Eckbo and Smith (1998). More detail on the information variables is given in the Data section of this paper. Another important point to stress here is that in some cases the interactions terms between the information variables and risk factors other than the market premium may be excluded in the same manner as in Cochrane (1996). This general conditional model is applied using each of the unconditional models already considered, and used to assess the performance for the insider portfolios, the difference portfolio and the mutual fund portfolio.

4.5 Estimation

I use two separate methods to estimate the models outlined above: Ordinary Least Squares, OLS, and Generalised Method of Moments, GMM. The two different

[6] These variables can include, but are not limited to, the risk free rate, dividend yield, the term spread and the default spread.
[7] One problem of conditional models is that the number of coefficients to be estimated increases rapidly with each additional risk factor.
[8] For example in the CAPM model the relevant risk factor would only be $R_m - R_f$

methods are used to test the robustness of the results; the methods rely on different assumptions and thus comparing both of them allows us to see how the results vary when the assumptions are altered. OLS is standard in almost every application of empirical finance studies and so will not be explained in any detail. A basic explanation of GMM will be covered, since this is a slightly more unusual estimation method.

GMM offers an alternative to OLS by relaxing many of the assumptions of that method, and instead requiring that a set of moment conditions are specified for each model. These conditions vary from model to model, but they must be a function of the model parameters, and ensure that their expectations are zero at the true value. For a more in depth discussion of GMM see Hall (2005). If I find that the results for both the OLS and GMM estimation of a model are relatively similar, then this suggests that the estimates are not affected by the assumptions needed.

5 Data

Here I give a brief overview of the data needed in order to complete the empirical analysis outlined in section 4.

5.1 Insider Trades and Holdings

The empirical analysis in this paper focuses first and foremost on all individuals, related to companies that are publicly listed on the Oslo Børs, that are defined to be 'insiders' under the new Securities Trading Act that was brought into force as of November 2007. The definition of an insider in this study is crucial and follows the wording of the act in that an insider is, " any member of the board, senior employee, member of the control committee or auditor, or any close family members of these individuals." These individuals must disclose to the market[9] when they trade shares in the firms to which they are defined to be insiders. In addition to a notification that a trade has been made, insiders must divulge information regarding the number of shares and the price at which they were purchased or sold. Prior to the introduction of this new act, insiders were defined in the same manner, but the main difference that the new act brought was increased supervision of market manipulation and stricter penalties to those convicted.

In order to replicate the study of Eckbo and Smith (1998) I had to acquire data on all insider trades from January 2008 until December 2012. Since no database exists of this information I had to create a database of insider trades from scratch using the notifications of trades that insiders are required to make as a result of the Securities Trading Act. For each company listed on the Oslo Børs the number of insiders, and each individual's holding in the company, as of the end of December 2012 is noted. Starting at this point I recursively construct a monthly time series of changes in individual insider holdings for each company from the changes in insider holdings observed from the mandatory notification of trades; each buy was subtracted from the previous periods holdings, and each sell was added to the previous periods holdings, and the total number of shares outstanding was adjusted for any stock dividends or

[9] These disclosures are listed at www.newsweb.no.

new issuances. If an insider sold all their stock in December 2012 this was accounted for since trades were considered in this month as well.

Following the methodology of Eckbo and Smith (1998) I had to consider certain assumptions upon creating the insider holdings portfolio. Firstly, if a firm is delisted from the Oslo Børs then all insider holdings in the firm are set to zero in the same month that the delisting takes place. Secondly, when a shareholder in the firm becomes an insider (or ceases to be an insider) this is not treated as a buy (or sell). Thirdly, it is assumed that all changes in insider holdings, due to either buys or sells, are disclosed publicly to the market and thus can be accounted for in this portfolio of trades. Unlike Eckbo and Smith (1998) it is not necessary to assume that insiders purchase their pro rata share of new equity issues; this is due to the fact that this information is disclosed to the market for the relevant firms; this was not the case previously. The main difference in the collection of data in relation to Eckbo and Smith (1998) is that their data was reported on a quarterly basis, whereas in this study it is reported in real time.

5.2 Mutual Funds

For the analysis of mutual funds data on prices for these funds is recovered from Datastream. In total 189 Norwegian mutual funds are included in the sample. These funds accounted for a wide variety of different investment strategies, and geographical concentrations, but this is assumed to be appropriate considering the goal of this study in relation to fund performance. Thus as many funds as possible are included in the dataset. In the analysis an equal weighted portfolio is utilised so there is no need for further information with respect to mutual funds. There are 70 funds in the affiliated group, and 119 funds in the non-affiliated group after allocation.

5.3 Information and Risk Variables

As note already unconditional and conditional models are used in order to assess the effect that accounting for time varying betas has on performance. The unconditional models assume that risk preferences are constant, while the unconditional models

assume that risk preferences alter throughout time. Consequently they require a number of different information and risk variables.

The unconditional models are based around the methodology of Fama and French (1993) and Carhart (1997), and thus require the correct variables as identified in previous academic research. As a starting point a risk free rate and market index are required for all models. The risk free rate is defined as the monthly yield on the three-month NIBOR as is the norm for studies within Norway. The market index chosen for the models is the Oslo Exchange All Share index; this can be considered as appropriate as the study considers the whole set of publicly listed companies due to the manner in which the insider portfolio is created. The monthly prices for the risk free rate and the market index are obtained from the Datastream database.

When considering the Fama and French (1993) and Carhart (1997) models, slightly more complex risk factors are necessary. For the Fama and French model the Small Minus Big, SMB, and the High Minus Low, HML, factors are necessary, and for the Carhart model the Momentum, MOM, factor is required. The monthly data for these factors is obtained from the database set up by Bernt Arne Ødegaard at the University of Stavanger, who aims to replicate the database of Kenneth French in the USA. Due to restrictions on the availability of data, the Fama and French and Carhart factors are only available for the period January 2008 until July 2012, and thus the period of the study is adjusted to reflect this restriction.

In order to ensure that the results from the conditional models are comparable to those of previous studies the same set of information variables is used as in Eckbo and Smith (1998). The information variables consist of the lagged market index; the lagged dividend yield minus the three-month NIBOR rate; and the three-month NIBOR rate minus the monthly change in Norwegian CPI lagged one period (the term spread). In these cases the market index is as specified previously, and the dividend yield is of the Oslo Exchange All Share index and calculated as in Anderson et al (2011). Again all information is obtained from the Datastream database.

5.4 Data Biases

There are several issues related to the type of data that is used in the fund performance section of this study. One of the most apparent problems with data in early academic studies on fund performance is survivorship bias. Survivorship bias occurs when mutual funds that have either failed or have merged with another fund are not included in studies of fund performance. The consequence of this is that many studies tended to overstate fund performance, as they did not include the poorest performing funds and hence fund performance is actually lower than had been previously thought (Elton et al, 1996). The sample of mutual funds used in this study is survivorship bias free and this is especially important when a characteristic, such as the affiliation of a fund, is considered.

Another more recent problem with fund data is incubation bias. Incubation bias occurs when asset management companies trial a number of different funds using seed money raised internally, but only offer the best performing of these funds to the public. This can lead to an overestimation in the performance of a fund, as most measures would not take this bias into account. Evans (2010) postulates two methods that can mitigate the effects of this bias when measuring fund performance. However, this bias is generally not considered when evaluating fund performance and is suitable for a study in itself; therefore we shall assume that it is not a major factor in driving the returns of the funds in our sample.

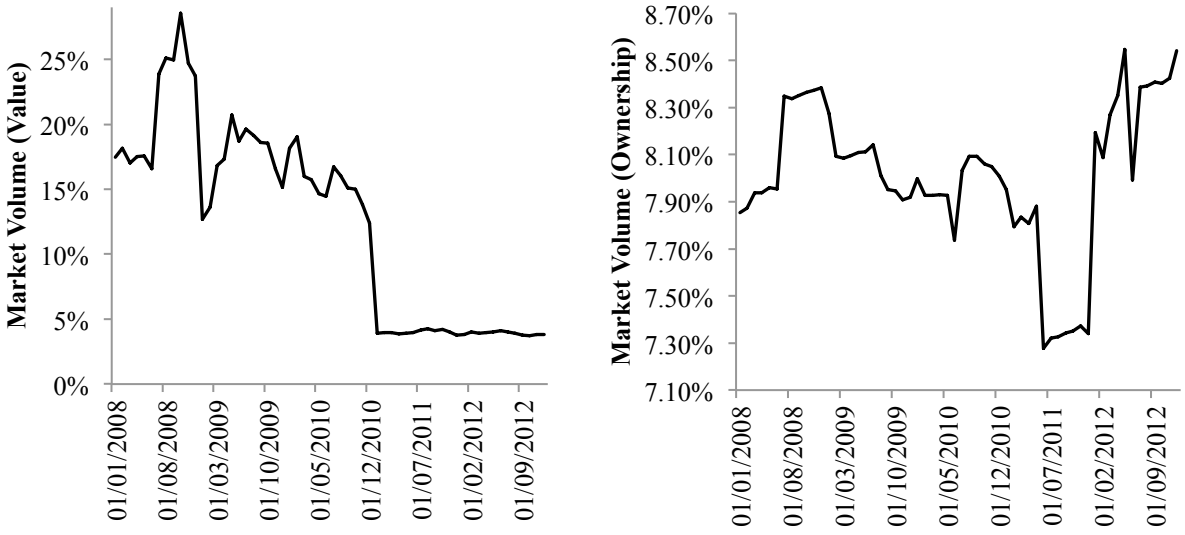
6 Results

The purpose of this section of the study is to outline the results of carrying out the analysis specified in the methodology section. For the analysis primarily concerning the insider portfolio results for both the value and ownership portfolios are presented side-by-side. In addition, in order to avoid being overly pedantic in the presentation of results, for those models with a high number of independent variables, notably the conditional Carhart models, some of the beta factors may be relegated to the appendix.

6.1 Insider Summary Statistics

First considering the data used to create the insider portfolios I observe some characteristics of the market and the insiders. The number of public companies included in the initial sample is 228; however only 139 of these have active insiders in their organisation. Thus only 61% of companies have active insiders, and notably from observation it seems that many firms in the financial sector are seldom active with regards to insider trades. The proportion of market volume that is traded by insiders can be viewed in Figure 1 below:

Figure 1: Percentage of Market Volume for Insiders



Note: This figure shows the percentage of market volume traded using two different definitions. The plot on the left hand side is the percentage market volume calculated as the total market value of insider shares divided by the total market value of all shares listed on the Oslo Exchange All Share index (value percentage). The plot on the right hand side is the percentage market volume calculated as the total number of insider shares divided by the total number of outstanding shares on the Oslo Exchange All Share index (ownership percentage).

From Figure 1 it can be seen that the market volume varies quite dramatically depending on whether the value percentage of ownership percentage is used. The ownership percentage (right hand plot) of insider shares is relatively constant except for a large drop in 2011, whereas the value percentage (left hand plot) drops dramatically from the start of the period before settling at around 4% from 2011 onwards. This drop in the value percentage comes near the end of the credit crisis and could be partially due to many insiders cashing out, or also the fact that many firms were forced to file for insolvency during this period. While it is not the aim of this study to deduce why insider holdings change over time, this does nonetheless indicate that insider's attitudes towards their holdings alter dependent on the market conditions. This helps motivate the use of conditional models that are used later, as it appears that insiders may have time varying attitudes towards risk.

6.2 The Performance of Insider Trades

The results for the performance of insider trades are divided into two separate sections in order to account for the different estimation methods used in the analysis.

6.2.1 The Performance of Insider Trades – OLS Estimates

I now analyse the performance of the insider trading portfolios using the risk adjusted performance models that were described in the methodology section. Specifically the analysis will begin with the results from the OLS estimates, with these being reported for both the value and ownership portfolios in each case. The main results are reported in Table 1, with the full results in Table 7 in the Appendix.

Table 1

Insider Portfolio Performance OLS Estimates: Average Monthly Abnormal Returns for Conditional and Unconditional Models for the Oslo Stock Exchange, January 2008 to July 2012

This table reports the OLS estimates of the unconditional and conditional CAPM and Carhart models for the period January 2008 until July 2012 for the two insider portfolios. Alpha is reported in percent per month. R_{mt}, SMB, HML and MOM are the market proxy excess return and factor mimicking portfolios for size, book-to-market value, and one-year momentum. R_{mt-1}, DY_{t-1} and TS_{t-1} are the lagged information variables for the market proxy, the dividend yield and the term spread. w^h and w^s represent that the asset is either the value portfolio or the ownership portfolio. The relevant coefficients for each model are reported with t statistics in parenthesis below the estimates. With full results for the conditional Carhart model reported in Appendix Table 8. '***', '**' and '*' represent 1%, 5% and 10% regression coefficient significance, respectively.

	CAPM		Carhart		Cond. CAPM		Cond. Carhart	
	w^h	w^s	w^h	w^s	w^h	w^s	w^h	w^s
α	-0.04**	-0.03**	-0.04**	-0.03**	-0.04**	-0.02*	-0.01	-0.02
	(-2.47)	(-2.10)	(-2.42)	(-2.18)	(-2.44)	(-1.86)	(-0.78)	(-1.18)
$\beta_1 R_{mt}$	0.29	0.31*	0.48	0.66**	-0.64	0.01	-1.36	-1.07
	(1.34)	(1.78)	(1.56)	(2.67)	(-0.84)	(0.02)	(-1.30)	(-1.24)
$\beta_2 SMB$			0.79*	0.90**			0.06	-1.24
			(1.84)	(2.61)			(0.04)	(-0.95)
$\beta_3 HML$			0.25	0.09			0.45	0.03
			(0.7)	(0.34)			(0.44)	(0.03)
$\beta_4 MOM$			-0.79**	-0.35			-1.56	0.57
			(-2.04)	(-1.12)			(-1.23)	(0.55)
$\beta_5(R_{mt}R_{mt-1})$					-1.35	-2.39	-8.63	-0.23
					(-0.53)	(-1.17)	(-1.31)	(-0.04)
$\beta_6(R_{mt}DY_{t-1})$					30.35	7.3	64.91*	57.86*
					(1.27)	(0.38)	(1.7)	(1.85)
$\beta_7(R_{mt}TS_{t-1})$					-24.46	-15.96	43.84	30.22
					(-0.51)	(-0.42)	(0.65)	(0.54)

The results reported in Table 1 give the first insight into how the insider portfolio performs. First it makes sense to consider the results derived from the unconditional models. For both the unconditional models and both the insider portfolios there are negative and significant alphas of between -0.04 and -0.03 per month. This is perhaps a surprising result given the view that insiders are privy to a wider information set than uninformed investors. Nonetheless the result is significant at the 5% level and

across the different unconditional models so this could be an interesting area to investigate further.

When the beta loadings for the unconditional models are examined it is clear that these seem to vary across both models and insider portfolios. For the CAPM the market proxy is only significant for the ownership portfolio with a beta of 0.31, even if this is only at the 10% significance level. Thus for the insider portfolio represented by ownership proportions the market index is a driver of returns, and thus investment decisions for insiders.

For the Carhart model the beta loadings for the two insider portfolios seem to differ notably from each other. The value portfolio reports significant betas for the size and momentum factors, whereas the size coefficient is 0.79 and the momentum coefficient is -0.79. From this it is possible to state that for the value insider portfolio, insiders attempt to take advantage of the size effect, while at the same time trading in an opposite direction to a momentum strategy. This result related to the momentum strategy is perhaps a bit surprising but could be due to insider information, which indicates that this is the preferred investment. Clearly, though, with the negative alpha this strategy is not paying off.

In contrast to the value portfolio the ownership portfolio reports significant betas for the market and size factors, which are 0.66 and 0.90 respectively. The interpretation of the significant betas for the market and size factors is as above for the value portfolio, and the results related to the CAPM as well.

Clearly these differences in the estimated parameters of the models between the value and ownership portfolios need to be investigated in more detail. Nevertheless the results still indicate that the insider portfolios exhibit non-zero and significant negative performance for all unconditional models.

Now the results for the conditional models will be covered. For the conditional CAPM the results are very similar to those of the unconditional models with non-zero and negative significant alphas of -0.04 and -0.025 for the value and ownership portfolios respectively. None of the beta loadings for the conditional CAPM for either

of the insider portfolios are found to be non-zero. Thus it seems that the conditional CAPM does not offer any extra explanatory power over the unconditional models, and possibly even worse performance.

In contrast to the conditional CAPM the conditional Carhart model produces notable differences in results relative to the other models already observed. For both insider portfolios the alphas are not significantly different from zero. Therefore the negative insider portfolio performance has disappeared once all publicly available information has been accounted for in the model. Furthermore from Table 1 above and Table 7 in the Appendix there are a number of significant betas for both insider portfolios. Both portfolios have significant betas for the interaction between the market proxy and the lagged dividend yield at the 10% significance level (64.91 for the value portfolio, and 57.86 for the ownership portfolio), and the interaction between the book-to-market value factor and the lagged market proxy (-22 for the value portfolio at 1%[10], and -11.2 for the ownership portfolio at 5%). Additionally the ownership insider portfolio has a significant beta for the interaction between the size factor and the lagged dividend yield of 82.92 at the 5% significance level.

The interpretation of the findings for the beta loadings is quite important in understanding the returns of the insider portfolios. On a general level it can simply be stated that conditioning information, that is all publicly available information, is clearly important to insiders as to whether or not they decide to trade or not, and to the returns associated with such trades. The improvement of performance seen with the conditional Carhart model suggests that informed investors are able to accurately utilise publicly available information for investment purposes. A more in depth discussion on the trading strategies of insiders and what can be learned from the finding that certain betas are significant in insider returns shall be discussed in more detail in the final section of this paper.

[10] "At X%" simply means that the coefficient is significant at the X% level.

6.2.2 The Performance of Insider Trades – GMM Estimates

In order to test the robustness of the results derived above I shall use an alternative method to estimate the parameters in the relevant conditional and unconditional models. Here the same models will be reported, and thus only results that differ from those in Table 1 and Table 7 in the Appendix are discussed in this section in order to avoid repetition. Table 2 below reports the results for the GMM estimates:

Table 2

Insider Portfolio Performance GMM Estimates: Average Monthly Abnormal Returns for Conditional and Unconditional Models for the Oslo Stock Exchange, January 2008 to July 2012

This table reports the GMM estimates of the unconditional and conditional CAPM and Carhart models for the period January 2008 until July 2012 for the two insider portfolios. Alpha is reported in percent per month. R_{mt}, SMB, HML and MOM are the market proxy excess return and factor mimicking portfolios for size, book-to-market value, and one-year momentum. R_{mt-1}, DY_{t-1} and TS_{t-1} are the lagged information variables for the market proxy, the dividend yield and the term spread. w^h and w^s represent that the asset is either the value portfolio or the ownership portfolio. The relevant coefficients for each model are reported with test statistics in parenthesis below the estimates. With full results for the conditional Carhart model reported in Appendix Table 9. '***', '**' and '*' represent 1%, 5% and 10% regression coefficient significance, respectively.

	CAPM		Carhart		Cond. CAPM		Cond. Carhart	
	w^h	w^s	w^h	w^s	w^h	w^s	w^h	w^s
α	-0.04**	-0.03**	-0.04**	-0.03**	-0.04***	-0.03*	-0.01	-0.02
	(-2.52)	(-2.12)	(-2.57)	(-2.33)	(-2.77)	(-1.94)	(-0.92)	(-1.26)
$\beta_1 R_{mt}$	0.29	0.31	0.48	0.66**	-0.64	0.011	-1.36	-1.07
	(1.10)	(1.42)	(1.46)	(2.37)	(-0.70)	(0.02)	(-1.30)	(-1.14)
$\beta_2 SMB$			0.80*	0.90***			0.06	-1.24
			(1.77)	(2.64)			(0.04)	(-1.13)
$\beta_3 HML$			0.25	0.09			0.44	0.026
			(0.87)	(0.38)			(0.72)	(0.04)
$\beta_4 MOM$			-0.04**	-0.35			-1.56**	0.57
			(-2.57)	(-1.38)			(-2.06)	(0.70)
$\beta_5(R_{mt}R_{mt-1})$					-1.35	-2.39	-8.63*	-0.23
					(-0.32)	(-0.87)	(-1.80)	(-0.04)
$\beta_6(R_{mt}DY_{t-1})$					30.35	7.3	64.91	57.86
					(0.98)	(0.39)	(1.10)	(1.60)
$\beta_7(R_{mt}TS_{t-1})$					-24.46	-15.96	43.84	30.22
					(-0.35)	(-0.29)	(0.62)	(0.72)

Using the GMM methodology as opposed to OLS estimation does not alter the results of the models in a significant manner. However, one notable difference between the two methodologies arises when the conditional Carhart model is examined. For this model there is a noticeable change is the beta loadings, especially for the value insider portfolio. In the OLS estimation only the coefficients for the interaction between the market proxy and the lagged dividend yield, and the interaction between the book-to-

market value factor and the lagged market proxy were significant. From Table 2 and Table 8 in the Appendix in the GMM estimation the following coefficients are significant: the momentum factor (-1.56 at 5%), the interaction between the market proxy and the lagged market proxy (-8.63 at 10%), the interaction between the book-to-market value factor and the lagged market proxy (-22 at 1%), the interaction between the book-to-market value factor and lagged the term spread (-133.81 at 10%), and the interaction between the momentum factor and the lagged dividend yield (31.18 at 10%).

There is a similar though not quite so pronounced difference for the ownership portfolio where the interaction between the market proxy and the lagged dividend yield becomes non-significant under GMM, and is replaced by the now significant interaction between the book-to-market value factor and the lagged term spread (-149.37 at 5%). One explanation of this difference is the different treatment of errors in the two methods. Many of the coefficients that are now significant are only at the 10% level, and those that are now no longer significant are on the brim of being significant. Of those additional significant coefficients not on the borderline are the momentum factor for the value portfolio, and the interaction between the book-to-market value factor and the lagged term spread for the ownership portfolio. These coefficients should be interpreted in the same manner as in the OLS section, and the implications will be considered in more detail in the discussion section.

Despite the findings in relation to the beta loadings for the conditional Carhart model, it seems that overall the majority, and the most important, of the results are robust to the type of methodology used. However, as has been shown by the differences between the unconditional models and the conditional CAPM, and the conditional Carhart model the finding of non-zero significant performance for the insider portfolios is not robust to the type of model used.

6.3 Mutual Funds vs. Insider Portfolios

To hold parity with the study by Eckbo and Smith (1998) I compare the performance of mutual funds and the insider portfolios. The main difference between the two studies, though, is that this paper has a much larger set of mutual funds, 189 in total

compared to the 7 that Eckbo and Smith (1998) use in their paper. This is partially due to the increase in the number of available funds in the last decade and a half, and should give a much clearer comparison of performance. The results are reported in Table 3 below:

Table 3

Mutual Funds vs. Insider Portfolio Performance: OLS and GMM Estimates for all Models

This table reports the OLS (Panel A) and GMM (Panel B) estimates of the unconditional and conditional CAPM and Carhart models for the period January 2008 until July 2012 for the difference between the average mutual fund return and the insider portfolio return. Alpha is reported in percent per month. w^h and w^s represent that the asset is either the difference between the average mutual fund returns and value portfolio, or the ownership portfolio. The relevant coefficients for each model are reported with test statistics in parenthesis below the estimates. '***', '**' and '*' represent 1%, 5% and 10% regression coefficient significance, respectively.

Panel A: OLS		CAPM	Carhart	Cond. CAPM	Cond. Carhart
α	w^h	0.037**	0.035**	0.037**	0.010
		(2.44)	(2.36)	(2.38)	(0.62)
	w^s	0.024**	0.025**	0.021*	0.014
		(2.2)	(2.29)	(1.87)	(1.1)
Panel B: GMM		**CAPM**	**Carhart**	**Cond. CAPM**	**Cond. Carhart**
α	w^h	0.037**	0.035**	0.037***	0.010
		(2.49)	(2.5)	(2.66)	(0.76)
	w^s	0.024**	0.025**	0.021*	0.014
		(2.22)	(2.47)	(1.93)	(1.22)

From the table above it can seen that average mutual fund outperforms the insider portfolios with alphas of between 0.021 and 0.037, which are statistically and economically significant values. The only model this does not hold for is the conditional Carhart model, which reports no significant difference in performance. This suggests that either the returns to insider trades are lower or the same as mutual funds without inside information, and thus it does not form any advantage to these privileged investors, or that mutual funds are also privy to insider information and combine this with their superior investment ability to realise abnormal returns.

6.4 Fund Affiliation

Having found evidence of negative and zero abnormal performance for the insider portfolios, and that mutual funds significantly outperform the insider portfolios, the next part of the study will present the results for the performance of the fund portfolio as defined in equation 11[11]. Since this section of the paper was built upon the notion that insider trading may be prevalent through mutual funds, as opposed to explicitly, it is still possible that evidence of a positive performance effect of insider trading could be revealed. As such the models for the fund portfolio will be estimated normally, as in the case of the insider portfolio, and then twice more: once with the addition of the value insider portfolio as a dependent variable, and then with the addition of the ownership insider portfolio as a dependent variable. Again the results are split into OLS and GMM estimates.

6.4.1 Fund Affiliation – OLS Estimates

The OLS estimates for the unconditional models are presented in Table 4 below:

[11] As a quick reminder, the fund portfolio has a long position in the affiliated funds, and a short position in the non-affiliated funds.

Table 4

Affiliated Funds vs. Non-Affiliated Funds Performance: OLS Estimates of the Unconditional Models for the set of Norwegian Mutual Funds

This table reports the OLS estimates of the unconditional CAPM and Carhart models for the period January 2008 until July 2012 for the fund portfolio. Alpha is reported in percent per month. R_{mt}, SMB, HML and MOM are the market proxy excess return and factor mimicking portfolios for size, book-to-market value, and one-year momentum. w^h and w^s represent that either the value portfolio or the ownership portfolio is being used as an independent variable. The relevant coefficients for each model are reported with t statistics in parenthesis below the estimates. '***', '**' and '*' represent 1%, 5% and 10% regression coefficient significance, respectively.

	CAPM			Carhart		
	F_p	$F_p + w^h$	$F_p + w^s$	F_p	$F_p + w^h$	$F_p + w^s$
α	0.002**	0.001	0.001	0.002**	0.001*	0.001
	(2.6)	(1.63)	(1.59)	(2.59)	(1.77)	(1.55)
$\beta_1 w^h$		-0.021***			-0.017**	
		(-3.17)			(-2.41)	
$\beta_2 w^s$			-0.038***			-0.036***
			(-5.37)			(-4.67)
$\beta_3 R_{mt}$	-0.083***	-0.077***	-0.071***	-0.100***	-0.092***	-0.076***
	(-7.45)	(-7.37)	(-7.70)	(-6.38)	(-6.00)	(-5.45)
$\beta_4 SMB$				-0.046**	-0.033	-0.014
				(-2.10)	(-1.51)	(-0.71)
$\beta_5 HML$				-0.027	-0.220	-0.023
				(-1.46)	(-1.28)	(-1.52)
$\beta_6 MOM$				0.029	0.016	0.017
				(1.48)	(0.81)	(1.00)

The results from the table above present some interesting findings, notably with respect to the alphas and insider portfolio factors. As before each model will be considered in turn. The CAPM with no insider portfolio factor has an alpha of 0.002 that is significant at the 1% level. This result indicates that the difference in performance between affiliated funds and non-affiliated funds is in fact important, and that affiliated funds performance is significantly better than non-affiliated funds. Therefore the notion put forth in this paper that affiliated funds could outperform non-affiliated funds due to flows of information could well be a possibility. Of course

there could be other factors creating this performance difference but this issue is tackled shortly.

Considering the market proxy factor for the first CAPM model, there is a beta coefficient of -0.083 that is significant at the 1% level. This indicates that the difference in performance between affiliated funds and non-affiliated funds is significantly negatively affected by the market conditions. Essentially from this when the market is performing poorly it would be expected that affiliated funds would outperform non-affiliated funds, and the opposite relation when the market is performing well. However, this relation could have been significantly effected by the time period of the study, a period in which the market performed poorly in general. Nonetheless this relation with the market will be monitored through the other models as well.

In light of the evidence of a difference in performance between affiliated and non-affiliated funds, two further CAPM models were specified which included either the value or ownership insider portfolio as a risk factor. In both cases it was found that the alphas were now not significantly different from zero, and that the betas for the insider portfolios were significant at the 1% level with coefficients of -0.021 and -0.038 for the value and ownership portfolios respectively. The main result here is that when the portfolio of insider trades is included as a risk factor the abnormal performance of the fund portfolio disappears. This could be taken to indicate that the insider trading portfolios are responsible for the difference in performance in the type of funds.

The unconditional Carhart models show relatively similar results to that of the CAPM, despite the addition of the extra risk factors. In the case of the regular Carhart model there is a positive alpha of 0.002 that is significant at the 5% level, and significant coefficients on the market proxy (-0.1 at 1%) and the size factor (-0.046 at 5%). The alpha and beta on the market are interpreted in exactly the same manner as in the CAPM case. The size factor indicates that the difference in performance between affiliated funds and non-affiliated funds is significantly related to the returns on small capitalisation firms relative to large capitalization firms. Due to the method that is used to create the size factor this could indicate that affiliated funds prefer to

invest in large capitalization firms, while non-affiliated firms prefer to invest in small capitalization firms.

When the insider portfolios are included as risk factors in the Carhart model similar results are found as in the CAPM case. When the ownership portfolio is included there is no significant alpha, and for the value portfolio the alpha is only significant at the 10% level, where it is only just significant. Thus, again it seems that the insider portfolios have taken account of all the abnormal performance in the case of the ownership portfolio, and the vast majority of abnormal performance when the value portfolio is used.

Again the insider portfolios are both significant factors with coefficients of -0.017 at 5%, and -0.036 at 1% for the value and ownership portfolios respectively. In addition to this the market proxy is significant at the 1% level for both portfolios. Interestingly, the size factor is no longer significant once the insider portfolios are included as risk factors. It could be the case that the insider portfolios account for the movements in the size factor and thus it is no longer necessary to explain returns.

The unconditional models have indicated that the insider portfolios seem to account for the abnormal performance of the fund portfolio, and thus the difference in performance between affiliated funds and non-affiliated funds. It will be intriguing to see whether this result is robust to the inclusion of conditioning information in the models. The results for the conditional models are reported in Table 5 below, and Table 10 in the Appendix.

Table 5

Affiliated Funds vs. Non-Affiliated Funds Performance: OLS Estimates of the Conditional Models for the set of Norwegian Mutual Funds

This table reports the OLS estimates of the conditional CAPM and Carhart models for the period January 2008 until July 2012 for the fund portfolio. Alpha is reported in percent per month. R_{mt}, SMB, HML and MOM are the market proxy excess return and factor mimicking portfolios for size, book-to-market value, and one-year momentum. R_{mt-1}, DY_{t-1} and TS_{t-1} are the lagged information variables for the market proxy, the dividend yield and the term spread. w^h and w^s represent that either the value portfolio or the ownership portfolio is being used as an independent variable. The relevant coefficients for each model are reported with t statistics in parenthesis below the estimates. With full results for the conditional Carhart model reported in Appendix Table 10. '***', '**' and '*' represent 1%, 5% and 10% regression coefficient significance, respectively.

	Cond. CAPM			Cond. Carhart		
	F_p	$F_p + w^h$	$F_p + w^s$	F_p	$F_p + w^h$	$F_p + w^s$
α	0.002**	0.001*	0.001*	0.002**	0.002*	0.001*
	(2.64)	(1.74)	(1.84)	(2.15)	(1.96)	(1.74)
$\beta_1 w^h$		-0.017***			-0.018**	
		(-2.77)			(-2.28)	
$\beta_2 w^s$			-0.034***			-0.036***
			(-4.89)			(-3.48)
$\beta_3 R_{mt}$	-0.034	-0.045	-0.034	0.450	0.021	0.013
	(-0.95)	(-1.34)	(-1.15)	(0.87)	(0.42)	(0.27)
$\beta_4 SMB$				0.115	0.116	0.077
				(1.46)	(1.56)	(1.11)
$\beta_5 HML$				-0.041	-0.033	-0.040
				(-0.82)	(-0.70)	(-0.92)
$\beta_6 MOM$				-0.040	-0.067	-0.022
				(-0.64)	(-1.12)	(-0.41)
$\beta_7 (R_{mt} R_{mt-1})$	0.174	0.151	0.093	0.057	-0.095	0.050
	(1.46)	(1.34)	(0.93)	(0.18)	(-0.30)	(0.18)
$\beta_8 (R_{mt} DY_{t-1})$	-1.500	-0.969	-1.251	-5.122**	-3.976**	-3.363*
	(-1.34)	(-0.91)	(-1.36)	(-2.73)	(-2.15)	(-1.96)
$\beta_9 (R_{mt} TS_{t-1})$	3.850*	3.423	3.308*	2.460	3.234	3.379
	(1.72)	(1.63)	(1.79)	(0.74)	(1.02)	(1.15)

As previously the results from the different models will be considered in turn. For the conditional CAPM there is an alpha of 0.002, which is significant at the 5% level. This is consistent with the results from the unconditional model. Surprisingly the market factor is now no longer significant, and this holds for all the conditional models. Therefore it seems that the conditioning scaled factors account for the variation that the market previously covered. On that note the only relevant factor for the conditional CAPM is the interaction between the market and the lagged term spread (3.85 at 10%). The interpretation of the betas on the conditioning factors is slightly more complicated than it was for the insider portfolio earlier. If a beta is significant then it affects the difference in performance between affiliated and non-affiliated funds, thus is could be argued that these two groups of funds utilise the conditioning information in a different manner to each other.

When the insider portfolios are included for the conditional CAPM the alphas are both 0.001 and only significant at the 10% level. Therefore, although there is still weak evidence of the superior performance of affiliated funds relative to non-affiliated funds, the insider portfolios do account for a large amount of the performance difference exhibited in the regular conditional CAPM. The coefficient for the value portfolio is -0.017 and for the ownership portfolio is -0.034, both significant at the 1% level. For the conditional CAPM with the value portfolio no other factors are found to be significant, whereas for the ownership portfolio the interaction between the market and the lagged term spread is found to be significant (3.308 at 10%).

For the normal conditional Carhart model there is an alpha of 0.002, which is significant at the 5% level. The following factors have significant betas: the interaction between the market and the lagged dividend yield (-5.122 at 5%), the interaction between the size factor and the lagged dividend yield (-6.266 at 5%), the interaction between the size factor and the lagged term spread (9.446 at 5%), the interaction between the momentum factor and the lagged market index (-0.576 at 10%), and the interaction between the momentum and the term spread (-13.147 at 5%). All of these betas are interpreted in the same manner as was stated for the conditional CAPM.

When the insider portfolios are included in the conditional Carhart model again similar results to before are presented. The alphas of 0.002 for the value portfolio and 0.001 for the ownership portfolio are now only significant at the 10% level. Thus the insider portfolio is still accounting for part of the abnormal returns, with coefficients of -0.018 at 5% for the value portfolio, and -0.036 at 1% for the ownership portfolio. The fact that the insider portfolios are still so relevant even when all the conditioning information is accounted for indicates that they really are meaningful in describing the difference in performance between affiliated and non-affiliated funds.

The majority of significant betas for the conditional Carhart model in the presence of the insider portfolios are the same, therefore only the differences will be reported. For the value portfolio all the same factors are significant, with the only difference that the interaction between the momentum factor and the lagged market proxy is significant at the 5% level instead of the 10% level. For the ownership portfolio the interaction between the momentum and the lagged market proxy is no longer significant, and all other betas are only significant at the 10% level.

Overall from the results of the OLS estimation of the models it seems that there is a significant difference in the performance of affiliated and non-affiliated funds. While for the unconditional models this abnormal performance completely disappears in most cases when the insider portfolios are accounted for, in the presence of conditioning information there is still some abnormal performance noted. Nonetheless, the finding of a difference in the first place, and the discovery that this is strongly affected by the insider portfolios creates many discussion points that will be addressed later.

6.4.2 Fund Affiliation – GMM Estimates

As with the tests of the insider portfolios the results for fund affiliation are assessed using the GMM methodology in order to investigate if the findings still hold. To start the GMM estimates of the unconditional models are reported in Table 6 below:

Table 6

Affiliated Funds vs. Non-Affiliated Funds Performance: GMM Estimates of the Unconditional Models for the set of Norwegian Mutual Funds

This table reports the GMM estimates of the unconditional CAPM and Carhart models for the period January 2008 until July 2012 for the fund portfolio. Alpha is reported in percent per month. R_{mt}, SMB, HML and MOM are the market proxy excess return and factor mimicking portfolios for size, book-to-market value, and one-year momentum. w^h and w^s represent that either the value portfolio or the ownership portfolio is being used as an independent variable. The relevant coefficients for each model are reported with test statistics in parenthesis below the estimates. '***', '**' and '*' represent 1%, 5% and 10% regression coefficient significance, respectively.

	CAPM			Carhart		
	F_p	$F_p + w^h$	$F_p + w^s$	F_p	$F_p + w^h$	$F_p + w^s$
α	0.002**	0.001	0.001	0.002**	0.001*	0.001*
	(2.5)	(1.69)	(1.63)	(2.57)	(1.87)	(1.70)
$\beta_1 w^h$		-0.021***			-0.017***	
		(-3.25)			(-2.95)	
$\beta_2 w^s$			-0.038***			-0.036***
			(-5.04)			(-4.52)
$\beta_3 R_{mt}$	-0.083***	-0.077***	-0.071***	-0.100***	-0.092***	-0.076***
	(-4.41)	(-4.87)	(-6.08)	(-4.35)	(-4.52)	(-5.26)
$\beta_4 SMB$				-0.046**	-0.033	-0.014
				(-2.14)	(-1.68)	(-0.81)
$\beta_5 HML$				-0.027*	-0.220	-0.023*
				(-1.72)	(-1.58)	(-1.76)
$\beta_6 MOM$				0.029	0.016	0.017
				(1.44)	(0.80)	(0.93)

The results for the unconditional models are predominantly the same as in the OLS case with only minor, and not so important, differences. For the CAPM model all results are the same with only small changes in the test statistics reported. In the case of the Carhart model, for the ownership portfolio case, the alpha is now significant at the 10% level. However, this does not have a great effect of the results since the Carhart model with the value portfolio already had a similar alpha. The only other difference is now that the book-to-market value factor is significant at the 10% level for the standard Carhart model, and the Carhart model with the ownership portfolio

factor. Once again this is probably due to the treatment of the error terms since the coefficients are just significant and does not have any major implications.

Now the results for the GMM estimation of the conditional models for fund affiliation are presented in Table 6 below, and Table 10 in the Appendix.

Table 7

Affiliated Funds vs. Non-Affiliated Funds Performance: GMM Estimates of the Conditional Models for the set of Norwegian Mutual Funds

This table reports the GMM estimates of the conditional CAPM and Carhart models for the period January 2008 until July 2012 for the fund portfolio. Alpha is reported in percent per month. R_{mt}, SMB, HML and MOM are the market proxy excess return and factor mimicking portfolios for size, book-to-market value, and one-year momentum. R_{mt-1}, DY_{t-1} and TS_{t-1} are the lagged information variables for the market proxy, the dividend yield and the term spread. w^h and w^s represent that either the value portfolio or the ownership portfolio is being used as an independent variable. The relevant coefficients for each model are reported with test statistics in parenthesis below the estimates. With full results for the conditional Carhart model reported in Appendix Table 11. '***', '**' and '*' represent 1%, 5% and 10% regression coefficient significance, respectively.

	Cond. CAPM			Cond. Carhart		
	F_p	$F_p + w^h$	$F_p + w^s$	F_p	$F_p + w^h$	$F_p + w^s$
α	0.002***	0.001*	0.001*	0.002**	0.002**	0.001*
	(2.80)	(1.82)	(1.94)	(2.12)	(2.09)	(1.91)
$\beta_1 w^h$		-0.017***			-0.018***	
		(-2.96)			(-2.80)	
$\beta_2 w^s$			-0.034***			-0.030***
			(-6.11)			(-5.08)
$\beta_3 R_{mt}$	-0.034	-0.045*	-0.034	0.450	0.021	0.013
	(-1.35)	(-1.72)	(-1.59)	(1.33)	(0.62)	(0.40)
$\beta_4 SMB$				0.115*	0.116*	0.077
				(1.70)	(1.82)	(1.18)
$\beta_5 HML$				-0.041	-0.033	-0.040
				(-0.97)	(-0.88)	(-1.17)
$\beta_6 MOM$				-0.04	-0.067	-0.022
				(-0.53)	(-0.94)	(-0.34)
$\beta_7 (R_{mt} R_{mt-1})$	0.174	0.151*	0.093	0.057	-0.095	0.050
	(1.60)	(1.71)	(1.37)	(0.23)	(-0.43)	(0.25)
$\beta_8 (R_{mt} DY_{t-1})$	-1.5*	-0.969	-1.251*	-5.122***	-3.976***	-3.363***
	(-1.68)	(-1.03)	(-1.80)	(-4.03)	(-3.11)	(-2.72)
$\beta_9 (R_{mt} TS_{t-1})$	3.85*	3.423*	3.308**	2.460	3.234	3.379
	(1.67)	(1.82)	(2.27)	(0.90)	(1.09)	(1.53)

With the respect to the main results from the conditional CAPM, that is the alphas and the beta loadings on the insider portfolios, there are no differences in the OLS and GMM results. However, there are a number of differences in relation to the beta loadings of the other factors in the models. Now for the conditional Carhart model with the value portfolio there are significant betas for the market proxy (-0.045 at 5%), the interaction between the market proxy and the lagged market proxy (0.151 at 10%), and the interaction between the market proxy and the lagged term spread (3.423 at 10%). In addition to this the regular conditional Carhart model, and that with the ownership portfolio now have significant betas for the interaction between the market proxy and the lagged dividend yield (-1.5 at 10% and -1.251 at 10% respectively).

The new significance of the betas in this case is not terribly alarming given the low level of significance of all but the market proxy for the value portfolio, and even for this it can be seen that it becomes insignificant for the conditional Carhart models.

Considering those Carhart models it is found that all the factors that were significant in the case of the OLS estimates are still significant for the GMM estimates. Furthermore it is also the case that there are further factors that appear to be relevant for the performance of the fund portfolio. For the regular conditional Carhart model the size factor now becomes significant at the 10% level with a coefficient of 0.115. For the conditional Carhart with the value portfolio the size factor also becomes significant at the 10% level with a coefficient of 0.116, and in addition the interaction between the momentum factor and the lagged dividend yield and the interaction between the book-to-market value factor and the lagged market proxy both become significant at the 10% level with coefficients of 2.708 and -0.448 respectively. Finally, for the conditional Carhart with the ownership portfolio the interaction between the book-to-market value factor and the lagged market proxy now becomes significant at the 5% level with a coefficient of -0.401.

6.6 Summary of Findings

The first main result that I find from this study is that the insider portfolio, for both types of portfolios, reports significant negative or zero alphas for all models and

estimation methods. I find that with the introduction of conditioning information the negative significant performance of the insider portfolios disappears, and that the portfolio itself is significantly affected by a number of the scaled factors used.

When I consider the analysis of fund affiliation the results indicate that there is evidence of a significant performance advantage for affiliated funds over non-affiliated funds. However, once the insider portfolios are factored in this superior performance almost entirely disappears, suggesting that the difference in performance between affiliated and non-affiliated funds is significantly related to the insider portfolios. In addition the conditioning information factors, and the market proxy in the unconditional models, have a strong affect on the difference in performance.

7 Discussion

7.1 The Performance of Insider Trades

The analysis into insider trading in Norway after the most recent alteration to legislation is consistent with the study by Eckbo and Smith (1998), that there is no evidence of superior insider performance relative to other investors. My results in this paper are in fact even stronger that those reported by Eckbo and Smith, with significant negative performance for the insider portfolios in almost all cases. However, the results are in contrast to Bris (2005) and Durnev and Nain (2007), which both find evidence of positive insider trading returns in Norway in their event studies.

Considering insider trading outwith Norway the result of negative or zero performance comes as a slight surprise, given the plethora of studies that have found that insiders obtain positive abnormal returns[12]. Therefore it is necessary to consider the methodologies utilised by these studies in light of these differences in results. Most of the literature on insider trading that comes to the conclusion of positive abnormal performance does so through the use of long-term event studies. Whereas in this paper the Eckbo and Smith (1998) portfolio weight measures have been used as an alternative. Fama (1988) critiques the long-term event study approach, stating that many anomalies discovered as a result of long-term event studies disappear when the method of estimating abnormal returns is adjusted. Consistent with this is the study by Lakonishok and Lee (2001) who find using short-term event study methodology that there is no evidence of economically significant market movements around insider trades.

In the light of this performance from insiders, it is natural to question why this occurs given the larger information set available to informed investors. I propose two separate explanations of this result: the first is that insiders do not utilise private

[12] Finnerty (1976), Seyhun (1986), and Seyhun (1998) are only a few examples of the positive performance of insider trades.

information due to regulation, and the second is that insiders' investment strategies lead to the poor performance.

7.1.1 Regulation

The first proposal as to why the aggregate insider portfolio performs poorly has sound intuitive reasoning: if the cost to an agent of being charged with insider trading outweighs the benefits of the insider trade, then insiders will not act on inside information. This reasoning would seem to hold when the notion of loss aversion is considered. Kahneman and Tversky (1979) found that many people prefer to avoid subjecting themselves to losses as opposed to acquiring gains. Clearly it may be the case that many insiders see the possibility of imprisonment, or large fines, as a strong enough deterrent to realising the abnormal returns associated with insider trading.

Guercio et al (2013) consider this very idea in their study of the Securities and Exchange Commission's (SEC) enforcement intensity on illegal insider trading. They find that as the SEC increases enforcement intensity that illegal insider trading activity declines, in line with the loss aversion idea above. As insiders are more likely to get caught, their propensity to trade illegally declines. Building on this Degryse et al (2014) study the Dutch market and find that the introduction of new legislation reduces the information content of insider trades. This seems to suggest that the insider trading is reduced in the presence of new regulation. As noted earlier in this paper the Norwegian market was subjected to new insider regulation, which was initiated just before the start of the period observed in the analysis.

A further issue related to regulation comes from Denis and Xu (2013) who find that stricter insider trading legislation is associated with higher salaries for employees. If salaries are increased concurrently with new insider trading legislation then this is equivalent to a reward for not utilising private information in the manner that it was before. Hence, it could be argued that the additional salary is given in order to account for the insider not being able to achieve abnormal returns through insider information. Another related paper by Jagolinzer et al (2011) finds that limiting the window that insiders can trade in, through corporate governance policies, leads to lower insider trading profits. Therefore if in Norway strong corporate governance policies with

regards to insider trading are enforced, then this could explain the lack of profits to insiders.

It seems that increased insider regulation would be able to explain why the insider portfolio would perform poorly, and as a matter of course new legislation was recently introduced in Norway. Despite this, though, Durnev and Nain (2007) state that Norway has some of the least strict legislation, with a score of 1 out of 5 for this factor. Thus it seems unlikely that increased regulation has led to the poor performance of insiders in Norway. Consequently the poor performance of insiders must be a result of the methodology used in this paper, poor investment decisions from insiders, or that inside information is used in another manner than to trade privately. One possible solution could be the relation with mutual funds, which will be discussed shortly.

7.1.2 Insider Trading Strategies

The second explanation of the poor performance of the insider portfolios was that they simply follow suboptimal investment strategies. It is possible to assess the investment strategies of the aggregate insider portfolio by observing the significant beta loadings from the models as shown in the results section.

A basic reason for insiders to trade their own stock is to take advantage of diversification and liquidity effects (Aktas et al, 2008). This means that these trades are not necessary based on inside information, and since this study only considers trades that insiders make in their own firm, then it is not surprising that returns would be negative or zero.

Moving past the above statement and assuming that insiders trade for reasons other than liquidity and diversification, the notion of a contrarian investment strategy becomes very important. Contrarian investment strategies often consist of investing in asset classes that have a record of high past returns, such as value or small capitalisation stocks. Lakonishok and Lee (2001) find strong evidence that insiders are contrarian investors especially with respect to value and momentum strategies. Similar results are reported in this study through the Carhart model, whereby insiders

are shown to follow contrarian investment strategies by utilising the size and momentum effects.

In contrast to the concept that insider returns are driven by contrarian investment strategies Jiang and Zaman (2010) find that insiders are instead able to predict returns from their ability to predict future cash-flow news. An analogous finding is exhibited in this study by the conditional Carhart model, whereby the contrarian strategies no longer appear to drive insider returns, and these are instead driven by the conditional variables. While this result is not as strong as that found in Jiang and Zaman, who suggest that investors utilise private information, it can at least be stated that insiders are using the full set of public information to make investment decisions. It should be repeated here that for the conditional model zero performance is reported for the insider portfolios.

Kallunki et al (2009) study Swedish insider trades and find evidence of behavioural biases among insiders. They state that insiders seem to be subject to the disposition effect and overconfidence, which are both notable explanations as to why returns to insiders may be lower than expected.

Given the finding that when insiders use all publicly available information to make investment decisions they obtain no abnormal returns, and that many insiders are subject to behavioural biases, it is likely that insiders do in fact utilise insider information. If it is assumed that behavioural biases significantly negatively affect the performance of insider trades, then if insiders were rational there would be significant positive returns to the insider portfolios. Thus the negative performance of the insider trading portfolios could be explained in this manner.

7.2 Mutual Fund Affiliation

In their study of insider trading in Norway Eckbo and Smith (1998) stated that because the insider portfolio did not outperform mutual funds, this supported the belief that there was no evidence of insider trading. While the result that mutual funds outperform the insider portfolio holds again, I posit another explanation: mutual funds

affiliated with financial conglomerates are also privy to insider information, and use this combined with their superior investment skill to obtain a significant advantage.

There has been relatively little research into this specific area, and thus the results for fund affiliation are to some extent unique, and especially so in the context of the Norwegian market. One study that tackles the same area directly by Hao and Yan (2012) finds that non-affiliated funds significantly outperform affiliated funds. This is in stark contrast to the results in this paper where the reverse relation is found to hold. Hao and Yan find that affiliated funds, instead of being able to utilise information to increase returns, are subject to other pressures such are assisting banks underwrite new IPOs by buying up shares. In Norway, the number of IPOs is substantially lower than the US, where the study was carried out, and therefore affiliated funds in Norway are not subjected to the same pressure to purchase new share issues. Thus it is not as surprising that Norwegian affiliated funds are able to outperform non-affiliated funds.

However, it could be the case that affiliated funds outperform non-affiliated funds due to superior manager skill, or other omitted variables. Thus the study then uses the insider portfolios as an independent variable to test whether this is actually responsible for the difference in fund affiliation performance. As noted in the results I find that the insider portfolios account for nearly all of the performance difference between affiliated and non-affiliated funds. This result is consistent with one of the only other studies in this area by Lee (2014), which finds that fund managers in affiliated funds of funds are able to obtain higher returns by utilising insider information.

Massa and Rehman (2008) find that funds affiliated with financial conglomerates outperform their non-affiliated counterparts, and offer an explanation as to why insider information could affect fund performance. They find that affiliated funds invest greater amounts in stocks that have lending agreements with the banks to which the funds are affiliated, and that these stocks outperform the other stocks that the funds invest in. Therefore the affiliated funds are utilising private information, to which the non-affiliated funds are not privy, in order to obtain higher returns. The result seems to align with the finding in this study that the insider portfolio represents the superior performance of affiliated funds. Though this study has not delved into the

details of how insider information is used by affiliated funds, it is natural to assume that the information would be used to help pick stocks to invest in.

The finding that the difference in performance between affiliated and non-affiliated funds was significantly affected by a number of the conditional factors is intriguing. This suggests that the two types of funds utilise public information differently in making investment decisions. One explanation of this difference is that investment banks often allocate "hot" IPOs to affiliated funds, in order to improve fund performance (Ritter and Zhang, 2007). Hence these funds will interpret public information in a different manner when deciding whether or not to subscribe to an IPO. In fact it isn't actually surprising that the different groups of funds interpret public information differently, in light of the fact that affiliated funds can also take into account private information, differences in strategies should be expected.

7.3 Limitations

It should be noted that there are limitations, and omissions, to the analysis carried out in this paper and that extensions to it may provide more insight.

A common approach to insider portfolio studies is to split the performance of insider trades into buys and sells, as in Eckbo and Smith (1998) and in many other papers. This has been omitted here since the study was interested in the overall performance of the insider portfolio, however, it would be interesting to investigate in more detail the performance of both the buys and sells, and how these affected the fund affiliation portfolio.

Investigating how the different insiders in a company trade could also provide some useful results. For instance Cheng and Lo (2006) find that CEOs have significantly more influence over asset prices than other insiders. As a further extension to this, it could be possible to investigate which insiders seem to influence the returns of affiliated mutual funds. Hillier et al (2014) find that insider trading returns are dominated by individuals as opposed to firm characteristics, and thus mimicking their methodology could prove effective in detecting these effects.

Considering the fund affiliation section of the paper, one glaring omission is the effect that expenses would have on fund performance. The reasoning that the study does not take expenses into account is that they would not alter the result of whether affiliated funds outperform non-affiliated funds, unless of course there is a significant difference in fund fees, which there is not. Therefore including fees in the study would simply lower the overall returns to the specific funds and nothing else.

It would also have been possible to go into more depth in the section on fund analysis, dividing mutual funds into different groups based upon investment strategy in a manner similar to Kosowski (2011). This would have allowed a deeper understanding of were the performance differences originate from in the study. Another extension to the fund analysis could possibly have been to assess the active management of funds using the Active Share of Cremers and Petajisto (2009). The Active Share can be used to assess how active a mutual fund's investment strategy is, and thus it would be interesting to test whether or not affiliated funds are more active than non-affiliated funds. That is does insider information induce mutual funds to trade more or less frequently.

Finally it seems intuitive to state that the findings in this paper should be tested over a wider sample size. Further to this it would be beneficial to test whether the results in this study hold outwith Norway, as observed previously many other insider trading studies have been carried out but very few using this methodology. Clearly the Norwegian market could be an anomaly, as it is a relatively small and concentrated market compared to many others across the globe. Nonetheless it is likely that this relation between insider trading and mutual funds has some substance in other markets.

7.4 Conclusion

This study into the performance of insider trades and mutual funds in the Norwegian market adds to the literature in two distinct ways. Firstly I consider the returns to insider trades in light of new legislation in Norway, and secondly I investigate the relationship between the insider trading portfolio and the returns to mutual funds. Studies in the US have previously considered the performance differences between

affiliated and non-affiliated mutual funds, but none have directly tested how insider trading affects performance.

From the empirical results in this paper I find that the insider trading portfolios report negative or zero alphas, and that this result is robust to the type of model used and the methodology to estimate the model. In addition to this it is observed that once conditional models are considered, insiders do not follow contrarian investment strategies and instead predict returns through the use of all publicly available information. It is likely that insider information is used in these portfolios, but that it does not result in superior performance due to behavioural biases, the aggregation of performance due to the use of portfolios, and other motivations to trade such as for diversification purposes.

The most important and unique finding that this paper offers is with regards to mutual funds. My results indicate that affiliated funds outperform their non-affiliated counterparts, and that the insider portfolios cause this difference in performance. A consequence of this result is that affiliated funds investment strategies differ from non-affiliated funds, due to the incorporation of private information into their decision making process.

In essence it seems that insiders do not obtain abnormal returns themselves, but that instead insider information is siphoned through firm affiliated mutual funds that allows the funds to achieve superior returns. This result poses the following questions for future studies: what effect does this flow of information have on other actors in the market? If this information transfer is illegal does current legislation cover this form of insider trading?

8 References

Acharya, V.V., and Johnson, T.C., 2010, More insiders, more insider trading: Evidence from private-equity buyouts, *Journal of Financial Economics,* Vol. 98, Pp. 500-523

Aktas, N., de Bodt, E., and Oppens, H.V., 2008, Legal insider trading and market efficiency, *Journal of Banking and Finance,* Vol. 32, No. 7, Pp. 1379-1392

Anderson, G., Fletcher, J., and Marshall, A., 2011, Performance evaluation of dynamic trading strategies in UK stock returns incorporating lagged conditioning Information, *The European Journal of Finance,* Vol. 17, No. 1, Pp. 67-82

Aragon, G., and Ferson, W.E., 2006, Portfolio performance evaluation, *Foundations and Trends in Finance,* Now Publishers Vol. 2, Pp. 83-190

Bainbridge, S.M., 2000, Insider Trading, *The Encyclopedia of Law and Economics,* 772, Edward Elgar Publishing

Berk, J.B., and Green, R.C., 2004, Mutual Fund Flows and Performance in Rational Markets, *Journal of Political Economy,* Vol. 112, No. 6, Pp. 1269-1295

Betzer, A., and Theissen, E., 2009, Insider Trading and Corporate Governance: The Case of Germany, *European Financial Management,* Vol. 15, No. 2, Pp. 402-429

Breusch, T.S., and Pagan, A.R., 1979, Simple test for heterscedasticity and random coefficient variation, *Econometrica,* Vol. 45, No. 5, Pp. 1297-1294

Bris, A., 2005, Do Insider Trading Laws Work? *European Financial Management,* Vol. 11, No. 3, Pp. 267-312

Carhart, M.M., 1997, On persistence in mutual fund performance, *Journal of Finance,* Vol. 52, No.1, Pp. 57-82

Chan, K.C., Gup, B.E., and Pan, M-S., 1997, International Stock Market Efficiency and Integration: A Study of Eighteen Nations, *Journal of Business Finance and Accounting,* Vol. 24, No. 6, Pp. 803-813

Cheng, Q., and Lo, K., 2006, Insider trading and voluntary disclosures, *Journal of Accounting Research,* Vo. 44, No. 5, Pp. 815-848

Cochrane , J.H., 1996, A cross-sectional test of an investment-based asset pricing model, *Journal of Political Economy,* Vol. 104, No. 3, Pp. 572-621

Cochrane, J.H., 2005, Asset Pricing: Revised Edition, Princeton, NJ: Princeton University Press

Cremers, M., and Petajisto, A., 2009, How active is your fund manager? A new measure that predicts performance, *Review of Financial Studies,* Vol. 22, No. 9, Pp. 3329-3365

Denis, D.J., and Xu, J., 2013, Insider trading restrictions and top executive compensation, *Journal of Accounting and Economics,* Vol. 56, No. 1, Pp. 91-112

Durnev, A.A., and Nain, A.S., 2007, Does insider trading regulation deter private information trading? International Evidence, *Pacific-Basin Finance Journal,* Vol. 15, Pp. 409-433

Eckbo, B.E., and Smith, D.C., 1989, The Conditional Performance of Insider Trades, *The Journal of Finance,* Vol. 53, No. 2, Pp. 467-498

Elton, E.J., Gruber, M.J., and Blake, C.R., 1996, Survivorship bias and mutual funds performance, *The Review of Financial Studies,* Vol. 9, No. 4, Pp. 1097-1120

Evans, R.B., 2010, Mutual fund incubation, *The Journal of Finance,* Vol. 65, No. 4, Pp. 1581-1611

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

Fama, E.F., 1998, Market efficiency, long-term returns, and behavioral finance, *Journal of Financial Economics,* Vol. 49, No. 3, Pp. 283-306

Fama, E.F., and French, K.R., 1993, Common risk factors in the returns on stocks and bonds, *Journal of Financial Economics,* Vol. 33, No.1, Pp. 3-56

Fergusson, K., and Planten, E., 2006, On the distributional characterization of daily log-returns of a world stock index, *Applied Mathematical Finance*, Vol. 13, No. 1, Pp. 19-38

Ferson, W.W., and Schadt, R.W., 1996, Measuring fund strategy and performance in changing economic conditions, *The Journal of Finance,* Vol. 51, No. 2, Pp. 425-461

Finnerty, J.E., 1976, Insiders and Market Efficiency, *The Journal of Finance,* Vol. 31, No. 4, Pp. 1141-1148

Guercio, D.D., Odders-White, E.R., and Ready, M.J., 2013, The deterrence effect of SEC enforcement intensity on illegal insider trading, *Working Paper*

Hall, A.R., 2005, Generalized method of moments (Advanced texts in econometrics), Oxford University Press

Hansen, L.P., and Jagannathan, R., 1994, Assessing specification errors in stochastic discount factor models, *Technical Working Paper No. 153,* NBER

Hansen, L.P., and Singleton, K.J., 1982, Generalized instrumental variables estimation of nonlinear rational expectations models, *Econometrica,* Vol. 50, No. 5, Pp. 1269-1286

Hanson, R., 2008, Insider Trading and Prediction Markets, *Journal of Law, Economics, and Policy,* Vol. 4 (2), Pp. 449-463

Hao, Q., and Yan, X., 2012, The performance of investment bank-affiliated mutual funds: conflicts of interest or informational advantage? *Journal of Financial and Quantitative Analysis,* Vol. 47, No. 3, Pp. 537-565

Hillier, D., Korczak, A., and Korczak, P., 2014, The impact of personal attributes on corporate insider trading, *Working Paper*

Hilzenrath, D.S., 2011, Raj Rajaratnam, hedge fund billionaire, gets 11-year sentence for insider trading, *Washington Post,* 13th October 2011. Available at: <http://www.washingtonpost.com/business/economy/hedge-fund-billionaire-gets-11-year-sentence-in-fraud-case/2011/10/13/gIQAa0PZhL_story.html> [Accessed 26th May 2014]

Inci, A.C., Lu, B., and Seyhun, H.N., 2010, Intraday Behavior of Stock Prices and Trades around Insider Trading, *Financial Management,* Vol. 39, No. 1, Pp. 323-363

Jagannathan, R., and Wang, Z., 1996, The conditional CAPM and the cross-section of expected returns, *The Journal of Finance,* Vol. 51, No. 1, Pp. 3-53

Jagolinzer, A.D., Larcker, D.F., and Taylor, J., 2011, Corporate governance and the information content of insider trades, *Journal of Accounting Research,* Vol. 49, No. 5, Pp. 1249-1274

Jaffe, J.F., 1974, Special Information and Insider Trading, *The Journal of Business,* Vol. 47, No. 3, Pp. 410-428

Jensen, M.C., 1968, The performance of mutual funds in the period 1945-1964, *Journal of Finance*, Vol. 23, No.1, Pp. 389-416

Jensen, M.C., 1972, Optimal utilization of market forecasts and the evaluation of investment performance, in G.P. Szego and K. Shell (eds.): Mathematical Methods in Investment and Finance, (North-Holland, Amsterdam)

Jiang, H., Verbeek, M., and Wang, Y., 2012, Information Content when Mutual Funds Deviate from Benchmarks, *Working Paper*

Jiang, X., and Zaman, M.A., 2010, Aggregate insider trading: contrarian beliefs or superior information? *Journal of Banking and Finance,* Vol. 34, No. 6, Pp. 1225-1236

Kahneman, D., and Tversky, A., 1979, Prospect Theory: An analysis of decision under risk, *Econometrica,* Vol. 47, No. 2, Pp. 263-291

Kallunki, J., Nilsson, H., and Hellstrom, J., 2009, Why do insiders trade? Evidence based on unique data on Swedish insiders, *Journal of Accounting and Economics,* Vol. 48, No. 1, Pp. 37-53

King, M., Roell, A., Kay, J., and Wyplosz, C., 1988, Insider Trading, *Economic Policy,* Vol. 3, No. 6, Pp. 163-193

Kosowski, R., 2011, Do mutual funds perform when it matters most to investors? U.S. mutual fund performance and risk in recessions and expansions, *Quarterly Journal of Finance,* Vol. 1, No. 3, Pp. 607-664

Lakonishok, J., and Lee, I., 2001, Are insider trades informative? *The Review of Financial Studies,* Vol. 14, No.1, Pp. 79-111

Lee, J.H., 2014, Information Flows in Mutual Fund Families, *Working Paper*

Leland, H.E., 1992, Insider Trading: Should it be Prohibited? *Journal of Political Economy,* Vol. 100, No. 4, Pp. 859-887

Massa, M., and Rehman, Z., 2008, Information flows within financial conglomerates: Evidence form the banks-mutual funds relation, *Journal of Financial Economics,* Vol. 89, No. 2, Pp. 288-306

Massoud, N., Nandy, D., Saunders, A., and Song, K., 2011, Do Hedge Funds Trade On Private Information? Evidence From Syndicated Lending and Short-Selling, *Journal of Financial Economics,* Vol. 99, No. 3, Pp. 477-499

Ritter, J.R., and Zhang, D., 2007, Affiliated mutual funds and the allocation of initial public offerings, *Journal of Financial Economics,* Vol. 86, No. 2, Pp. 337-368

Seyhun, N.H., 1986, Insiders' profits, costs of trading, and market efficiency, *Journal of Financial Economics,* Vol. 16, No. 2, Pp. 189-212

Seyhun, N.H., 1998, Investment Intelligence: From Insider Trading, *MIT Press,* Cambridge

Ødegaard, B.A., 2011, Empirics of the Oslo Stock Exchange. Basic, descriptive, results, *Working Paper,* University of Stavanger and Norges Bank

9 Appendix

Table 8

Insider Portfolio Performance OLS Estimates: Average Monthly Abnormal Returns for Conditional and Unconditional Models for the Oslo Stock Exchange, January 2008 to July 2012

This table reports the same results as Table 1 except that all the coefficients for the conditional Carhart model are included.

	CAPM		Carhart		Cond. CAPM		Cond. Carhart	
	w^h	w^s	w^h	w^s	w^h	w^s	w^h	w^s
α	-0.04**	-0.03**	-0.04**	-0.03**	-0.04**	-0.03*	-0.01	-0.02
	(-2.47)	(-2.10)	(-2.42)	(-2.18)	(-2.44)	(-1.86)	(-0.78)	(-1.18)
$\beta_1 R_{mt}$	0.29	0.31*	0.48	0.66**	-0.64	0.01	-1.36	-1.07
	(-1.34)	(-1.78)	(-1.56)	(-2.67)	(-0.84)	(-0.02)	(-1.30)	(-1.24)
$\beta_2 SMB$			0.79*	0.90**			0.06	-1.24
			(-1.84)	(-2.61)			(-0.04)	(-0.95)
$\beta_3 HML$			0.25	0.01			0.46	0.03
			(-0.7)	(-0.34)			(-0.44)	(-0.03)
$\beta_4 MOM$			-0.79**	-0.35			-1.56	0.57
			(-2.04)	(-1.12)			(-1.23)	(-0.55)
$\beta_5(R_{mt}R_{mt-1})$					-1.35	-2.39	-8.63	-0.23
					(-0.53)	(-1.17)	(-1.31)	(-0.04)
$\beta_6(R_{mt}DY_{t-1})$					30.35	7.31	64.91*	57.86*
					(-1.27)	(-0.38)	(-1.7)	(-1.85)
$\beta_7(R_{mt}TS_{t-1})$					-24.46	-15.96	43.84	30.22
					(-0.51)	(-0.42)	(-0.65)	(-0.54)
$\beta_8(SMBR_{mt-1})$							-5.27	3.08
							(-0.5)	(0.36)
$\beta_9(SMBDY_{t-1})$							38.62	82.92**
							(0.77)	(2.02)
$\beta_{10}(SMBTS_{t-1})$							-0.41	-50.88
							(-0.01)	(-0.65)
$\beta_{11}(HMLR_{mt-1})$							-22***	-11.2**
							(-3.80)	(-2.37)
$\beta_{12}(HMLDY_{t-1})$							16.83	19.93
							(0.59)	(0.85)

Table 8 Continued

	CAPM		Carhart		Cond. CAPM		Cond. Carhart	
	w^h	w^s	w^h	w^s	w^h	w^s	w^h	w^s
$\beta_{13}(HMLTS_{t-1})$							-133.81	-149.37
							(-1.14)	(-1.55)
$\beta_{14}(MOMR_{mt-1})$							-3.68	6.49
							(-0.56)	(1.2)
$\beta_{15}(MOMDY_{t-1})$							31.18	-26.75
							(0.91)	(-0.96)
$\beta_{16}(MOMTS_{t-1})$							-33.27	88.18
							(-0.27)	(0.86)

Table 9

Insider Portfolio Performance GMM Estimates: Average Monthly Abnormal Returns for Conditional and Unconditional Models for the Oslo Stock Exchange, January 2008 to July 2012

This table reports the same results as Table 2 except that all the coefficients for the conditional Carhart model are included.

	CAPM		Carhart		Cond. CAPM		Cond. Carhart	
	w^h	w^s	w^h	w^s	w^h	w^s	w^h	w^s
α	-0.04**	-0.03**	-0.04**	-0.03**	-0.04***	-0.03*	-0.01	-0.02
	(-2.52)	(-2.12)	(-2.57)	(-2.33)	(-2.77)	(-1.94)	(-0.92)	(-1.26)
$\beta_1 R_{mt}$	0.29	0.31	0.48	0.66**	-0.64	0.011	-1.36	-1.07
	(1.10)	(1.42)	(1.46)	(2.37)	(-0.70)	(0.02)	(-1.30)	(-1.14)
$\beta_2 SMB$			0.80*	0.90***			0.06	-1.24
			(1.77)	(2.64)			(0.04)	(-1.13)
$\beta_3 HML$			0.25	0.01			0.44	0.026
			(0.87)	(0.38)			(0.72)	(0.04)
$\beta_4 MOM$			-0.04**	-0.35			-1.56**	0.57
			(-2.57)	(-1.38)			(-2.06)	(0.70)
$\beta_5(R_{mt}R_{mt-1})$					-1.35	-2.39	-8.63*	-0.23
					(-0.32)	(-0.87)	(-1.80)	(-0.04)
$\beta_6(R_{mt}DY_{t-1})$					30.35	7.3	64.91	57.86
					(0.98)	(0.39)	(1.10)	(1.60)
$\beta_7(R_{mt}TS_{t-1})$					-24.46	-15.96	43.84	30.22
					(-0.35)	(-0.29)	(-0.62)	(-0.72)
$\beta_8(SMBR_{mt-1})$							-5.27	3.08
							(-0.81)	(0.34)
$\beta_9(SMBDY_{t-1})$							38.62	82.92**
							(0.75)	(2.30)
$\beta_{10}(SMBTS_{t-1})$							-0.41	-50.88
							(-0.01)	(-0.94)
$\beta_{11}(HMLR_{mt-1})$							-22***	-11.2***
							(-4.58)	(-2.76)
$\beta_{12}(HMLDY_{t-1})$							16.83	19.93
							(0.96)	(0.85)

Table 9 Continued

	CAPM		Carhart		Cond. CAPM		Cond. Carhart	
	w^h	w^s	w^h	w^s	w^h	w^s	w^h	w^s
$\beta_{13}(HMLTS_{t-1})$							-133.81*	-149.37**
							(-1.77)	(-2.16)
$\beta_{14}(MOMR_{mt-1})$							-3.68	6.49
							(-0.57)	(1.26)
$\beta_{15}(MOMDY_{t-1})$							31.18*	-26.75
							(1.72)	(-1.39)
$\beta_{16}(MOMTS_{t-1})$							-33.27	88.18
							(-0.35)	(1.45)

Table 10

Affiliated Funds vs. Non-Affiliated Funds Performance: OLS Estimates of the Conditional Models for the set of Norwegian Mutual Funds

This table reports the same results as Table 5 except that all the coefficients for the conditional Carhart model are included.

	Cond. CAPM			Cond. Carhart		
	F_p	$F_p + w^h$	$F_p + w^s$	F_p	$F_p + w^h$	$F_p + w^s$
α	0.002**	0.001*	0.001*	0.002**	0.002*	0.001*
	(2.64)	(1.74)	(1.84)	(2.15)	(1.96)	(1.74)
$\beta_1 w^h$		-0.017***			-0.018**	
		(-2.77)			(-2.28)	
$\beta_2 w^s$			-0.034***			-0.036***
			(-4.89)			(-3.48)
$\beta_3 R_{mt}$	-0.034	-0.045	-0.034	0.450	0.021	0.013
	(-0.95)	(-1.34)	(-1.15)	(0.87)	(0.42)	(0.27)
$\beta_4 SMB$				0.115	0.116	0.077
				(1.46)	(1.56)	(1.11)
$\beta_5 HML$				-0.041	-0.033	-0.040
				(-0.82)	(-0.70)	(-0.92)
$\beta_6 MOM$				-0.040	-0.067	-0.022
				(-0.64)	(-1.12)	(-0.41)
$\beta_7 (R_{mt} R_{mt-1})$	0.174	0.151	0.093	0.057	-0.095	0.050
	(1.46)	(1.34)	(0.93)	(0.18)	(-0.30)	(0.18)
$\beta_8 (R_{mt} DY_{t-1})$	-1.500	-0.969	-1.251	-5.122**	-3.976**	-3.363*
	(-1.34)	(-0.91)	(-1.36)	(-2.73)	(-2.15)	(-1.96)
$\beta_9 (R_{mt} TS_{t-1})$	3.85*	3.423	3.308*	2.460	3.234	3.379
	(1.72)	(1.63)	(1.79)	(0.74)	(1.02)	(1.15)
$\beta_{10} (SMBR_{mt-1})$				0.313	0.220	0.406
				(0.61)	(0.45)	(0.9)
$\beta_{11} (SMBDY_{t-1})$				-6.266**	-5.584**	-3.746*
				(-2.54)	(-2.38)	(-1.65)

Table 10 Continued

	Cond. CAPM			Cond. Carhart		
	F_p	$F_p + w^h$	$F_p + w^s$	F_p	$F_p + w^h$	$F_p + w^s$
$\beta_{12}(SMBTS_{t-1})$				9.446**	9.439**	7.900*
				(2.02)	(2.13)	(1.92)
$\beta_{13}(HMLR_{mt-1})$				-0.060	-0.448	-0.401
				(-0.21)	(-1.41)	(-1.50)
$\beta_{14}(HMLDY_{t-1})$				0.064	0.361	0.669
				(0.05)	(0.27)	(0.54)
$\beta_{15}(HMLTS_{t-1})$				5.416	3.054	0.876
				(0.94)	(0.55)	(0.17)
$\beta_{16}(MOMR_{mt-1})$				-0.576*	-0.641**	-0.379
				(-1.78)	(-2.09)	(-1.31)
$\beta_{17}(MOMDY_{t-1})$				2.158	2.708	1.345
				(1.29)	(1.69)	(0.91)
$\beta_{18}(MOMTS_{t-1})$				-13.147**	-13.734**	-10.467*
				(-2.14)	(-2.36)	(-1.93)

Table 11

Affiliated Funds vs. Non-Affiliated Funds Performance: GMM Estimates of the Conditional Models for the set of Norwegian Mutual Funds

This table reports the same results as Table 7 except that all the coefficients for the conditional Carhart model are included.

	Cond. CAPM			Cond. Carhart		
	F_p	$F_p + w^h$	$F_p + w^s$	F_p	$F_p + w^h$	$F_p + w^s$
α	0.002***	0.001*	0.001*	0.002**	0.002**	0.001*
	(2.80)	(1.82)	(1.94)	(2.12)	(2.09)	(1.91)
$\beta_1 w^h$		-0.017***			-0.018***	
		(-2.96)			(-2.80)	
$\beta_2 w^s$			-0.034***			-0.030***
			(-6.11)			(-5.08)
$\beta_3 R_{mt}$	-0.034	-0.045*	-0.034	0.450	0.021	0.013
	(-1.35)	(-1.72)	(-1.59)	(1.33)	(0.62)	(0.40)
$\beta_4 SMB$				0.115*	0.116*	0.077
				(1.70)	(1.82)	(1.18)
$\beta_5 HML$				-0.041	-0.033	-0.040
				(-0.97)	(-0.88)	(-1.17)
$\beta_6 MOM$				-0.040	-0.067	-0.022
				(-0.53)	(-0.94)	(-0.34)
$\beta_7 (R_{mt} R_{mt-1})$	0.174	0.151*	0.093	0.057	-0.095	0.05
	(1.60)	(1.71)	(1.37)	(0.23)	(-0.43)	(0.25)
$\beta_8 (R_{mt} DY_{t-1})$	-1.500*	-0.969	-1.251*	-5.122***	-3.976***	-3.363***
	(-1.68)	(-1.03)	(-1.80)	(-4.03)	(-3.11)	(-2.72)
$\beta_9 (R_{mt} TS_{t-1})$	3.850*	3.423*	3.308**	2.460	3.234	3.379
	(1.67)	(1.82)	(2.27)	(0.90)	(1.09)	(1.53)
$\beta_{10} (SMBR_{mt-1})$				0.313	0.220	0.406*
				(0.98)	(0.84)	(1.76)
$\beta_{11} (SMBDY_{t-1})$				-6.266***	-5.584***	-3.746*
				(-3.27)	(-3.05)	(-1.94)

Table 11 Continued

	Cond. CAPM			Cond. Carhart		
	F_p	$F_p + w^h$	$F_p + w^s$	F_p	$F_p + w^h$	$F_p + w^s$
$\beta_{12}(SMBTS_{t-1})$				9.446***	9.439***	7.900***
				(2.68)	(2.74)	(2.86)
$\beta_{13}(HMLR_{mt-1})$				-0.060	-0.448*	-0.401**
				(-0.31)	(-1.74)	(-2.22)
$\beta_{14}(HMLDY_{t-1})$				0.064	0.361	0.669
				(0.06)	(0.36)	(0.75)
$\beta_{15}(HMLTS_{t-1})$				5.416	3.054	0.876
				(1.52)	(0.87)	(0.27)
$\beta_{16}(MOMR_{mt-1})$				-0.576**	-0.641**	-0.379
				(-2.01)	(-2.43)	(-1.63)
$\beta_{17}(MOMDY_{t-1})$				2.158	2.708*	1.345
				(1.30)	(1.67)	(0.87)
$\beta_{18}(MOMTS_{t-1})$				-13.147**	-13.734**	-10.470**
				(-2.32)	(-2.53)	(-2.07)