RETURN PERFORMANCE OF INSIDER TRANSACTIONS: EVIDENCE FROM THE ISTANBUL STOCK EXCHANGE

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I certify that this thesis satisfies all the requirements as a thesis for the degree of Master of Business Administration.

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This is to certify that we have read this thesis and that in our opinion it is fully adequate, in scope and quality, as a thesis for the degree of Master of Business Administration.

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ABSTRACT

RETURN PERFORMANCE OF INSIDER TRANSACTIONS: EVIDENCE FROM ISTANBUL STOCK EXCHANGE

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The aim of this master's thesis is to estimate the return performance of insiders (persons or firms liable for announcing their transactions to the public in accordance with the Capital Markets Board decrees) from their transactions and assess whether outsiders can earn abnormal returns by following reported insider transactions. In the study, Rolling Portfolio Approach has been implemented.

As a result of the analysis made, when the purchases and sales of insiders are considered together, it has been observed that they, generally, cannot earn abnormal positive returns from their transactions or that they earn positive abnormal returns in the short periods that follow their transactions. When the returns of the portfolios consisting of stocks of which the insiders are the net purchasers or net sellers are taken into consideration, it has been perceived that the portfolios made up of stocks of which the insiders are net buyers cannot earn daily positive abnormal returns or that they earn daily positive abnormal returns in the short periods following their transactions. In the meantime, net sale portfolios earn statistically significant abnormal negative returns over longer holding periods.

On the other hand, it has been perceived that investors replicating insider transactions, in general, cannot earn abnormal returns by employing an investment strategy founded on following the purchases and sales of insiders together. Moreover, it has been observed that an investment strategy based on buying the stocks of which the insiders are the net purchasers does not bring abnormal positive returns or that it can bring abnormal positive returns in the brief periods after the transactions. In contrast, it has been observed that, generally, in the sample period analyzed in the study, by avoiding buying or selling stocks of which the insiders are the net sellers, outsiders can evade daily negative abnormal returns.

Findings of this thesis have important implications for the efficiency of the Istanbul Stock Exchange. Results indicate that the Istanbul Stock Exchange is not Semi Strong or Strong Form Efficient.

Keywords: Insider trading, the Istanbul Stock Exchange (ISE), market efficiency

ÖZ

İÇERDEN ÖĞRENENLERİN HİSSE SENEDİ İŞLEMLERİNİN GETİRİ PERFORMANSI: İSTANBUL MENKUL KIYMETLER BORSASI'NDAN BULGULAR

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Bu çalışmanın amacı, içeriden öğrenenlerin (Sermaye Piyasası Kurulu Tebliği'ne göre yapmış oldukları işlemleri kamuya açıklamakla yükümlü olan kişi ve kurumlar) İstanbul Menkul Kıymetler Borsası'nda yaptıkları işlemlerden elde ettikleri getiri performansını incelemektir. Ayrıca, içeriden öğrenenlerin işlemlerini takip ederek diğer yatırımcıların olağan dışı getiriler elde edip edemeyecekleri araştırılmıştır. Çalışmada "hareketli portföy, belirli bir dönem sonunda değiştirilen portföy" (rolling portfolio approach) yöntemi benimsenmiştir.

Yapılan analizler sonucunda, genel olarak, alım ve satım işlemleri birlikte göz önüne alındığında içeriden öğrenenlerin yaptıkları işlemlerden olağan dışı pozitif getiriler elde edemedikleri ya da işlemlerini takip eden kısa sürelerde olağan dışı pozitif getiriler elde ettikleri görülmüştür. İçeriden öğrenenlerin net alıcı veya net satıcı olduğu hisselerden oluşan portfoylerin getirileri incelendiğinde, içeriden öğrenenlerin net alıcı oldukları hisselerden oluşan portfoylerin günlük olağan dışı pozitif getiriler elde edemediği ya da işlemleri takip eden kısa süreçlerde günlük

olağan dışı pozitif getiriler elde ettiği bulunmuştur. Bunun yanı sıra, satım portföylerinin daha uzun zaman aralıklarında istatistiksel olarak anlamlı günlük olağandışı negatif getiriler elde ettiği görülmüştür.

İçeriden öğrenenlerin işlemlerini takip eden yatırımcıların ise, genel olarak, alım ve satımları bir arada takip eden bir yatırım stratejisi oluşturarak olağan dışı getiriler elde edemeyecekleri görülmüştür. Ayrıca, içeriden öğrenenlerin net alıcı olduğu hisseleri satın alarak uygulanacak bir yatırım stratejisinin olağan dışı pozitif getiriler elde edemediği yada yapılan işlemleri takip eden kısa sürelerde olağan dışı pozitif getiriler elde edeceği görülmüştür. Öte yandan yatırımcıların, genel olarak, çalışma kapsamında incelenen zaman aralıklarında içeriden öğrenenlerin net satıcı olduğu hisseleri almaktan kaçınarak ya da satarak günlük negatif anormal getiriler elde etmekten kaçınabilecekleri görülmüştür.

Çalışma sonuçları İstanbul Menkul Kıymetler Borsasının etkinliğine dair önemli bir takım çıkarımlara işaret etmektedir. Sonuçlar, İstanbul Borsa Kıymetler Borsası'nın yarı güçlü veya güçlü formda etkin olmadığına işaret etmektedir.

Anahtar Kelimeler: İçeriden öğrenenler ticareti, İstanbul Menkul Kıymetler Borsası (İMKB), market etkinliği

To Yasemin Tunçer,
who humoured me when no one could

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CHAPTER 1

INTRODUCTION

Insider's trading has been a subject attracting the attention of academia and public in the last 50 years. The main reason for this attention is the insiders' monopolistic access to material information, which is not yet shared with other market participants (non-public information) about their companies. Moreover, insiders are the most probable group to detect misvaluations in current prices of their company shares, since they hold extensive information (e.g. current inventory levels, dates of new product launches, current market share, etc.) related to the future prospects of their companies. Because of this information asymmetry between insiders and the general public, insiders are thought to be the most probable group to generate above average (abnormal) returns consistently.

Empirical research related to insider trading concentrates mainly on two areas. The first area analyzes insider trading surrounding public announcement of price-sensitive corporate news in order to test whether insiders exploit their access to material non-public information. Previous studies on this subject generally conclude that insiders take positions consistent with upcoming corporate events in the stock market and increase their trading around announcement of these events. The second area mainly examines abnormal returns to insiders surrounding their transactions and availability of abnormal returns to investors following regulatory filings of insider trades. Previous research generally finds that insiders, on average, earn above market returns over a period surrounding the date of their transaction. Furthermore, publication of these insider-trades predict future returns. On the other hand, it is still debatable whether outsiders can earn abnormal returns, net of transaction costs, following trades of insiders. For the Istanbul Stock Exchange

(ISE), to the best of my knowledge, Doğu (2007) is the only study that analyzes existence and persistence of abnormal returns following disclosure of insider transactions using an event study methodology.

The aim of this master's thesis is to estimate a proxy for returns earned by insiders from their transactions and assess whether profit opportunities exist for outsiders by following the reported insider transactions. The traditional event study methodology used in the literature generally equally weights estimated abnormal returns over a fixed period surrounding insider transactions in order to test whether excess returns, on average, exist. The major drawback of this methodology is the fact that it assesses the abnormal movement in stock prices around insider trades rather than the return performance of insiders from their transactions.

To the best of my knowledge, only two papers try to estimate the investment performance of insiders. The first paper is the one by Eckbo and Smith (1998). They estimate insiders' performance on the Oslo Stock Exchange by aggregating insider holdings into a value-weighted portfolio. This approach provides an estimate for average return performance of insiders from their holdings, but does not provide a measure for return performance of insiders from their transactions.

The second paper is the one by Jeng, Metrick and Zeckhauser (2003). They, on the other hand, estimate a proxy for average monthly abnormal returns to insiders from their transactions by employing performance evaluation methods to value-weighted portfolios of insider transactions. In this study, insider purchase and sale portfolios are formed daily in order to estimate average abnormal returns to insiders from their transactions. The holdings in these portfolios are weighted by the proportion of insider trades in the underlying securities. They identify the holding period of insiders as six months by the help of the short-swing rule, which obligates insiders to return any profit that they earn from their consecutive purchase and sale transactions in their company shares within six months to the company itself. The

major shortcoming of this methodology is the equal weighting of each day. Although insider portfolios are constructed in a value-weighted manner, if insider transactions are clustered in time, abnormal returns to insiders calculated using this methodology might be understated due to the equal weighting of each day. When it comes to applying this methodology to examine profitability of insider trades in Turkey, one would have the difficulty of identifying an appropriate holding period since there is not a regulation similar to the short-swing rule in Turkey. Therefore, an insider can offset his/her market position to exploit short-term profit opportunities at any time. As a result, offsetting positions taken within a six-month interval might overlap and introduce a bias to abnormal return estimates of buy and sell portfolios.

Due to lack of regulations restricting insiders to exploit short-term profit opportunities at any time, throughout this study it is assumed that an insider holds his/her initial trade position at most for a predefined holding period, and then reverse initial trading position at the end of this predefined holding period. If an insider reverses some portion of his/her transaction prior to the end of this predefined holding period, an insider is forced to reverse only the remaining amount of his initial position.

The methodology proposed in this thesis is to estimate return performance of insiders by the help of rolling net purchase and net sale portfolios constructed from the transactions of insiders using daily insider trading data. Each insider transaction is allocated into one of these portfolios at the closing price of the transaction date by taking into account the existing positions of insiders as a group in the underlying company shares up to that date. Then, value-weighted zero investment portfolios are constructed by combining the former two portfolios with the risk free asset proxied by the overnight repo rate. Risk adjusted return performance of the insiders from their transactions are estimated by regressing daily returns of the value-weighted zero investment portfolio to the CAPM or the Fama and French

risk factors. Furthermore, daily average abnormal returns to the net purchase and net sale portfolios are estimated by regressing daily excess returns of these portfolios to the CAPM or the Fama and French risk factors. Furthermore, return performance of sub portfolios are analyzed in order to test whether certain characteristics of the trades (i.e. relative trade volume, position of insider in the company) and the traded companies (i.e. size, book to market ratio) have any effect on abnormal returns. In order to assess whether profit opportunities exist for outsiders by following the reported transactions of insiders, outsider portfolios are constructed similarly to replicate insider transactions at the closing prices on the day following the announcement day of these trades in the ISE's website. All the analyses carried out for the insider portfolios are conducted for the outsider portfolios as well.

It has been observed that insiders, generally, cannot earn abnormal positive returns from their transactions or that they earn positive abnormal returns in the short periods that follow their transactions. When the insiders are the net purchasers, they cannot earn daily positive abnormal returns or that they earn daily abnormal positive returns in the short periods following the transactions. On the other hand, it has been perceived that insiders avoid statistically significant abnormal negative returns over longer periods, when they are net sellers.

Similarly, it has been perceived that investors replicating insider transactions, in general, cannot earn abnormal returns by employing an investment strategy following the purchases and sales together. Moreover, it has been observed that an investment strategy based on buying the stocks of which the insiders are the net purchasers does not bring abnormal positive returns or that it can bring abnormal positive returns in the brief periods after the transactions. In contrast, it has been observed that, generally, in the sample period analyzed in the study, by avoiding buying or selling stocks of which the insiders are the net sellers outsiders can evade negative abnormal returns.

Findings of this thesis have important implications for the efficiency of the Istanbul Stock Exchange. Results indicate that the Istanbul Stock Exchange is not Semi Strong or Strong Form Efficient.

In the next chapter, a review of the empirical studies analyzing abnormal returns to insiders and the informativeness of their transactions are presented. Chapter 3 describes data and explains the methodology that is used in order to assess abnormal returns to insiders and outsiders from their transactions. Empirical results of the thesis are presented in Chapter 4. Chapter 5 presents the conclusions drawn from the empirical analysis.

CHAPTER 2

LITERATURE REVIEW

Almost every study that analyzes returns to insiders or informativeness of their transactions is also a test of Efficient Market Hypothesis (EMH). Fama (1970) introduces Efficient Market Hypothesis (EMH) and divides the empirical tests of the hypothesis into three sub categories based on three different information subsets. The weak form EMH assumes that stock prices fully reflect all past returns and other available market information (i.e. trading volume data). The semi strong form EMH assumes that stock prices efficiently adjust to the release of all public information (market or nonmarket), and thus, current stock prices fully reflect all public information. The strong form EMH assumes that no investor or group has monopolistic access to information that affects stock prices; in other words, current stock prices fully reflect all information whether publicly announced or not. Most of the empirical studies analyzing returns to insider transactions (returns to outsiders following insider transactions) are taken as tests of the strong form (the semi strong form) Efficient Market Hypotheses.

Empirical studies on returns to insider trading can be divided into two categories. The first category mainly analyzes insider trading surrounding firm-specific events in order to test whether insiders exploit material non-public information to earn abnormal returns. Studies in the second category focus on profitability and the information content of insider trading by analyzing all transactions carried out by insiders following their trades and outsiders following the announcement of insider trading.

2.1. Insider Trading Around Firm Specific Events

Most of the studies analyzing all publicly available insider transaction publications, which are discussed in the next section, reach the conclusion that insiders can earn abnormal returns from their transactions (e.g., Jaffe (1974), Finnerty (1976a)). These abnormal returns might be due to exploitation of private information by insiders or due to trades of outsiders in the same direction with insiders after the announcement of insiders' trades. It is widely accepted by the general public that insiders have superior ability to detect misvaluations in their company's stock price. Therefore, outsiders closely monitor insiders' trading activity and see their transactions as an indicator of direction of change in the price of their companies' share in the future. As a result, uninformed investors try to trade in the same direction with insiders in the following periods. In order to determine the sources of abnormal returns to insiders' trades, several studies analyze the returns to insider trades and the trading patterns of insiders around firm specific price sensitive announcements. If insiders earn abnormal returns by altering their trading patterns surrounding firm-specific price sensitive news announcements, these returns can be attributed to the exploitation of inside information.

Penman (1982) analyzes insiders' trading activities around the voluntary announcements of the annual management earnings forecast from 1968 to 1973. He concludes that, on average, the observed direction of insider trading surrounding earnings forecast announcements supports the view of insiders taking market positions based on information contained in the forthcoming announcement.

Elliott, Morse and Richardson (1984) extend Penman's research by analyzing the association between various corporate announcements and insider trading from 1975 to 1979. The dataset of this study, which is mostly dominated by earnings announcements, also includes public release of information about earnings, dividends, bond ratings, mergers and bankruptcies. Their results show that although

the direction of insider trades is generally consistent with profitable trading strategy to exploit private information around corporate news announcements, distributional characteristics of insider trading surrounding news announcements is not statistically different from the insider trading at other times.

Givoly and Palmon (1985) try to determine whether abnormal returns earned by insiders are due to their trading activities around disclosure of price sensitive news or information conveyed to the market by insider trade itself. Their dataset contains insider-trading data and various firm-specific news (i.e. earnings announcements, dividends announcements, litigation etc.) collected from the Wall Street Journal. They investigate the association between insider trades and upcoming corporate news announcement for a sample of randomly selected 68 American Stock Exchange (AMEX) listed companies over the period from 1973 to 1975. They claim that their sample is most likely to reflect the effects of trading on information since the AMEX companies are relatively smaller than the New York Stock Exchange (NYSE) companies. Evidence from their study is unable to associate insider trading with the disclosure of corporate news. Furthermore, they show that insiders can earn significant abnormal returns from their transactions during periods where no specific news is disclosed. They accept these as supporting evidence for the superior performance of insiders mainly due to the tendency of investors to follow the trade of insiders rather than the exploitation of inside information.

Studies focusing on insiders' trading around bankruptcy (Seyhun and Bradley (1997)), dividend initiations (John and Lang (1991)), new equity issues (Karpoff and Lee (1991)), and stock repurchase announcements (Lee, Mikkelson and Partch (1992)) generally find increase in insider trading around these events as an evidence supporting exploitation of inside information. However, several studies show that the trading behavior of insiders surrounding takeover and earnings announcements are rather complex and cannot be easily interpreted as exploitation

of inside information. For example, Noe (1999) finds no significant association between insider trades and the management earnings forecast for 20 days prior to announcement. However, he reports an increase in insider purchases (sales) after earnings forecasts with negative (positive) stock price reactions. According to Seyhun (1992a), the decrease in insiders' trading activities prior to takeovers and earnings announcements is due to the case law, which defines trading prior to important corporate announcements as an illegal activity in the USA. He concludes that the involvement of courts decreases insiders' trading prior to corporate announcements covered by the case law.

2.2. Studies using Insider Trading Publications

Another line of literature examines returns to insiders over a fixed period by using event study methodology where publicly available insider trading activities themselves are the event. Since the data come from regulatory filings of insider trades, these studies also examine information content of the regulatory filings while testing whether outsiders can profit from acting on announcement of insider trades.

The United States of America is the country where insider trading is analyzed the most. The Security Exchange Act of 1934 prohibits the exploitation of inside information by corporate insiders. Earlier studies include Smith (1941), Rogoff (1964), Glass (1966) and Lorie and Niederhoffer (1968). According to Jaffe (1974) the use of a small sample or less efficient techniques, ignoring transaction costs or relative risks of different securities are the major shortcomings of these earlier studies. In order to solve existing problems in the previous papers, Jaffe (1974) analyzes insider trading for 200 large firms in the period from 1962 to 1968. In this study, insider abnormal returns are estimated using a variant of the Capital Asset Pricing Model (CAPM) developed by Sharpe (1964) and Lintner (1965). According to his study, insiders and outsiders following the trades of insiders can

earn abnormal returns from their transactions. However, when the round-trip transaction cost of 2% is introduced, only intensive insider trading samples with an 8-month holding period have statistically significant abnormal returns.

Finnerty (1976a) also uses the CAPM to evaluate the equally weighted returns to all insiders from their open market transactions between 1969 and 1972 for NYSE firms. His main concern regarding earlier work is the quality of the data since there was no accurate price and trading day information for insider trades reported to the Securities Exchange Commission (SEC) before 1965. Moreover, he states that selecting samples based on intensive trading criteria biases the analysis in favor of finding superior performance for insiders compared to average insider. Although this bias does not affect findings related to outsiders' profitability, he indicates that it invalidates their results as being a test of strong form efficiency. The results of his study confirm the findings of Jaffe (1974). Insiders can and do identify profitable and unprofitable situations and they are able to outperform the market.

Later, Baesel and Stein (1979) confirm the results found by Jaffe (1974) and Finnerty (1976a) by using data from the Toronto Stock Exchange (TSE). They analyze the insider-trading data of 111 large companies by randomly drawing five companies (with insider trades) for each month between 1968 and 1972. Although their methodology is similar to earlier papers, they include randomly drawn control samples in their analyses. There are two reasons for including control samples. The first one is to test whether the selection of only large firms due to data limitations introduces survivorship bias to their sample. The second concern is related to the criticism regarding the empirical testability of the CAPM (Roll (1977)). They report that their results are free from these biases since the cumulative average returns (CAR) for all periods are near zero for their control sample. Furthermore, trades of boards of directors of banks are separately analyzed since most of the bank directors also hold directory positions in other companies. They find that bank directors earn higher abnormal returns compared to ordinary insiders. This is

supporting evidence for the relation between the quality of information set and the position of insiders in the company.

Banz (1981) and Reinganum (1981) show that small firms experience average risk adjusted returns systematically higher than large firms when returns are estimated with the CAPM. Therefore, if insiders are net buyers (net sellers) of the smaller (larger) firms, then studies using the CAPM based residuals, are biased in favor of finding abnormal returns for insiders. Previous work by Finnerty (1976b) supports the assertion that insiders tend to purchase (sell) the stock of companies which are smaller (larger) in size. In addition, insiders tend to purchase (sell) securities of firms with higher (lower) earnings and dividends (Finnerty (1976b)).

Seyhun (1986) analyzes insider transactions for 769 NYSE and AMEX firms from 1975 to 1981. Apart from the availability of abnormal returns to insiders and outsiders following the trades of insiders, determinants of insiders' predictive ability and costs imposed on other investors from insider trading are also examined. In this study, the market model is used for estimating abnormal returns to avoid the size bias discussed by Banz (1981) and Reinganum (1981). Furthermore, the size bias is tested by comparing market model based abnormal returns with the CAPM based ones. His study confirms the existence of upward bias in the CAPM based abnormal returns. Nevertheless, his findings show that size is still one of the significant determinants of abnormal returns to insiders. Along with size, insiders' functional role in the company (i.e. officer, director etc.) and dollar volume of the trade are determinants of abnormal returns to insiders. His findings can be summarized as follows: 1) expected loss to the informed investors is reflected in bid-ask spreads charged by the market maker, 2) insiders are able to identify and exploit profit opportunities, 3) outsiders cannot profit using publicly available insider transactions data after taking into account transaction costs.

In a later study, Seyhun (1988) tests the relationship between aggregate insider trading and future stock market returns. His study shows that net aggregate insider trading is statistically significantly correlated with the market returns of the following two months. Moreover, insiders of small firms are more likely to trade based on firm-specific factors, whereas insiders of large companies and companies with high market risk trade based on economy wide factors.

In a following study, Seyhun (1992b) investigates sources of predictive ability of past aggregate insider trading for future excess returns. According to this study, aggregate insider trading over the previous twelve months can explain up to 60% of variation in excess return for the following twelve months. Moreover, the predictive power of aggregate insider trading over the previous twelve months remains statistically significant after including various explanatory variables such as firm size, future real activity and past stock returns. He concludes that insiders' ability to identify mispricing and changes in business conditions are both sources of predictive ability of aggregate insider trading.

Rozeff and Zaman (1988) argue that reported returns to insiders in earlier studies are due to not taking into account the size and the earning/price ratio (E/P) effects. In order to control these effects, they create 25 control portfolios based on size and E/P quintiles. They show that abnormal returns to insiders decrease significantly to a negligible level and abnormal returns to outsiders following insider trades become negative, when returns are adjusted for the size and the E/P effects.

Results of the study by Lin and Howe (1990) on over-the-counter (OTC) National Association of Securities Dealers Automated Quotations (NASDAQ) market support the findings of Seyhun (1986), and Rozeff, and Zaman (1988). They conclude that transactions of insiders have predictive content; however, high bid-ask spreads in the OTC market makes it impossible for outsiders to profit from mimicking the trades of insiders.

Later, Bettis, Vickrey and Vickrey (1997) argue that the unprofitability of outsiders following the trades of insiders documented by Seyhun (1986), and Rozeff and Zaman (1988) are due to delays in dissemination of insider-trading data to investors for the time periods of their study. They use CDA/ Investnet's Insider Trading Monitor rather than Official Summary to identify the date of public dissemination of transactions. Their results show that outsiders can earn abnormal returns by mimicking the large transactions of top executives.

Rozeff and Zaman (1998) find evidence consistent with contrarian strategies of investing (see for example, Lakonishok, Shleifer and Vishny (1994)). They show that insiders tend to buy value stocks and sell glamour stocks. Later, Lakonishok and Lee (2001) confirm the results of Rozeff and Zaman (1998). They investigate the predictive ability of insider trading for the period from 1975 to 1995 for major US stock exchanges (NYSE, AMEX and NASDAQ). Their study shows that aggregate insider trading predicts market movements even after adjusting for contrarian investing strategies. Companies with excess insider purchases over the past six months outperform companies with excess insider sales over the same period by 4.8% in the following twelve-month period after adjusting for Book to Market ratio (B/M) and size effect. Furthermore, consistent with earlier studies, they find that insider purchases convey more information than sales and that predictive ability of insider trading for future returns is higher for small-cap stocks. Moreover, they state that the market underreacts to insider trading since abnormal returns around the announcement of insider trades are not economically meaningful.

Fidrmuc, Goergen, and Renneboog (2006) extend the literature by analyzing the impact of various factors on market participants' short-term reaction to trades of directors on London Stock Exchange for the period from 1991 to 1998. They argue that the presence of important news releases before the trades of directors, the ownership and the control structure of the company affect the reaction of the

market to the transaction by directors. They find that abnormal returns to insiders remain significant even after adjusting for prior news releases except for merger and acquisition related ones. They also report that market participants associate insider sales with less information content, which is consistent with earlier studies (e.g., Seyhun (1986), Lakonishok and Lee (2001)), than purchases. Furthermore, their study shows that the existence of large blockholders, who are likely to monitor activities of the company, decreases the price reaction to directors' trades. On the other hand, the presence of institutional blockholders has the opposite effect. They are unable to find evidence regarding the information asymmetry between different types of insiders, but find supporting evidence for increasing reaction to announcements of multiple trades by different directors.

Previous studies cited in this section, either use intensive trading criteria and/or equally weight each transaction in order to estimate informativeness of insider trading or abnormal returns to insiders. Eckbo and Smith (1998) argue that to assess the average insider performance, the portfolio that proxies aggregate monthly insider holdings should be tracked instead of the aggregated trades of insiders. Furthermore, they argue that abnormal returns to insiders should be measured in a time varying expected return setting, by considering certain factors which have predictive ability on future market returns (such as term structure of interest, real interest rate, past excess world market returns, etc.). They use conditional performance evaluation techniques to assess the average performance of insiders in Oslo Stock Exchange (OSE). Their results show that aggregate insider portfolio does not generate statistically significant abnormal returns in a conditional multifactor setting.

Jeng, Metrick and Zeckhauser (2003) investigate returns to insiders from their transactions on major US stock exchanges (NYSE, AMEX and NASDAQ) during a period from 1975 to1996. They argue that earlier studies, which employ intensive trading rules, examine informativeness of insider trading rather than profits to

insiders from their transactions. As opposed to Eckbo and Smith (1998), they use a portfolio approach to approximate returns to insiders. Since the true holding periods for most of the insider transactions cannot be determined for the U.S. data, they take advantage of the "short-swing rule" that prohibits profit taking by insiders from offsetting trades within six months of each other. They place each purchase (sell) transaction in a purchase (sell) portfolio on the day of transaction and hold it for six months. By applying performance evaluation methods to value-weighted insider purchase and sell portfolios, they approximate returns to insiders from their transactions. Their results show statistically significant abnormal return for the purchase portfolio over the 6-month holding period, which provides evidence against strong form market efficiency. However, returns to sell portfolio are not statistically significant.

Most of the studies summarized in this section are conducted on the US stock exchanges. Some examples from the literature analyzing other markets are: Pope, Morris and Peel (1990), Friederich, Gregory, Matatko and Tonks (2002) on the London Stock Exchange, Betzer and Theissen (2009) on the German Market and Del Brio, Miguel and Perote (2002) on the Spanish Stock Market. Results of studies conducted in international markets mostly confirm that insiders can earn abnormal returns from their transactions.

For Turkey, to the best of my knowledge, Doğu (2007) is the only study that analyzes abnormal returns to insiders. He uses standard event study methodology (see Campbell, Lo and MacKinlay, 1997) to evaluate short-term abnormal returns to insider trading around the announcement of their trades on the ISE from February 2005 to July 2007. The result of his study shows that abnormal returns exist prior to purchase transactions. However, for periods following insider trades (up to 50 days) abnormal returns are generally not statistically significant. Furthermore, he indicates that insiders announce their purchases when underlying stock prices are already at their highest level. Doğu (2007) argues that insiders

might be hiding their trading activities, and deliberately announcing their purchases to the public to support the price level of stock when they believe it reaches its maximum. On the other hand, evidence given in his study for the insiders' sales show that abnormal returns preceding (following) announcements are generally positive (negative). He concludes that the announcement of insider sales contains more information for investors than insider purchases for the ISE as opposed to results of similar studies done across the world.

CHAPTER 3

DATA AND METHODOLOGY

3.1. Data Sources

Data sets that are used to measure abnormal returns to insiders and to outsiders by following transactions of insiders can be categorized in two groups. The first group of datasets contains supplementary datasets needed to do empirical analysis throughout the study. The second dataset consists of insider trading data that is hand collected from the Istanbul Stock Exchange website. These data sets cover a period from January 2007 to December 2008

3.1.1. Supplementary Datasets

The datasets listed below are used in order to measure the return performance of insider transactions over certain holding periods. Furthermore, the return performance of outsiders from replicating trades of insiders is analyzed using these supplementary datasets.

a. The ISE-ALL Return Index: Return series calculated from this index is used as the proxy for value weighted return on the market portfolio that is necessary for measuring the abnormal return.

b. Daily Repo Rate: Daily repo rate is used to proxy the daily return on the risk-free asset.

c. Daily Price Ranges of the Companies Listed on the ISE: This information is used to create a price filter to identify off-the-market transactions and possible miscoded insider reports.

d. Daily Trading Volume of the Companies Listed on the ISE: This dataset is used to create a volume filter to identify off-the-market transactions and possible miscoded insider reports.

e. Dividend and Split Adjusted Returns for the Companies Listed on the ISE: This dataset is used in the estimation of the daily returns of the portfolios analyzed in this study.

f. Daily Number of Shares Outstanding for the Companies Listed on the ISE: This dataset is used to estimate the relative size of each insider transaction.

3.1.2. Insider Trading Data

The Capital Markets Board (CMB) of Turkey has regulated insider trading and manipulation since 1992 in Turkey. Standard and legal framework defining insiders and requirements on public announcement of their trades is the decree of the CMB in Serial: VIII, No: 39. This decree became effective on July 20, 2003 and has remained in effect throughout the sample period of this study.

According to this decree, board of directors, executive officers, or other key employees who hold important administrative or operational positions, shareholders directly or indirectly holding more than 5% of any equity class and people who act together with them are considered as insiders. Therefore, these people are legally obligated to inform the ISE of their trades until 9:00 am of the workday following their transaction. The CMB issued a new decree [Serial: VIII, No: 54] on February 6, 2009. This decree relaxes the obligation of immediate

announcement to at the latest 9:00 am of the third workday following an insider's trade. In addition, shareholders who do not participate in administrative or operational decision-making processes of the company are only required to publicly announce their transactions that cause them to exceed ownership thresholds (5%, 10%, 15%, etc.) specified by the decree. Moreover, members of the board of directors, executive officers, and other key employees who hold important administrative or operational positions are not required to publicly announce their transactions until the total value of their transactions (direct or indirect) exceed 10,000TL within a twelve-month time period. Obviously, prior to February 2009, insider trades were announced to the public on a timelier basis. Furthermore, all trades by insiders are announced to the public regardless of the effect of that trade on the ownership share of the insider. For these reasons, our sample covers a period from January 2007 to December 2008 in order to avoid working with a dataset collected from two different regulatory environments.

Prior to 2005, announcement forms of insider trading were published in the Daily Bulletins of company news or as a paper attachment to the Daily Bulletins of the ISE. After January 24, 2005, these forms are published daily in the Daily Bulletins section of the ISE's website (http://www.imkb.gov.tr/bultenler.htm) under the name "Attachments to Company News". However, these forms are basically scanned versions of insider faxes and cannot be readily used in statistical analysis.

According to the decree of CMB in Serial: VIII, No: 39 , announcement forms of insider trading sent to the ISE should contain the following information: name of the reporting person, issuer name or ticker symbol, transaction date, type of transaction (buy or sell), relationship of reporting person to the issuer, number of shares traded, per share price of equities traded, total value of the transaction, nominal value of shares owned after the transaction and the proportion of the total shares of the company owned by the insider after the transaction. For the period of the analysis (January 2007 to December 2008), attachments to company news and

daily bulletins are investigated for insider transactions and the dataset needed for empirical analysis is created. This dataset is created by manually entering information given for each reporting observation.

a. Ticker Symbol: Identification Code of the Stock.

b. Name of the Insider: Name of the individual or institutional shareholder whose trades are reported to the ISE.

c. Position of the Insider in the Company: Position of insider is classified by assigning five different codes. If the observation does not contain this information, websites of the companies, company news bulletins and annual general meeting records are investigated to identify the position of the insider and/or who acts together with them.

- Directors (D):
Members of Board of Directors, their family members and people who act together with them are categorized as Directors.

- Officers (O):
Executive officers or other key employees who hold important administrative or operational positions, their family members and people who act together with them are categorized as Officers.

- Corporate Insiders (CI):
Parent companies, subsidiaries and companies represented by a member of the board of directors or executive officer of the company are categorized as Corporate Insiders.

- Shareholders (S):

Shareholders directly or indirectly holding more than 5% of any equity class without administrative or operative control in the company are categorized as Shareholders. Although investors falling into this category generally do not have access to material non-public information about the company, they are legally accepted as insiders by the CMB.

- Institutional Investors (II):

Institutional investors directly or indirectly holding more than 5% of any equity class without administrative or operative control in the company are categorized as Institutional Investors. Although investors falling into this category generally do not have access to material non-public information about the company, they are legally accepted as insiders by the CMB.

d. Date of the Transaction: The date on which an insider trade occurs.

e. Date of the Announcement: Daily bulletins become available on the ISE's website after the market closes on that day. Although in some incidents data vendors (i.e. Reuters, Forex etc.) publicly announce insider transactions during the day, Daily Bulletins are the main medium for public dissemination of insider trading information. Thus, the announcement date of an insider's transaction is assumed as the publication date of this information in the Daily Bulletins of the ISE.

f. Type of Transaction (Buy or Sell): Buy transactions are coded as (1) and Sell Transactions are coded as (-1).

g. Nominal Value of the Shares Traded: It is the number of shares traded by the insider.

h. Transaction Price (TL/share): Transaction price is the price per share for a trade.

i. Total Value of the Transaction: TL value of the transaction.

j. Shares Owned After the Transaction: The nominal value of the shares owned by the insider after the transaction.

k. Ownership (%): The proportion of the total shares of the company owned by the insider after the transaction.

l. Relative Size of the Transaction (%): This value is calculated by dividing the nominal value of the shares traded by the nominal value of total shares of a company outstanding at the time of the trade.

Following the creation of this dataset, duplicate entries, unreadable, and inaccurate records are eliminated. In addition, transactions of insiders of companies that have more than one type of shares traded on the ISE are eliminated from the dataset. These shares are: A, B and C type shares of "Adana Çimento Sanayii Türk A.Ş.", A and B type shares of "Carrefoursa Carrefour Sabancı Ticaret Merkezi A.Ş.", A, B and C type shares of "Türkiye İş Bankası Anonim Şirketi" and A, B, and D type shares of "Kardemir Karabük Demir Çelik Sanayi ve Ticaret A.Ş.". Furthermore, observations that do not contain the following information are eliminated from the dataset: the type of the transaction, number of shares traded, and transaction price and transaction date. Observations stating the transaction date as a time interval are also eliminated from the dataset. Insider trades, which occurred before the analysis period, but announced during the analysis period and insider trades announced with more than five-day delay to the ISE are also eliminated from the dataset. Observations stating that the transaction occurred off-the-market or between family members are excluded from the dataset since these type of transactions generally are executed for corporate control benefits, or diversification or liquidity needs.

In addition to these, price and volume filters are used to identify possibly miscoded reports or off-the-market transactions. Off-the-market transactions are large volume transactions that are traded at negotiated prices instead of market prices. Volume filter identifies transactions that involve number of shares that is more than the total number of shares of that security traded on the transaction day. Price filter identifies transactions whose price falls outside the daily trading range of the security. Obviously, these filters cannot possibly catch all off-the-market transactions and miscoded reports but they help reducing bias introduced to our result from large possibly off-the-market transactions and miscoded prices/transaction dates. Then, purchases and/or sales by the same insider on the same transaction and announcement day are aggregated into a single observation. The final dataset contains 8784 daily insider transactions in shares of 212 companies.

3.2. Methodology

Some researchers (e.g., Rozeff and Zaman (1988), Lakonishok and Lee (2001)) argue that intensive trading criteria should be used in order to reduce the potential noise arising from different motives of insiders for trading such as diversification, corporate control, etc. They argue that if insiders trade based on an important information, then many insiders should trade in the same direction in the same period. Thus, they select their events after applying some logical filters to the data. Others (e.g., Finnerty (1976a), Jeng, Metrick and Zeckhauser (2003)) argue that intensive trading criteria introduce an upward bias to abnormal returns to insiders by selecting trades that are most likely to have superior performance than average insider transactions. Furthermore, when intensive trading criteria are used, returns to insiders during the month of a trade are not included in the analysis since trading criteria are defined over a month and stocks are classified into trading classes at the end of a month. Thus, they state that in order to measure the average performance of insiders, the entire set of insider transactions should be analyzed. Since

estimating returns to insiders from their trades is one of the aims of this study, no intensive trading criteria are applied to the data.

Another difference among methodologies used in the literature is related to the division of insider trading dataset as purchase and sale transactions, and then measuring abnormal returns to each group separately. Arguments in favor of division are mainly related to the different natures of each transaction. Supporters of division argue that insider purchases transmit positive information about the firms' future prospects. Insider sales, on the other hand, might be caused by liquidity or diversification needs of insiders instead of negative information about the company since some part of executive compensation comes in the form of stocks and options. As a result, insiders are the net sellers of their companies' stocks for most of the studies. This finding can be thought as supporting evidence of insiders' sales conveying less information than insiders' purchases. Thus, purchase and sale transactions should be analyzed separately. As opposed to earlier studies done in the U.S., insiders are the net purchasers of their stocks for the analysis period of our study. Since insiders in Turkey are not net sellers of their company shares, there may still be a difference in the quality of the information conveyed to the market by the purchase and the sale transactions of insiders. However, in this case, the sale transactions of insiders might be expected to convey more information than insider purchases. Therefore, the purchase and the sale transactions of insiders are also analyzed separately to see the differences in information content of these transactions.

Another issue related to decomposing insider purchases and sales into separate groups is the existence of overlapping event periods for the same firm. This decomposition might introduce biases to return estimation, if return calculation or expected return estimation windows of purchase and sale transactions overlap. To exemplify, two different cases may be considered. In the first case, an insider sells X amount of a stock, and two days later buys 2X of it. On the other hand, in the

second case, an insider buys X amount without a preceding sale transaction. Obviously, the insider's overall position is the same for both of these cases, and market participants should interpret these cases similarly. However, when we decompose transactions into purchases and sales, and analyze them separately, in the first case, we might find no abnormal return or even find positive abnormal return for the sale transaction because the market reaction to this sale transaction is confounded by the market reaction to the purchase transaction that took place two days later.

If a country's regulations prohibit profit taking by insiders from offsetting trades within a specified period (such as short-swing rule in the US), one might easily assume that there are not any overlapping event windows for opposing trades by the same insider. On the other hand, the existence of the short-swing rule does not guarantee that insider-trading data is free from overlapping transactions of different insiders of the same firm within the event period. In order to avoid introducing biases in the abnormal return estimates, insider transactions are analyzed considering cross-sectional dependence of purchases and sales of insiders in this study.

There also exist different approaches regarding the period over which abnormal returns to insiders are measured. Some studies (e.g., Seyhun (1986), Rozeff and Zaman (1988)) measure long-term abnormal returns while others measure short-term abnormal returns (e.g., Fidrmuc, Goergen and Renneboog (2006), Friedrich et al. (2002), etc.). Long-term studies assume gradual adjustment of stock prices. On the other hand, short-term studies assume rapid adjustment of stock prices to new information. Since the aim of this study is to assess abnormal returns to insiders and outsiders following trades of insiders over different holding periods, the most common methodologies used in the literature, and their advantages and shortcomings are discussed in the following subsections under two major headings to justify the selected methodology.

3.2.1. Short Horizon Studies

Most of the studies analyzing short horizon abnormal returns use the Cumulative Abnormal Return (CAR) technique to measure abnormal returns around an event. The CAR technique is essentially similar to the methodology used by Fama, Fisher, Jensen and Roll (1969). Using the notation given in Campbell, Lo, and MacKinlay (1997), the Cumulative Abnormal Return (CAR) of each event over an event window $[\tau_1, \tau_2]$ is calculated by cumulating daily abnormal returns.

$$CAR_i = \sum_{\tau=\tau_1}^{\tau_2} (R_{i,\tau} - E(R_{i,\tau})) \tag{3.1}$$

where i is the event, τ is a day in the event window ($\tau = 0$ is the event date), $R_{i,\tau}$ is the simple return on the event day τ and $E(R_{i,\tau})$ is the expected return estimated by a benchmark model (i.e. the CAPM) for the event firm from the eventless period window.

Then, Cumulative Average Abnormal Return (CAAR) is calculated by taking an average of CARs for N events:

$$CAAR = \frac{1}{N} \cdot \sum_{i=1}^{N} CAR_i \tag{3.2}$$

The null hypothesis that the CAAR is equal to zero for a sample of N events can be tested by using parametric test statistics. The main assumptions for this methodology are that the benchmark model (e.g., market model, or the CAPM) captures normal returns, the abnormal returns are concentrated in the event window, and these abnormal returns are normally, independently and identically distributed.

Expected Return parameter of the standard event study approach should be estimated from an eventless period (before or after event) by using the benchmark model. Since insiders in our dataset actively trade certain stocks and these transactions dominate the overall dataset, finding an eventless period to estimate an expected return for these stocks would be almost impossible. The general approach used in the literature is to estimate the expected return of an event stock over a predefined period before the event (i.e. [t-250, t-15], where t is the event date). However, this approach would be biased if the insiders actively trade the event stock during the predefined period.

According to Brown and Warner (1980), using the market model to calculate benchmark returns for the CAR technique performs well in detecting abnormal returns for short horizons. In a follow-up study, they confirm their former result by using daily data and conclude that standard event study methodology is quite effective in measuring abnormal performance for short event windows (Brown and Warner (1985)). Moreover, according to their study, there are three potential drawbacks of using daily data. These are the non-normality of daily returns, non-synchronous trading, and problems associated with variance estimation. Of these drawbacks, only problems associated with variance estimation can severely affect the specification and the power of the parametric tests for short window event studies. In addition, they conclude that gains from adjusting test statistics for cross-sectional dependence of abnormal returns are negligible for short horizon studies unless events are clustered in calendar time. On the other hand, severe autocorrelation and event-induced variance can significantly reduce the power of test statistics.

Overlapping event periods for the same firm is the major source of autocorrelation in returns of a company, and it might cause misspecification of the test statistics. For example, if an insider purchase event occurs five days after another purchase or sale, their event periods will partially coincide, and the measured abnormal returns

for each event will contain the effect of the other event. Fortunately, the effect of overlapping event periods on test statistics is negligible since the probability of overlap is quite small for short horizons. As stated by Brown and Warner (1985) and Campbell and Wasley (1993) benefits from adjusting test statistics for autocorrelation is negligible for short horizon studies.

In order to account for event-induced variances, unlike the commonly used standardized residual test of Patell (1976), Boehmer, Masumeci, and Poulsen (1991) propose a standardized cross-sectional test. According to their study, standardized cross-sectional test is properly specified, without significantly reducing the power of the test.

Later, Campbell and Wasley (1993) report significant departures from the normality assumption for abnormal returns of NASDAQ securities, as opposed to NYSE and AMEX securities analyzed by Brown and Warner (1985) and Corrado (1989). Furthermore, they report higher frequency of zero daily returns for NASDAQ securities compared to NYSE and AMEX securities. They state that higher frequency of zero daily returns would cause misspecification in parametric test statistics even for short horizon studies since parametric test statics mostly rely on estimated variance from observed returns. They conclude that Corrado's (1989) rank test statistic is robust to various event study conditions such as nonnormality of returns, nonsynchronous trading, and event clustering. This finding is not surprising since nonparametric rank tests are free from assumptions concerning the distribution of abnormal returns.

In brief, the standard event study methodology using CARs to estimate abnormal performance is quite effective for short horizon tests although there are statistical biases and difficulties associated with the assumptions of this methodology. Furthermore, using nonparametric tests together with either parametric tests or the

standardized cross-sectional tests to check for robustness of the findings enhances the reliability of results of short horizon event studies.

3.2.2. Long Horizon Studies

Unlike short horizon studies, using the standard event study methodology for long horizon studies can have serious problems due to departures from the assumptions of the methodology. Major departures from the assumptions are caused by a bad-model, cross-correlations arising from calendar and/or industry clustering, and autocorrelations in returns due to overlapping event windows for the same firm (Barber, Lyon and Tsai (1999)).

As stated by Fama (1998, p. 291), "all models for expected returns are incomplete descriptions of the systematic patterns in average returns during any sample period. As a result, tests of efficiency are always contaminated by a bad-model problem." A bad-model problem is much more severe for long horizon studies since estimation errors arising merely from incorrect specification of the underlying model becomes statistically significant with an increase in period over which returns are estimated (Fama (1998)). There are two firm specific expected return estimation procedures, as called by Fama (1998), in order to estimate the expected return during the event window. In the first method, the systematic risk of a security is estimated over a period that does not include the event window and then this systematic risk measure is used to calculate the expected return during the event window. In the second method, the average return over a period that does not include the event window is taken as the expected return estimate during the event window. According to Fama (1998), "firm-specific expected return estimation procedures" reduce the bad-model problem. However, anomalies related to cross-section of average returns such as P/E ratio (Basu (1977)), size (Banz (1981)), size and book to market ratio (Fama and French (1993)) and momentum (Jegadeesh and Titman (1993)) cannot be explained by using either one of these models.

Fama and French (1993) propose a three-factor model with the inclusion of size and book to market ratio as relevant risk factors in estimating expected returns to account for anomalies. Later, Carhart (1997) extends the three-factor model of Fama and French (1993) by adding a momentum factor in order to improve the expected return estimation. Although the issue of whether these factors proxy for risk or indicate market inefficiencies remain unresolved in the literature, these factors should be controlled for when measuring abnormal returns associated with a certain event (Kothari and Warner (2007)).

Another statistical difficulty encountered when estimating abnormal returns for long horizon studies is the cross-correlation of returns to event firms. It is a well-known fact that economy-wide and industry-specific factors generate contemporaneous co-movements in security prices. If insiders are trading based on economy wide and/or industry-specific factors, then there might be a calendar and/or an industry clustering in the sample. As a result, test statistics would be biased due to the violation of the assumption that abnormal returns are independently distributed.

Overlapping event periods for the same firm, as stated by Barber, Lyon and Tsai (1999, p. 190) "is the most severe form of cross-sectional dependence that a researcher could encounter in an event study of long-run abnormal stock returns." Obviously, the probability of having an overlapping event window increases as the event period becomes longer. Barber, Lyon and Tsai (1999) propose, by citing previous works of Loughran and Ritter (1995), and Spiess and Affleck-Graves (1999), the elimination of overlapping observations by pre-event screening. However, eliminating observations has a drawback of testing smaller samples consisting of firms in which insiders are less active.

Because of difficulties associated with estimating the abnormal performance for long horizon studies, there is not any commonly accepted methodology. Two

common methods used for measuring abnormal returns are a Buy and Hold Abnormal Return (BHAR) approach and a Calendar-Time Portfolio approach. However, as stated by Kothari and Warner (2007, p. 23) "Both have low power against economically interesting null hypotheses, and neither is immune to misspecification."

The BHAR methodology assumes that the expected or normal return of a security can be estimated by the return on a stock or a portfolio that resembles a certain characteristic of the security in question to account for its risk. The BHAR of the event is calculated as the difference between return on a buy and hold investment in the event firm and return on a buy and hold investment in a stock or a portfolio with similar risk characteristics as the event firm for a defined period of time. For example, if the size and the book to market ratio are the relevant risk factors, then a matching firm or a portfolio is selected with similar size and book to market ratio characteristics of the event firm. Using the notation given in Barber, Lyon and Tsai (1999) formulas for calculating Abnormal Return (AR) for an event window around insider transactions can be given as follows:

$$AR_i = \prod_{\tau=\tau_1}^{\tau_2}(1+R_{i,\tau}) - \prod_{\tau=\tau_1}^{\tau_2}(1+E(R_{i,\tau})) \tag{3.3}$$

where i is the event, τ is a day in the event window ($\tau = 0$ is the event date), $R_{i,\tau}$ is the simple return on the event day τ for the event firm and $E(R_{i,\tau})$ is the expected return for the event firm estimated by a characteristic matched firm or a portfolio for the event day τ.

Then, Average Abnormal Return (AAR) is calculated by taking an average of ARs for N events:

$$AAR = \frac{1}{N} \cdot \sum_{i=1}^{N} AR_i \tag{3.4}$$

The null hypothesis that the AAR is equal to zero for a sample of N events can be tested by using conventional t-statistic. The main assumptions of this methodology are the same as the CAR approach except for the use of a characteristic matched firm or a portfolio instead of a benchmark model (i.e. market model) to capture the normal returns of the event firms. Therefore, the BHAR approach is also sensitive to misspecifications mentioned in the section discussing the CAR approach including the bad-model problem. According to Fama (1998), bad-model problems are much more severe for the BHAR approach since systematic errors arising from imperfect normal return proxies are also compounded when long term buy and hold returns are calculated.

The most important advantage of the BHAR approach is its ability to measure investors' actual investment performance better than the standard event study (CAR) approach since the latter one requires periodic rebalancing. The major disadvantage of BHAR is the severe positive skewness in buy and hold abnormal returns as compared to cumulative abnormal returns. This positive skewness leads to a negative bias in test statistics (Barber and Lyon (1997)). Barber, Lyon and Tsai (1999) propose a bootstrapped skewness adjusted t-statistics to alleviate problems related with the skewness of BHAR. They conclude that the BHAR approach is advantageous over other methods since it offers a better proxy for investor returns; however, precaution is necessary since it is sensitive to cross-sectional dependence among sample firms and constructed reference portfolio used to proxy normal returns to event firms.

Mitchell and Stafford (2000) and Jegadeesh and Karceski (2009) argue that the test statistic of Barber, Lyon and Tsai (1999) is misspecified since the assumption of cross-sectional independence of abnormal returns does not hold in long horizon. Jegadeesh and Karceski (2009) propose the use of serial correlation consistent, and the heteroskedasticity and serial correlation consistent tests together with conventional t-tests to control robustness of results for cross-correlation and autocorrelation in abnormal returns.

Another approach for measuring long horizon abnormal returns is the Calendar-Time Portfolio Approach (also known as rolling portfolio approach), first introduced by Jaffe (1974) and Mandelker (1974). In order to measure the abnormal performance after a certain event, over a T-month event period, an equally weighted or a value-weighted portfolio of all firms that experienced the event for the previous T-months is constructed. The number of firms in the portfolio varies each month since the firms experiencing the event vary from one month to another. Portfolios are rebalanced each month and the monthly portfolio excess returns are calculated by regressing the monthly portfolio returns on the CAPM market factor, or the three factors of Fama-French (1993), or the four factors of Carhart (1997).

The most important aspect of this methodology is the consideration of cross-correlation and autocorrelation of abnormal returns since events are aggregated into a single portfolio. Even Barber, Lyon and Tsai (1999), strong advocates of the BHAR approach, propose the use of Calendar-Time Portfolio Approach when there are overlapping event periods so that cross-sectional dependence is likely to be a problem. They also indicate that the Calendar-Time Portfolio Approach reduces, but does not eliminate, misspecifications resulting from industry clustering since it does not eliminate sensitivity to the bad-model problem.

A major argument against the use of Calendar-Time Portfolio Approach is the fact that it does not precisely measure the abnormal return to an investor over a certain holding period (Barber, Lyon and Tsai (1999)). Furthermore, Loughran and Ritter (2000) argue that since the Calendar-Time Portfolio Approach equally weights each period rather than each event, it would have low power to detect abnormal performance. Their main argument is that if the events cluster on some periods to exploit market wide mispricing then the Calendar-Time Portfolio Approach would underestimate the market-timing decision by equally weighting each period. Fama (1998) proposes using Jaffe's (1974) methodology to alleviate this problem. Jaffe (1974) standardizes period abnormal returns by its estimated standard deviation and then estimates the overall abnormal return by averaging these standardized abnormal returns.

To sum up, neither method seems to provide a reliable and powerful measure for long horizon abnormal returns surrounding an event. Further research is necessary to refine the methodology for long horizon performance measures (Kothari and Warner (2007)).

3.2.3. Methodology Proposed in this Thesis

The methodology proposed in this thesis involves replicating insider trades at the closing prices on their transaction day by simultaneously working two rolling portfolios, namely Net Purchase Portfolio (portfolio NP) and Net Sale Portfolio (portfolio NS) in order to account for the dependence of returns to purchases and sales of insiders for the same firm. This methodology involves allocating each insider transaction into one of these two portfolios by taking into account the existing positions of insiders as a group in the underlying company shares up to that date. Portfolio NP purchases the shares in which insiders are net purchasers as a group. Similarly, portfolio NS purchases shares in which insiders are net sellers as a group. As a result, if insiders earn positive abnormal returns on their purchase

transactions, the return on the NP portfolio is expected to be positive as well. On the other hand, if insiders earn positive abnormal returns on their sale transactions, the return on the NP portfolio is expected to be negative since the NP portfolio has long positions in these shares. In this section, portfolio formation and performance evaluation procedures are explained for the insider portfolios. Procedure for the outsider portfolios are essentially the same with one exception. Outsider portfolios are constructed to replicate insider transactions at the closing prices on the day following the announcement day of these trades in the ISE's website.

In order to construct these rolling portfolios, it is assumed that each insider holds his/her initial trade position at most T-days (predefined holding periods). Therefore, insiders are forced to reverse their initial positions T-days after the opening of these positions. If an insider reverses some portion of his/her transaction prior to the end of these predefined holding periods, the insider is forced to reverse only the remaining amount at the end of the predefined holding period interval. To exemplify, if insider A buys 2X shares on day t, and sells X shares on day t+1, the procedure explained above forces the insider to sell only the remaining X amount at time t+T.

These reversals are treated as hypothetical trade reports sent to the ISE on the day of the forced reversal. Predefined holding periods are implemented due to practical limitations in identifying actual holding periods of insiders. For example, when an insider reports that he/she sold shares of his/her company, he/she might be selling some portion of his/her holdings purchased before the insider status was achieved or prior to the analysis period of this study. Therefore, it is impossible to identify the date these shares are acquired by the insider.

The formation heuristics for these portfolios can be summarized as follows. At any given day t, when an insider purchases X shares of company A, portfolio NP checks the position of portfolio NS related to the underlying stock. If portfolio NS

does not hold any position in the stocks of company A, then portfolio NP purchases X amount of company A shares at the closing price on the day insider transaction occurs. Suppose portfolio NS holds Y shares (which means insiders as a group are net sellers over the previous T days) in company A. If $Y \geq X$, portfolio NS sells X shares and portfolio NP simply discards the buy signal. If $Y<X$, portfolio NS sells Y shares of company A, and portfolio NP purchases (X-Y) shares of the company A. This approach is similar with sale transactions. These positions are carried in the portfolios for different predefined holding periods (5-, 14-, 21-, 42- and 63-days) to assess how long abnormal returns persist following a transaction of an insider.

A portfolio build up period is employed to avoid starting the analysis with a portfolio consisting of very few companies. Furthermore, this portfolio build up period helps to achieve comparable results for portfolios with different predefined holding periods. In this thesis, portfolio build up period is selected as 63 days, which is the longest predefined holding period analyzed.

On each day, resulting net purchase (NP) portfolio would hold long positions in shares of the companies of which insiders as a group are net purchasers over the previous T days. Similarly, the net sale (NS) portfolio would hold long positions in shares of companies of which insiders as a group are net sellers over the predefined holding periods (T days). Therefore, the market value of these portfolios varies each day and these portfolios are essentially similar to daily value-weighted calendar-time portfolios. Consequently, the daily return series of these portfolios are calculated based on the daily changes in the market value of these portfolios.

In order to estimate excess returns earned by insiders from their transactions (purchases and sales), a zero-investment portfolio is also constructed. In order to take into account corresponding market values of the net purchase and the net sale portfolios on each day, the sum of the market values of these portfolios is normalized to one. This zero investment portfolio consists of value weighted

combinations of a long position in NP portfolio, a short position in NS portfolio and either a long or short position in the risk free asset depending upon market values of the NP and the NS portfolios on each day. The equation for daily excess returns of this value-weighted zero-investment portfolio (Portfolio ZIP) can be given as:

$$R_{ZIP,t} = w_{NP,t} \cdot R_{NP,t} - w_{NS,t} \cdot R_{NS,t} + \left(w_{NP,t} - w_{NS,t}\right) \cdot R_{f,t} \tag{3.5}$$

where: $R_{ZIP,t}$ is the excess return of the value-weighted zero-investment portfolio on day t, $R_{NP,t}$ is the return of the NP portfolio on day t, $R_{NS,t}$ is the return of the NS portfolio on day t, $R_{f,t}$ is the risk free rate proxied by the repo rate on day t. In this equation, $w_{NP,t}$ and $w_{NS,t}$ are the normalized market values of the NP and the NS portfolios, respectively, on the day t. Returns on this zero-investment portfolio (portfolio ZIP) are regressed on the CAPM or the Fama-French factors to estimate abnormal returns earned by insiders from their transactions.

Excess returns on the NP and the NS portfolios are also regressed on the CAPM or the Fama-French factors to estimate abnormal returns earned by portfolios constructed from stocks net purchased by insiders and stocks net sold by insiders over T-days. The equations for calculating the excess returns to these portfolios can be given as follows:

$$R_{ER\_NP,t} = R_{NP,t} - R_{f,t} \tag{3.6}$$

and

$$R_{ER\_NS,t} = R_{NS,t} - R_{f,t} \tag{3.7}$$

In these equations, $R_{ER\_NP,t}$ and $R_{ER\_NS,t}$ are the excess returns on the NP and the NS portfolios on day t, respectively. Similarly, $R_{NP,t}$ and $R_{NS,t}$ are the returns on the NP and the NS portfolios on the day t, respectively. $R_{f,t}$ is the risk free rate proxied by the repo rate on the day t.

The portfolio formation methods used in this thesis differ from the ones used in Jeng, Metrick and Zeckhauser (2003) in several ways. First of all, as explained above, purchase and sale transactions of insiders are allocated to the net purchase and net sale portfolios by taking into account the existing positions of insiders as a group in that company shares up to that point. Therefore, the net sales and the net purchase portfolio created in this thesis reflect the net positions of insiders as a group in that company shares at all points in time. Second, rather than forcing insiders to reverse their positions in a single predefined holding period, this methodology takes into account position reversals by the insiders within this period.

3.2.4. Performance Evaluation Methods

3.2.4.1. The CAPM

As mentioned in the literature review chapter, there exist biases when abnormal returns are estimated using the CAPM. However, analysis of abnormal returns calculated using the CAPM is conducted to compare results with previous studies and to see whether there are any significant differences in results using different performance evaluation methods for securities trading on the ISE as well.

In order to analyze the risk adjusted return performance of the portfolios constructed in the previous section, daily returns of these portfolios are regressed on the CAPM factor:

$$R_{i,t} = \alpha_i + \beta_i \cdot (R_{M,t} - R_{f,t}) + \varepsilon_{i,t} \quad (3.8)$$

where $R_{i,t}$ is either the $R_{ZIP,t}$ given by equation 3.5, or $R_{ER\_NP,t}$ given by equation 3.6 or $R_{ER\_NS,t}$ given by equation3.7, $R_{f,t}$ is the risk free rate proxied by the repo rate, and $R_{M,t}$ is the value weighted return on the market portfolio proxied by the ISE-All on day t. Here α_i can be interpreted as the daily average abnormal return to portfolio i.

If the market is efficient and the CAPM factor captures all the relevant risks in estimating normal returns to a portfolio and insiders are not trading based on material non-public information, then it is expected that, for each of the portfolios constructed in the previous section, α_i should not be statistically significantly different from zero. The following hypothesis is tested:

$H_{0,1}$: Daily average abnormal return to portfolio i is equal to zero ($\alpha_i = 0$).
$H_{a,1}$: Daily average abnormal return to portfolio i is not equal to zero ($\alpha_i \neq 0$).

3.2.4.2. The Three Factor Model

The Three Factor Model proposed by Fama and French (1993) is used to measure the performance of insider portfolios after controlling for the effects of the size and the B/M ratio. The size and the B/M ratio return indices are constructed following the procedure proposed by Fama and French (1993) using daily returns instead of monthly returns. Market capitalization of each firm listed on the ISE is calculated by multiplying the number of shares outstanding and the market price of shares as

of the end of June. These firms are ranked based on their market capitalizations in June of each year beginning from 2005. Then, these firms are divided into big and small size groups based on the median market capitalization. Independent of the size-grouping, the ISE stocks are divided into three categories based on the ranking of their B/M ratio at the end of each calendar year. Companies in the top 30% are considered as high-B/M firms, whereas companies in the bottom 30% are considered as low-B/M firms, and the remaining companies are categorized as medium-B/M firms.

As a result of this procedure, six portfolios (Small High-B/M, Small Medium-B/M, Small Low-B/M, Big High-B/M, Big Medium-B/M, Big Low-B/M) are constructed from the intersection of the size and the B/M ratio categories. For example, Small Medium-B/M portfolio contains all stocks, which are in both small market value and medium B/M groups. Then, for each of these six portfolios, market value weighted daily returns from the beginning of July t to end of June t+1 are calculated. Size index (SMB_t) is then the difference between simple average returns on three small market portfolios and three big market portfolios. The B/M ratio index (HML_t) is calculated as simple average returns on two high B/M portfolios minus two low B/M portfolios.

In order to analyze the risk adjusted return performance of insider portfolios constructed in earlier sections, daily returns on these portfolios are regressed on the three Fama and French factors:

$$R_{i,t} = \alpha_i + \beta_{i,1} \cdot (R_{M,t} - R_{f,t}) + \beta_{i,2} \cdot SMB_t + \beta_{i,2} \cdot HML_t + \varepsilon_{i,t} \quad (3.9)$$

where $R_{i,t}$ is either the $R_{ZIP,t}$ given by equation 3.5, or $R_{ER\_NP,t}$ given by equation 3.6 or $R_{ER\_NS,t}$ given by equation3.7, $R_{f,t}$ is the risk free rate proxied by the repo rate, and $R_{M,t}$ is the value weighted return on the market portfolio proxied by the

ISE-All. SMB_t is the size index and HML_t is the B/M ratio index on day t. Here α_i can be interpreted as the daily average abnormal return to portfolio i.

If the market is efficient and the three Fama and French factors captures all the relevant risks in estimating normal returns to a portfolio and insiders are not trading based on material non-public information then it is expected that, for each of the portfolios constructed in the previous section, α_i should not be statistically significantly different from zero. The following hypothesis is tested:

$H_{0,2}$: Daily average abnormal return to portfolio i is equal to zero ($\alpha_i = 0$).
$H_{a,2}$: Daily average abnormal return to portfolio i is not equal to zero ($\alpha_i \neq 0$).

Furthermore, the risk adjusted return performance of insider and outsider portfolios are examined for different subgroups. Insider trades are classified into three as small, medium and large relative trade sizes based on the percentage of shares outstanding traded in that transaction. Similarly, insider trades are classified into four groups as Officers/Directors, Corporate Insiders, Institutional Investors and Shareholders according to the position of the insider in the company and his/her ability to access material non-public information about the company. Two more subgroup analyses are conducted based on the characteristics of companies in which insiders trade. The first classification is based on the market capitalization of companies. Based on this characteristic, insider trades are classified into three company size categories as trades in small, medium and large company shares. The second classification is based on B/M ratio of companies. Similarly, insider trades are classified into three B/M ratio categories as trades in low, medium and high B/M ratio company shares based on this characteristic. The risk adjusted return performance of the overall insider and outsider portfolios and subgroups mentioned above are presented and discussed in the following chapter.

CHAPTER 4

EMPRICAL RESULTS

4.1. Descriptive Statistics

During the analysis period of this study, shares of 329 companies are traded on the ISE. Of these 329 companies, Insiders are active in shares of 212 companies. Table 4.1 lists the ticker symbols of the twenty companies in which insiders are the most active during the period of this study.

As can be seen in Table 4.1, 36.57% of the insider transactions take place in 20 companies. Furthermore, observations in the most active 40 stocks account for 56.35% of the observations for the period from January 1, 2007 to December 31, 2008 for the ISE securities. Average daily observation for these 40 companies is approximately 0.2465 insider transactions per company Therefore; an insider trading is expected to be followed by another insider trading, on average, within 4 days for any of these 40 stocks. Thus, analyzing insider transactions without taking into account cross-sectional dependence of abnormal returns to these transactions might induce biases to the results. Furthermore, it is calculated from the insider trading dataset that, on average, an insider sell (repurchase) some portion of stocks purchased (sold) after 64.48 days (53.18 days). For the analysis in the following sections, 63 trading days (approximately 3 months) are used as longest holding period to proxy the holding period of insiders.

Table 4.1 Distribution of the insider trading activities grouped by the ticker symbol of the underlying company.

Company Ticker Symbol	Number of Observations	Cumulative Number of Observations	Observation (%)	Cumulative Observation (%)
BTCIM	284	284	3.23%	3.23%
GSRAY	221	505	2.52%	5.75%
GENTS	212	717	2.41%	8.16%
NUHCM	208	925	2.37%	10.53%
GLYHO	196	1121	2.23%	12.76%
TIRE	187	1308	2.13%	14.89%
ALGYO	175	1483	1.99%	16.88%
BUCIM	169	1652	1.92%	18.81%
IZMDC	169	1821	1.92%	20.73%
ASYAB	144	1965	1.64%	22.37%
FINBN	139	2104	1.58%	23.95%
YKGYO	138	2242	1.57%	25.52%
SARKY	136	2378	1.55%	27.07%
AGYO	129	2507	1.47%	28.54%
PEGYO	124	2631	1.41%	29.95%
YTFYO	123	2754	1.40%	31.35%
SKBNK	117	2871	1.33%	32.68%
BSKYO	115	2986	1.31%	33.99%
MIGRS	115	3101	1.31%	35.30%
GOLTS	111	3212	1.26%	36.57%
Next 20 Firms	1738	4950	19.79%	56.35%
Rest of the Firms	3834	8784	43.65%	100.00%

This table summarizes the number of observations for companies traded by insiders during the analysis period. The first column presents company ticker symbols. The second column gives the number of observations for the companies. The third column presents the cumulative number of observations. The fourth column shows the number of observations of each company as a percentage of total number of observations. The last column presents the cumulative number of observations in percentage.

Figure 4.1 presents Net Purchase Ratio (NPR) of the each month based on number of observations and TL value of the transactions for the analysis period. NPR of each month is the ratio of the net purchases to total insider transactions within that month. During the sample period of the study, insiders as a group, for all months, are net purchasers of their company shares based on the number of observations. If TL values of the transactions are considered instead of the number of observations, insiders seem to become net sellers of their company shares in certain months.

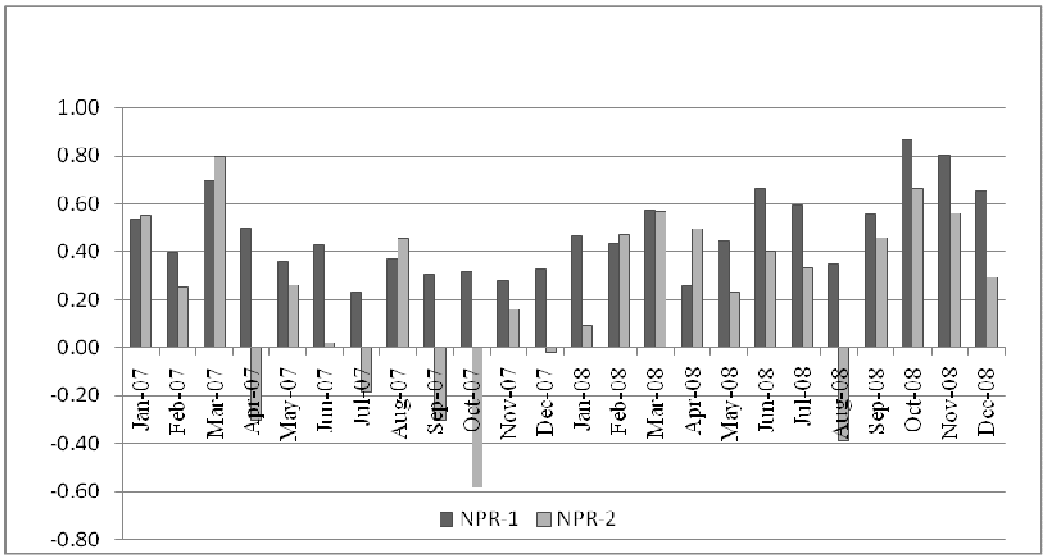

Figure 4.1 Net Purchase Ratios (NPR-1: based on number of observations, NPR-2: based on TL value of the transactions.)

As can be seen in Figure 4.2, months in which insiders are the net sellers of their company shares, in general, coincide with the peak levels of the ISE-ALL index. Moreover, the net purchase ratio seems to increase in the month following a significant decrease in the index. Thus, insiders might be timing their purchases as

contrarian investors, and buying when other market participants are overweighting recent economy wide bad news.

Figure 4.2 The ISE-ALL Return Index during the Period of the Study

Table 4.2 tabulates the breakdown of insider transactions and their underlying TL values as purchases and sales. Purchase observations as a percentage of total number of observations outnumber sale observations. However, if the TL value of transactions is considered, the gap between purchases and sales decreases significantly. Net purchase ratio (NPR) calculated for the dataset shows that insiders as a group are net buyers of their shares. Corporate Insiders are the most active group and Officers are the least active group during our sample period. In general, Company related insiders (i.e. Officers, Directors and Corporate Insiders) seem to be net purchasers of their company shares contrary to the findings of

similar studies done around the world. Shareholders are the net sellers of their company shares whereas Institutional Investors are neither net buyers nor net sellers.

Table 4.2 Distribution of the number of observations and TL value of the observations grouped by the type of insider

Type of the Insider		Purchase	Sale	Total	Purchase (mTL)	Sale (mTL)	Total (mTL)	Net Purchase Ratio (NPR)
Director	**(1)**	1746	328	2074	225.77	116.37	342.14	0.32
	(2)	19.88%	3.73%	23.61%	4.69%	2.42%	7.11%	
Officer	**(1)**	77	34	111	4.82	4.20	9.02	0.07
	(2)	0.88%	0.39%	1.26%	0.10%	0.09%	0.19%	
Corporate Insider	**(1)**	2515	506	3021	1,496.99	647.72	2,144.72	0.40
	(2)	28.63%	5.76%	34.39%	31.12%	13.46%	44.58%	
Institutional Investors	**(1)**	1707	1121	2828	984.75	994.63	1,979.38	0.00
	(2)	19.43%	12.76%	32.19%	20.47%	20.68%	41.14%	
Shareholder	**(1)**	567	183	750	127.21	208.27	335.48	-0.24
	(2)	6.45%	2.08%	8.54%	2.64%	4.33%	6.97%	
Overall	**(1)**	6612	2172	8784	2,839.55	1,971.19	4,810.74	0.18
	(2)	75.27%	24.73%	100.00%	59.03%	40.97%	100.00%	

This table summarizes the breakdown of the number of observations and their underlying total TL (in millions) values according to the type of insiders. The first three columns present purchase, sale and total number of observations for each insider group and overall dataset. The following three columns present the underlying total TL (millions) values of the observations for each group and the overall dataset. The last column presents net purchase ratios of each group, which is the ratio of net purchases to total transactions based on the TL value of the observations. Rows marked as (2) tabulates results in percentages.

Table 4.3 Panel A shows the classification of insider trades based on the relative size of their trades, and the market value and the book to market ratio of the company. Insiders generally purchase stocks in small/medium relative size quantities and sell stocks in larger quantities consistent with the trading behavior of their counterparts around the world. According to Panel B of Table 4.3, Directors, Officers and Corporate Insiders of small companies are generally net sellers or less

net buyers of their company shares compared to their counterparts in medium and big size firms. This pattern is different from the one reported in the literature (e.g. Finnerty, 1976b). In general, the trading behavior (their expectations about the prospects of their companies) of the Institutional Investors and Shareholders seems to differ from the first three groups of insiders.

Net purchase ratios indicate that Company Related Insiders of the value and medium B/M ratio firms are more intense purchasers of their firms' stock as opposed to Company Related Insiders of growth companies. These results are in line with the conclusions of Rozeff and Zaman (1998) that the proportion of insider buy transactions is positively related to the B/M ratio. Institutional Investors, on the other hand, are net sellers of value and medium B/M ratio firms.

Table 4.3 Descriptive Statistics for the Overall Dataset

Panel A: Relative Size of the Transaction

	Low (< 0.03 %)			Medium (0.03 % ≤ and ≤ 1%)			Large (>1%)		
Type	Purchase	Sale	Net Purchase Ratio	Purchase	Sale	Net Purchase Ratio	Purchase	Sale	Net Purchase Ratio
Director	1042	99	0.30	670	185	0.47	34	44	0.01
Officer	70	29	0.03	7	5	0.23	0	0	
Corporate Insider	1031	49	0.86	1329	319	0.69	155	138	0.16
Institutional Investors	732	327	0.24	926	747	0.04	49	47	-0.28
Shareholder	255	40	-0.21	246	108	-0.38	66	35	0.19

Panel B: Market Value of the Company

	Small Firms			Medium Firms			Big Firms		
Type	Purchase	Sale	Net Purchase Ratio	Purchase	Sale	Net Purchase Ratio	Purchase	Sale	Net Purchase Ratio
Director	231	142	-0.16	663	96	0.31	852	90	0.34
Officer	0	2	-1.00	17	6	0.32	60	26	0.07
Corporate Insider	724	298	0.08	623	144	0.39	1168	64	0.41
Institutional Investors	116	165	0.00	1026	551	0.08	565	405	-0.03
Shareholder	175	103	0.14	105	45	0.52	287	35	-0.45

Panel C: Book-to-Market Ratio of the Company

	Low B/M Ratio			Medium B/M Ratio			High B/M Ratio		
Type	Purchase	Sale	Net Purchase Ratio	Purchase	Sale	Net Purchase Ratio	Purchase	Sale	Net Purchase Ratio
Director	453	104	0.04	917	146	0.72	376	78	0.56
Officer	55	23	0.10	13	7	-0.08	9	4	0.21
Corporate Insider	943	108	0.28	961	236	0.70	611	162	0.38
Institutional Investors	760	357	0.07	535	388	-0.05	412	376	-0.29
Shareholder	279	66	-0.52	114	49	0.04	174	68	0.81

Panel A of this table presents the decomposition of observations based on the relative size of insider transactions for each insider group. The relative size of transaction is calculated by dividing the number of shares traded by the total number of shares of the company on the day of transaction. Panel B of this table presents the decomposition of insider transaction observations based on market capitalization of the underlying companies for each insider group. Panel C of this table presents the decomposition of the insider transaction observations based on book to market ratio of the underlying companies for each insider group. The columns marked as Purchase and Sale tabulate the number of purchase and sale observations for each group. Net Purchase Ratio columns present the ratio of net purchases to total transactions based on the TL value of observations of each group.

4.2. Results for Overall Insider and Outsider Portfolios

In this subsection, empirical results for the overall insider and outsider portfolios that are constructed by using all insider trading records reported to the ISE are discussed. The CAPM betas and the F-statistics of all the regressions are statistically significant. Furthermore, inclusion of SMB and HML increases the explanatory power of regressions, since adjusted R^2s of the three-factor regressions are greater than adjusted R^2s of the CAPM regressions (Table 4.4, Table 4.5 and Table 4.6.).

As can be seen in Panel A of Table 4.4, insiders earn daily average abnormal return (AAR) from their transactions (purchases and sales) for the 5-day holding period, if the risk adjusted returns are estimated by using the Fama and French three factor model. On the other hand, regression results related to outsider portfolios imply that outsiders cannot earn positive AARs by replicating all insider transactions reported to the ISE regardless of the holding period (Panel B of Table 4.4).

Results reported in Panel A of Table 4.5, show that portfolio constructed from stocks that are net purchased by insiders over previous 5 days earns statistically significant positive daily AAR. On the other hand, outsiders cannot earn positive AARs by purchasing stocks that are net purchased by insiders (Table 4.5, Panel B).

When risk adjusted return performance of net insider sale portfolios are investigated, evidences given in Panel A of Table 4.6 indicates that there exist statistically significant negative daily AARs over 5-day, 10-day and 21-day holding periods. On the other hand, abnormal returns to outsider net sale portfolios are not statistically significantly different from zero (Panel B of 4.6).

Table 4.4 Risk Adjusted Returns to Portfolios Constructed from All Insider Transactions

Panel A: Insider Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0014	0.0015	0.0007	0.0007	0.0004	0.0004	0.0001	0.0001	0.0000	-0.0001
p value	0.0516	0.0451	0.2916	0.2727	0.4833	0.4906	0.8100	0.8222	0.9393	0.9010
RM-RF	0.3182	0.3684	0.3079	0.3503	0.3090	0.3404	0.2614	0.2819	0.2103	0.2303
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.2763		0.2334		0.1700		0.1112		0.1065
p value		0.0005		0.0013		0.0094		0.0597		0.0560
HML		0.1880		0.1555		0.1945		0.1326		0.1768
p value		0.0580		0.0847		0.0173		0.0720		0.0112
adj. R^2	0.1797	0.2028	0.1996	0.2184	0.2354	0.2516	0.2143	0.2218	0.1641	0.1778
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0006	0.0006	0.0005	0.0005	0.0001	0.0001	0.0001	0.0001	-0.0002	-0.0002
p value	0.4378	0.4055	0.4540	0.4442	0.8333	0.8456	0.8449	0.8360	0.7154	0.6730
RM-RF	0.2571	0.3025	0.2849	0.3292	0.2838	0.3158	0.2102	0.2394	0.1897	0.2105
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.2519		0.2419		0.1729		0.1598		0.1105
p value		0.0017		0.0007		0.0093		0.0101		0.0494
HML		0.1241		0.2167		0.1966		0.1326		0.1918
p value		0.2145		0.0151		0.0179		0.0867		0.0064
adj. R^2	0.1234	0.1407	0.1785	0.2041	0.2010	0.2178	0.1366	0.1500	0.1349	0.1513
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk adjusted returns to portfolios constructed from insider transactions over different holding periods. Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk adjusted returns to portfolios constructed by outsiders to replicate insider transactions one-day after the announcement of insider transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) report the risk adjusted returns according to the CAPM and the three factor model respectively.

Table 4.5 Risk Adjusted Returns to Net Purchase Portfolios Constructed from All Insider Transactions

Panel A: Insider Net Purchase Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0014	0.0014	0.0007	0.0007	0.0003	0.0004	-0.0004	-0.0004	-0.0009	-0.0008
p value	0.0327	0.0227	0.2465	0.2011	0.5291	0.4758	0.3890	0.3974	0.0548	0.0475
RM-RF	0.7977	0.8708	0.7582	0.8278	0.7617	0.8231	0.7571	0.8258	0.7637	0.8348
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.4019		0.3831		0.3376		0.3783		0.3926
p value		0.0000		0.0000		0.0000		0.0000		0.0000
HML		0.2833		0.2582		0.2382		0.2446		0.2248
p value		0.0009		0.0006		0.0004		0.0001		0.0001
adj. R^2	0.6396	0.6703	0.6732	0.7053	0.7207	0.7477	0.7475	0.7822	0.7724	0.8090
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Net Purchase Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0007	0.0008	0.0004	0.0004	-0.0001	0.0000	-0.0007	-0.0007	-0.0011	-0.0011
p value	0.2666	0.2226	0.4881	0.4338	0.9040	0.9573	0.1677	0.1617	0.0150	0.0115
RM-RF	0.7729	0.8373	0.7443	0.8072	0.7528	0.8151	0.7424	0.8094	0.7568	0.8317
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.3562		0.3471		0.3442		0.3691		0.4150
p value		0.0000		0.0000		0.0000		0.0000		0.0000
HML		0.1899		0.2212		0.2107		0.2440		0.2116
p value		0.0254		0.0033		0.0020		0.0001		0.0002
adj. R^2	0.6321	0.6547	0.6667	0.6930	0.7112	0.7379	0.7256	0.7592	0.7622	0.8021
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk adjusted returns to net purchase portfolios constructed from stocks for which insiders are net buyers over previous t days (different holding periods). Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk adjusted returns to portfolios constructed by outsiders to replicate insider net purchase transactions one-day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) report the risk adjusted returns according to the CAPM and the three factor model respectively.

Table 4.6 Risk Adjusted Returns to Net Sale Portfolios Constructed from All Insider Transactions

Panel A: Insider Net Sale Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	-0.0036	-0.0036	-0.0018	-0.0018	-0.0018	-0.0017	-0.0006	-0.0006	-0.0006	-0.0006
p value	0.0005	0.0004	0.0508	0.0456	0.0224	0.0210	0.3242	0.3412	0.3759	0.4285
RM-RF	0.9019	0.9740	0.8790	0.9228	0.9111	0.9879	0.7896	0.8446	0.8496	0.9151
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.3922		0.2357		0.4231		0.3041		0.3664
p value		0.0003		0.0167		0.0000		0.0000		0.0000
HML		0.3918		0.3054		0.2836		0.1774		0.0959
p value		0.0038		0.0131		0.0053		0.0361		0.3120
adj. R^2	0.4858	0.5059	0.5254	0.5349	0.6243	0.6488	0.6473	0.6635	0.6272	0.6447
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Net Sale Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	-0.0020	-0.0019	-0.0015	-0.0015	-0.0009	-0.0008	-0.0006	-0.0006	-0.0004	-0.0003
p value	0.0581	0.0608	0.0861	0.0900	0.2464	0.2698	0.3590	0.3721	0.5728	0.6575
RM-RF	0.8884	0.9487	0.9127	0.9670	0.9149	0.9862	0.8066	0.8458	0.8377	0.9028
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.3326		0.2998		0.3958		0.2164		0.3656
p value		0.0029		0.0019		0.0000		0.0042		0.0000
HML		0.2005		0.1811		0.1744		0.1355		0.0530
p value		0.1486		0.1313		0.0884		0.1493		0.5769
adj. R^2	0.4697	0.4797	0.5554	0.5646	0.6262	0.6449	0.6149	0.6216	0.6204	0.6380
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk adjusted returns to net sale portfolios constructed from stocks for which insiders are net sellers over previous t days (different holding periods). Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk adjusted returns to portfolios constructed by outsiders to replicate insider net sale transactions one-day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) report the risk adjusted returns according to the CAPM and the three factor model respectively.

These results might indicate that investors perceive reported insider transactions as a signal of firm value and quickly adjust the prices of traded stocks. Since in this analysis, risk adjusted returns to an aggregate portfolio of all insiders with or without access to information is examined, it would only answer the question of whether person/corporation who are required to report their transactions to the ISE earn abnormal returns following their transactions. In the following section, whether abnormal returns to insiders differ based on the relative size of their transactions and the insider's relationship to the firm are investigated.

4.3. Portfolios Constructed based on Trade Characteristics

Several studies (e.g., Seyhun (1986), Jaffe (1974)) show the existence of a relationship between the information content of insider transaction, and the trade volume and position of an insider in the company. In order to test whether abnormal returns earned by insiders or outsiders following their trades differ across trade and insider specific characteristics, several portfolios are formed based on these characteristics.

4.3.1. Results Based on the Relative Size of Insider Transactions

Insider transactions are divided into three categories based on the percentage of the company shares traded in each transaction. Transactions involving greater than 1% of the company shares are considered as large relative volume transactions. Low relative volume transactions contain trades that are less than 0.03% of the total shares of the company. Remaining transactions are considered as medium relative volume transactions. For each category, portfolios are constructed in order to analyze the effect of the relative size of transaction on the abnormal returns earned by insiders and outsiders following the trades of insiders.

4.3.1.1. Low Relative Volume Transactions

Risk adjusted returns to portfolios that are constructed from low relative volume trades of insiders indicate that daily AARs to insiders and outsiders replicating insider trades are not statistically significantly different from zero regardless of the holding period (Panel A and B of Table 4.7.). Furthermore, regardless of the holding period, portfolios constructed from stocks of companies in which insiders are net purchasers in low relative trade volumes do not earn abnormal returns on a risk adjusted basis (Panel A and B of Table 4.8.).

On the other hand, there exist negative and statistically significant daily AARs returns to the net sale portfolios of insiders for all of the holding periods investigated except for the 10-day holding period (Panel A of Table 4.9). As it can be seen from Panel B of Table 4.9, outsider net sale portfolios are also experiencing statistically significant negative daily AARs except for the 5-day and 10-day holding periods. This daily negative AARs indicates that outsiders can avoid experiencing below market risk adjusted returns by not purchasing stocks that are net sold by insiders in low trade volumes over the previous 63 days.

Table 4.7 Risk Adjusted Returns to Portfolios Constructed from Low Relative Volume Transactions

Panel A: Insider Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0004	0.0004	0.0000	0.0000	0.0001	0.0001	-0.0001	-0.0001	-0.0002	-0.0002
p value	0.5983	0.5447	0.9736	0.9800	0.8131	0.8035	0.8491	0.8543	0.7246	0.7244
RM-RF	0.5496	0.6116	0.5308	0.5839	0.5595	0.5997	0.5297	0.5658	0.4807	0.5058
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.3440		0.2942		0.2198		0.1971		0.1372
p value		0.0000		0.0001		0.0006		0.0017		0.0201
HML		0.1657		0.1499		0.1906		0.1697		0.1267
p value		0.0982		0.1128		0.0175		0.0297		0.0852
adj. R^2	0.3889	0.4131	0.4018	0.4212	0.5104	0.5257	0.4979	0.5108	0.4811	0.4878
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0007	0.0007	-0.0003	-0.0002	0.0002	0.0002	-0.0002	-0.0002	-0.0003	-0.0003
p value	0.3705	0.3218	0.7120	0.7564	0.8025	0.7864	0.7327	0.7401	0.6160	0.6096
RM-RF	0.5360	0.5907	0.5481	0.5981	0.5476	0.5860	0.5287	0.5621	0.4758	0.4985
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.3054		0.2778		0.2103		0.1829		0.1232
p value		0.0001		0.0002		0.0012		0.0031		0.0354
HML		0.0994		0.1265		0.1650		0.1491		0.1277
p value		0.3140		0.1675		0.0407		0.0527		0.0804
adj. R^2	0.3860	0.4042	0.4330	0.4499	0.4979	0.5110	0.5048	0.5154	0.4806	0.4863
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk adjusted returns to portfolios constructed from low relative volume transactions of insiders over different holding periods. Transactions involving less than 0.03% of the firm equity are classified as low volume trades. Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk adjusted returns to portfolios constructed by outsiders to replicate low relative volume transactions of insiders one day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) report the risk adjusted returns according to the CAPM and the three factor model respectively.

Table 4.8 Risk Adjusted Returns to Net Purchase Portfolios Constructed from Low Relative Volume Transactions

Panel A: Insider Net Purchase Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0004	0.0004	0.0001	0.0002	-0.0002	-0.0002	-0.0004	-0.0004	-0.0004	-0.0004
p value	0.5854	0.4977	0.8238	0.7405	0.6547	0.6963	0.3938	0.4343	0.3679	0.4073
RM-RF	0.7777	0.8355	0.7584	0.8111	0.7639	0.8008	0.7385	0.7795	0.6908	0.7249
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.3241		0.2943		0.2046		0.2281		0.1905
p value		0.0000		0.0000		0.0003		0.0000		0.0002
HML		0.0527		0.0877		0.0922		0.0834		0.0579
p value		0.5575		0.2691		0.1858		0.2063		0.3616
adj. R^2	0.6126	0.6282	0.6581	0.6730	0.7204	0.7281	0.7263	0.7368	0.7173	0.7251
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Net Purchase Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0005	0.0006	-0.0002	-0.0001	-0.0003	-0.0003	-0.0006	-0.0005	-0.0006	-0.0005
p value	0.4826	0.3923	0.7667	0.8296	0.5254	0.5674	0.2529	0.2844	0.2263	0.2507
RM-RF	0.7845	0.8388	0.7557	0.7998	0.7613	0.7968	0.7347	0.7743	0.6858	0.7194
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.3067		0.2465		0.1975		0.2214		0.1871
p value		0.0000		0.0001		0.0005		0.0000		0.0002
HML		0.0029		0.0782		0.0731		0.0686		0.0651
p value		0.9739		0.3161		0.2961		0.2993		0.3022
adj. R^2	0.6264	0.6404	0.6670	0.6773	0.7182	0.7251	0.7245	0.7342	0.7167	0.7244
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk adjusted returns to low relative volume net purchase portfolios constructed from stocks for which insiders are net buyers over different holding periods. Transactions involving less than 0.03% of the firm equity are classified as low volume trades. Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk adjusted returns to net purchase portfolios constructed by outsiders to replicate low relative volume net purchase transactions of insiders one day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) report the risk adjusted returns according to the CAPM and the three factor model respectively.

Table 4.9 Risk Adjusted Returns to Net Sale Portfolios Constructed from Low Relative Volume Transactions

Panel A: Insider Net Sale Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	-0.0036	-0.0036	-0.0012	-0.0011	-0.0022	-0.0021	-0.0023	-0.0023	-0.0019	-0.0019
p value	0.0006	0.0007	0.2672	0.2802	0.0195	0.0227	0.0154	0.0176	0.0397	0.0430
RM-RF	0.6997	0.7093	0.6749	0.6941	0.7326	0.7508	0.7754	0.8128	0.7783	0.7987
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.0565		0.1079		0.1046		0.2098		0.1145
p value		0.6159		0.3394		0.2978		0.0431		0.2529
HML		-0.0592		0.0142		-0.0502		0.0396		0.0224
p value		0.6739		0.9196		0.6890		0.7595		0.8575
adj. R^2	0.3529	0.3506	0.3350	0.3334	0.4287	0.4278	0.4403	0.4430	0.4606	0.4598
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Net Sale Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	-0.0013	-0.0013	-0.0005	-0.0005	-0.0024	-0.0024	-0.0024	-0.0024	-0.0019	-0.0019
p value	0.2031	0.2041	0.6314	0.6096	0.0084	0.0089	0.0110	0.0116	0.0358	0.0401
RM-RF	0.7008	0.7052	0.6567	0.6461	0.7429	0.7515	0.7860	0.8041	0.7776	0.8052
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.0238		-0.0616		0.0481		0.1005		0.1555
p value		0.8310		0.5949		0.6226		0.3302		0.1215
HML		0.0281		0.0499		0.0176		0.0571		0.0158
p value		0.8399		0.7299		0.8854		0.6576		0.8994
adj. R^2	0.3585	0.3557	0.3122	0.3097	0.4498	0.4476	0.4502	0.4490	0.4582	0.4587
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk adjusted returns to low relative volume net sale portfolios constructed from stocks for which insiders are net sellers over different holding periods. Transactions involving less than 0.03% of the firm equity are classified as low volume trades. Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk adjusted returns to net sale portfolios constructed by outsiders to replicate low relative volume net sale transactions of insiders one day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) report the risk adjusted returns according to the CAPM and the three factor model respectively.

4.3.1.2. Medium Relative Volume Transactions

According to the results tabulated in Table 4.10, neither insiders nor outsiders, trading in medium relative volumes, earn daily AARs statistically significantly different from zero regardless of the holding period. Moreover, risk adjusted returns to insider net purchase portfolios indicate that insiders, as a group, do not earn above market returns from their net purchases (Table 4.11, Panel A). As can be seen from Panel B of Table 4.11, outsiders cannot earn above market returns on a risk adjusted basis by merely replicating medium relative volume net purchases of insiders.

On the other hand, there exists statistically significant negative daily AARs over 5- and 21-day holding periods to insider net sale portfolios (Table 4.12, Panel A). However, risk adjusted returns to outsider net sale portfolios indicate that outsiders cannot implement a profitable trading strategy (e.g. short selling) by merely replicating medium relative volume net sale transactions of insiders (Table 4.12, Panel B).

Table 4.10 Risk Adjusted Returns to Portfolios Constructed from Medium Relative Volume Transactions

Panel A: Insider Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0009	0.0009	0.0004	0.0004	0.0003	0.0002	-0.0003	-0.0003	-0.0003	-0.0004
p value	0.2416	0.2401	0.5914	0.5873	0.6871	0.7006	0.6759	0.6519	0.5575	0.5176
RM-RF	0.3021	0.3463	0.2716	0.3028	0.2820	0.3134	0.2511	0.2766	0.2322	0.2587
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.2401		0.1705		0.1695		0.1368		0.1405
p value		0.0046		0.0254		0.0163		0.0379		0.0258
HML		0.2470		0.1528		0.2032		0.1863		0.2305
p value		0.0194		0.1084		0.0211		0.0236		0.0035
adj. R^2	0.1487	0.1686	0.1494	0.1590	0.1807	0.1958	0.1671	0.1797	0.1568	0.1765
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0002	0.0002	0.0002	0.0002	-0.0001	-0.0001	-0.0005	-0.0005	-0.0005	-0.0005
p value	0.8043	0.7812	0.7617	0.7567	0.9106	0.9020	0.4292	0.4125	0.4392	0.3954
RM-RF	0.2269	0.2584	0.2388	0.2711	0.2615	0.2952	0.2318	0.2613	0.2076	0.2310
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.1743		0.1766		0.1829		0.1591		0.1231
p value		0.0360		0.0243		0.0107		0.0181		0.0557
HML		0.0941		0.1546		0.1928		0.1939		0.2428
p value		0.3637		0.1137		0.0311		0.0211		0.0026
adj. R^2	0.0932	0.0992	0.1135	0.1235	0.1550	0.1707	0.1403	0.1558	0.1245	0.1438
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk adjusted returns to portfolios constructed from medium relative volume transactions of insiders over different holding periods. Transactions involving greater than 0.03% and less than 1% of the firm equity are classified as medium volume trades. Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk adjusted returns to portfolios constructed by outsiders to replicate medium relative volume transactions of insiders one day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) report the risk adjusted returns according to the CAPM and the three factor model respectively.

Table 4.11 Risk Adjusted Returns to Net Purchase Portfolios Constructed from Medium Relative Volume Transactions

Panel A: Insider Net Purchase Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0010	0.0010	0.0003	0.0004	0.0000	0.0000	-0.0007	-0.0007	-0.0009	-0.0008
p value	0.1488	0.1183	0.5556	0.5007	0.9235	0.9494	0.1602	0.1417	0.0694	0.0577
RM-RF	0.7982	0.8805	0.7668	0.8371	0.7779	0.8426	0.7667	0.8386	0.7731	0.8443
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.4511		0.3865		0.3551		0.3953		0.3920
p value		0.0000		0.0000		0.0000		0.0000		0.0000
HML		0.3583		0.2781		0.2770		0.2920		0.2687
p value		0.0000		0.0002		0.0000		0.0000		0.0000
adj. R^2	0.6297	0.6705	0.6833	0.7168	0.7373	0.7683	0.7489	0.7882	0.7584	0.7957
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Net Purchase Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0005	0.0005	0.0002	0.0002	-0.0002	-0.0002	-0.0009	-0.0009	-0.0011	-0.0010
p value	0.4137	0.3697	0.7824	0.7359	0.6375	0.6604	0.0653	0.0531	0.0231	0.0175
RM-RF	0.7723	0.8344	0.7679	0.8350	0.7694	0.8347	0.7560	0.8291	0.7623	0.8365
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.3422		0.3690		0.3590		0.4019		0.4093
p value		0.0000		0.0000		0.0000		0.0000		0.0000
HML		0.2261		0.2688		0.2480		0.2874		0.2499
p value		0.0052		0.0003		0.0002		0.0000		0.0000
adj. R^2	0.6537	0.6770	0.6870	0.7176	0.7287	0.7588	0.7341	0.7745	0.7518	0.7916
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk adjusted returns to medium relative volume net purchase portfolios constructed from stocks for which insiders are net buyers over different holding periods. Transactions involving greater than 0.03% and less than 1% of the firm equity are classified as medium volume trades. Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk adjusted returns to net purchase portfolios constructed by outsiders to replicate medium relative volume net purchase transactions of insiders one day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) report the risk adjusted returns according to the CAPM and the three factor model respectively.

Table 4.12 Risk Adjusted Returns to Net Sale Portfolios Constructed from Medium Relative Volume Transactions

Panel A: Insider Net Sale Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	-0.0028	-0.0028	-0.0017	-0.0017	-0.0017	-0.0017	-0.0010	-0.0010	-0.0006	-0.0005
p value	0.0047	0.0044	0.0711	0.0709	0.0376	0.0360	0.1594	0.1508	0.3818	0.4316
RM-RF	0.9557	1.0281	0.9560	1.0186	0.9723	1.0377	0.9381	0.9964	0.9816	1.0507
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.3977		0.3439		0.3587		0.3181		0.3851
p value		0.0002		0.0006		0.0001		0.0000		0.0000
HML		0.2932		0.2572		0.2783		0.2846		0.1228
p value		0.0281		0.0392		0.0127		0.0019		0.1858
adj. R^2	0.5226	0.5389	0.5575	0.5702	0.6168	0.6326	0.6885	0.7050	0.6996	0.7162
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Net Sale Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	-0.0016	-0.0015	-0.0016	-0.0016	-0.0013	-0.0013	-0.0008	-0.0008	-0.0007	-0.0006
p value	0.1194	0.1276	0.0727	0.0726	0.1210	0.1175	0.2591	0.2475	0.3306	0.3875
RM-RF	0.9103	0.9792	0.9623	1.0099	0.9752	1.0365	0.9285	0.9864	0.9700	1.0393
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.3818		0.2609		0.3355		0.3162		0.3885
p value		0.0004		0.0083		0.0002		0.0000		0.0000
HML		0.1967		0.2134		0.2821		0.2956		0.0747
p value		0.1429		0.0834		0.0114		0.0016		0.4260
adj. R^2	0.4963	0.5097	0.5695	0.5765	0.6198	0.6341	0.6755	0.6923	0.6902	0.7069
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk adjusted returns to medium relative volume net sale portfolios constructed from stocks for which insiders are net sellers over different holding periods. Transactions involving greater than 0.03% and less than 1% of the firm equity are classified as medium volume trades. Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk adjusted returns to net sale portfolios constructed by outsiders to replicate medium relative volume net sale transactions of insiders one day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) report the risk adjusted returns according to the CAPM and the three factor model respectively.

4.3.1.3. Large Relative Volume Transactions

Empirical results for large relative volume transactions tabulated in Table 4.13 indicate that neither insiders nor outsiders replicating trades of insiders earn above market returns on a risk adjusted basis regardless of the holding period. Furthermore, risk adjusted return performance of insider and outsider net purchase portfolios are not statistically significantly different from zero (Panel A and B of Table 4.14). Among the net sales portfolios constructed, only the insider net sale portfolio with a 21-day holding period experiences statistically significant negative daily AAR (Table 4.15, Panel A).

Findings of this section can be summarized as follows: insiders, as a group, do not earn above market returns from their transactions regardless of the trade volume. Similarly, outsiders cannot implement a profitable trading strategy based on relative trade volume, by merely replicating transactions of insiders. Since net purchase portfolios constructed for insiders do not earn positive daily AARs over different holding periods, insiders, as a group, do not seem to concentrate their purchases to certain relative trade volumes to exploit material nonpublic information. On the other hand, statistically significant negative daily AARs to low relative volume net sales of insiders over longer holding periods than medium and large relative volume transactions indicate that information driven sales of insiders are concentrated in low relative trade volumes. Furthermore, statistically significant daily negative AARs to low relative volume outsider net sale portfolios over different holding periods (i.e. 21-,42-,63-day) as opposed to no abnormal returns to medium and large relative volume outsider net sale portfolios affirms this conclusion.

Table 4.13 Risk Adjusted Returns to Portfolios Constructed from Large Relative Volume Transactions

Panel A: Insider Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0026	0.0028	0.0024	0.0025	0.0016	0.0016	0.0008	0.0008	0.0006	0.0006
p value	0.1352	0.1101	0.0711	0.0599	0.0820	0.0748	0.2410	0.2212	0.3697	0.3685
RM-RF	0.1163	0.2017	0.3212	0.3917	0.1115	0.1305	0.1073	0.1106	0.0150	0.0138
p value	0.1231	0.0164	0.0000	0.0000	0.0056	0.0031	0.0003	0.0007	0.6101	0.6690
SMB		0.4514		0.3664		0.1081		0.0222		-0.0062
p value		0.0221		0.0173		0.2783		0.7638		0.9325
HML		0.0458		0.1544		-0.0317		-0.0930		-0.0174
p value		0.8447		0.3966		0.7986		0.3147		0.8493
adj. R^2	0.0033	0.0110	0.0628	0.0716	0.0152	0.0136	0.0267	0.0249	-0.0017	-0.0062
Sig. F	0.1231	0.0544	0.0000	0.0000	0.0056	0.0296	0.0003	0.0030	0.6101	0.9600

Panel B: Outsider Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	-0.0001	0.0000	0.0019	0.0020	0.0006	0.0007	0.0010	0.0011	0.0003	0.0003
p value	0.9563	0.9859	0.1759	0.1600	0.5147	0.4784	0.1619	0.1428	0.6429	0.6284
RM-RF	0.1518	0.2284	0.2465	0.3036	0.1055	0.1309	0.0415	0.0534	0.0272	0.0368
p value	0.0379	0.0049	0.0001	0.0000	0.0099	0.0035	0.1932	0.1261	0.3702	0.2684
SMB		0.4098		0.3114		0.1444		0.0706		0.0541
p value		0.0310		0.0437		0.1548		0.3736		0.4739
HML		0.1046		0.2729		-0.0336		-0.0907		0.0036
p value		0.6427		0.1522		0.7907		0.3599		0.9697
adj. R^2	0.0079	0.0144	0.0340	0.0421	0.0129	0.0133	0.0016	0.0011	-0.0004	-0.0039
Sig. F	0.0379	0.0290	0.0001	0.0001	0.0099	0.0318	0.1932	0.3216	0.3702	0.7253

Panel A of this table presents the risk adjusted returns to portfolios constructed from large relative volume transactions of insiders over different holding periods. Transactions involving greater than 1% of the firm equity are classified as large volume trades. Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk adjusted returns to portfolios constructed by outsiders to replicate large relative volume transactions of insiders one-day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) report the risk adjusted returns according to the CAPM and the three factor model respectively.

Table 4.14 Risk Adjusted Returns to Net Purchase Portfolios Constructed from Large Relative Volume Transactions

Panel A: Insider Net Purchase Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0003	0.0005	0.0000	0.0001	-0.0001	-0.0001	-0.0008	-0.0007	-0.0012	-0.0011
p value	0.8674	0.7843	0.9930	0.9477	0.9213	0.9310	0.3632	0.3864	0.1064	0.1146
RM-RF	0.8086	0.9253	0.8093	0.9210	0.7890	0.8889	0.7277	0.8196	0.7306	0.8244
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.6086		0.5719		0.5469		0.5081		0.5215
p value		0.0033		0.0008		0.0000		0.0000		0.0000
HML		0.2480		0.4973		0.4656		0.2809		0.2245
p value		0.3112		0.0138		0.0010		0.0119		0.0164
adj. R^2	0.1976	0.2112	0.2595	0.2828	0.3934	0.4322	0.4653	0.5044	0.5479	0.5942
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Net Purchase Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	-0.0014	-0.0012	-0.0001	0.0001	-0.0009	-0.0008	-0.0008	-0.0008	-0.0014	-0.0013
p value	0.3919	0.4565	0.9592	0.9659	0.4218	0.4271	0.3235	0.3349	0.0623	0.0666
RM-RF	0.7945	0.9383	0.8413	0.9638	0.7802	0.8703	0.7118	0.7867	0.7275	0.8255
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.7661		0.6667		0.4948		0.4131		0.5449
p value		0.0000		0.0000		0.0000		0.0000		0.0000
HML		0.2857		0.6419		0.3752		0.2672		0.2188
p value		0.1729		0.0005		0.0090		0.0184		0.0232
adj. R^2	0.2393	0.2704	0.3050	0.3467	0.3835	0.4125	0.4533	0.4803	0.5303	0.5792
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk adjusted returns to large relative volume net purchase portfolios constructed from stocks for which insiders are net buyers over different holding periods. Transactions involving greater than 1% of the firm equity are classified as large volume trades. Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk adjusted returns to net purchase portfolios constructed by outsiders to replicate large relative volume net purchase transactions of insiders one-day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) report the risk adjusted returns according to the CAPM and the three factor model respectively.

Table 4.15 Risk Adjusted Returns to Net Sale Portfolios Constructed from Large Relative Volume Transactions

Panel A: Insider Net Sale Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	-0.0035	-0.0034	-0.0025	-0.0023	-0.0034	-0.0032	-0.0013	-0.0012	-0.0006	-0.0005
p value	0.0737	0.0776	0.2230	0.2418	0.0087	0.0073	0.2073	0.2166	0.5295	0.6037
RM-RF	0.7666	0.8972	0.7302	0.8657	0.9500	1.1249	0.8193	0.9832	0.7963	0.9521
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.7221		0.7529		0.9681		0.9082		0.8667
p value		0.0005		0.0006		0.0000		0.0000		0.0000
HML		0.4110		0.3255		0.5103		0.4513		0.3447
p value		0.1119		0.2298		0.0018		0.0006		0.0080
adj. R^2	0.1574	0.1796	0.1334	0.1544	0.3979	0.4700	0.4199	0.5093	0.4167	0.4987
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Net Sale Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	-0.0025	-0.0024	-0.0023	-0.0021	-0.0019	-0.0017	-0.0015	-0.0013	-0.0006	-0.0005
p value	0.1877	0.2091	0.1838	0.2224	0.1259	0.1341	0.1668	0.1828	0.5352	0.6307
RM-RF	0.7381	0.8508	0.7672	0.8944	0.9610	1.1507	0.8232	0.9726	0.7652	0.9213
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.6300		0.7184		1.0549		0.8307		0.8712
p value		0.0022		0.0002		0.0000		0.0000		0.0000
HML		0.1754		-0.0109		0.4313		0.3426		0.2689
p value		0.4932		0.9632		0.0045		0.0105		0.0355
adj. R^2	0.1510	0.1655	0.1831	0.2061	0.4300	0.5166	0.4228	0.4945	0.4038	0.4886
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk adjusted returns to large relative volume net sale portfolios constructed from stocks for which insiders are net sellers over different holding periods. Transactions involving greater than 1% of the firm equity are classified as large volume trades. Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk adjusted returns to net sale portfolios constructed by outsiders to replicate large relative volume net sale transactions of insiders one-day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) report the risk adjusted returns according to the CAPM and the three factor model respectively.

4.3.2. Results Based on the Position of the Insider in the Company

For the different positions of the insiders in the company, namely Officers/Directors (Officers and members of Board of Directors), Corporate Insiders, Institutional Investors, and Shareholders, sub portfolios are constructed in order to analyze abnormal returns for each group. These classifications are different from the classifications given in the descriptive statistics section to avoid analyzing a small sample of Officer group separately.

4.3.2.1. Officers/Directors

When risk adjusted returns to the insider portfolios constructed from Officer/Director transactions are analyzed, daily AARs to these portfolios for all of the different holding periods are not statistically significantly different from zero. According to results tabulated in Panel B of Table 4.16, outsiders cannot achieve daily AARs by merely replicating transactions of the Officers/Directors on the day following the reporting of these transactions to the ISE. Furthermore, abnormal return estimates given in Table 4.17 indicates that return performance of insider and outsider net purchase portfolios do not statistically significantly differ from the market on a risk adjusted basis. For the portfolios constructed from stocks that are net sold by Officers/Directors as a group, there exist statistically significant daily AARs over 5-day, 21-day and 42-day holding periods (Panel A, Table 4.18). As can be seen from Panel B of Table 4.18, return performance of the outsider net sale portfolios, on the other hand, do not statistically significantly differ from the market on a risk adjusted basis with one exception. Under the CAPM, there exists statistically significant negative daily AAR over 21-day holding period (Table 4.18, Panel B).

Table 4.16 Risk Adjusted Returns to Portfolios Constructed from Officer/ Director Transactions

Panel A: Insider Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0014	0.0015	0.0002	0.0003	0.0006	0.0006	0.0003	0.0004	0.0002	0.0002
p value	0.1601	0.1264	0.8171	0.7353	0.5000	0.4685	0.6857	0.6691	0.8139	0.8264
RM-RF	0.5579	0.6389	0.5283	0.6010	0.4947	0.5625	0.4642	0.5198	0.4111	0.4430
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.4524		0.4068		0.3734		0.3049		0.1724
p value		0.0000		0.0000		0.0001		0.0009		0.0467
HML		0.1272		0.0983		0.2510		0.2418		0.2050
p value		0.3312		0.4141		0.0303		0.0335		0.0583
adj. R^2	0.2771	0.3041	0.2895	0.3146	0.2784	0.3063	0.2627	0.2833	0.2384	0.2468
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0004	0.0005	-0.0001	0.0000	0.0003	0.0003	0.0002	0.0002	0.0002	0.0001
p value	0.6954	0.6081	0.9208	0.9815	0.7201	0.7126	0.8510	0.8447	0.8378	0.8629
RM-RF	0.5825	0.6669	0.5289	0.5954	0.4903	0.5472	0.4623	0.5148	0.4027	0.4302
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.4718		0.3702		0.3110		0.2868		0.1471
p value		0.0000		0.0001		0.0008		0.0015		0.0870
HML		0.1380		0.1425		0.2802		0.2554		0.2196
p value		0.2476		0.2167		0.0156		0.0234		0.0410
adj. R^2	0.3320	0.3652	0.3086	0.3314	0.2767	0.2988	0.2649	0.2847	0.2340	0.2418
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk adjusted returns to portfolios constructed from transactions of Officers/Directors over different holding periods. Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk adjusted returns to portfolios constructed by outsiders to replicate transactions of Officers/Directors one day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) report the risk adjusted returns according to the CAPM and the three factor model respectively.

Table 4.17 Risk Adjusted Returns to Net Purchase Portfolios Constructed from Officer/ Director Transactions

Panel A: Insider Net Purchase Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0007	0.0008	0.0001	0.0002	0.0003	0.0004	-0.0001	0.0000	-0.0005	-0.0004
p value	0.3954	0.3144	0.8636	0.7335	0.6845	0.5715	0.8374	0.9469	0.4937	0.5869
RM-RF	0.8469	0.9413	0.8211	0.9081	0.8328	0.9123	0.8185	0.9045	0.8321	0.9223
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.5271		0.4883		0.4451		0.4802		0.5048
p value		0.0000		0.0000		0.0000		0.0000		0.0000
HML		0.1673		0.0917		0.1081		0.1443		0.1158
p value		0.1403		0.3539		0.2477		0.1105		0.1866
adj. R^2	0.5333	0.5657	0.5835	0.6154	0.6187	0.6461	0.6221	0.6560	0.6405	0.6776
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Net Purchase Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0003	0.0004	0.0001	0.0002	0.0002	0.0003	-0.0004	-0.0003	-0.0005	-0.0004
p value	0.6912	0.5736	0.9198	0.7897	0.7907	0.6850	0.5716	0.6527	0.4740	0.5618
RM-RF	0.8392	0.9259	0.8149	0.8911	0.8232	0.8960	0.8158	0.8996	0.8337	0.9207
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.4868		0.4282		0.4071		0.4672		0.4866
p value		0.0000		0.0000		0.0000		0.0000		0.0000
HML		0.0838		0.0427		0.1056		0.1499		0.1151
p value		0.4323		0.6572		0.2492		0.0925		0.1804
adj. R^2	0.5596	0.5884	0.5970	0.6220	0.6249	0.6485	0.6278	0.6606	0.6511	0.6861
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk adjusted returns to net purchase portfolios constructed from stocks for which Officers/Directors are net buyers over previous t days (different holding periods). Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk adjusted returns to portfolios constructed by outsiders to replicate Officers/Directors net purchase transactions one day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) report the risk adjusted returns according to the CAPM and the three factor model respectively.

Table 4.18 Risk Adjusted Returns to Net Sale Portfolios Constructed from Officer/ Director Transactions

Panel A: Insider Net Sale Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	-0.0036	-0.0036	-0.0015	-0.0014	-0.0024	-0.0023	-0.0024	-0.0022	-0.0015	-0.0014
p value	0.0031	0.0030	0.1973	0.2051	0.0341	0.0436	0.0303	0.0414	0.1034	0.1410
RM-RF	0.8126	0.8292	0.7454	0.7805	0.7411	0.7953	0.7409	0.8112	0.6274	0.6846
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.0886		0.1939		0.3105		0.4021		0.3303
p value		0.5048		0.1148		0.0129		0.0007		0.0012
HML		0.1356		0.1065		-0.1054		-0.1410		-0.2080
p value		0.4138		0.4873		0.4978		0.3387		0.1020
adj. R^2	0.3453	0.3438	0.3409	0.3421	0.3302	0.3379	0.3512	0.3676	0.3423	0.3605
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Net Sale Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	-0.0018	-0.0018	-0.0015	-0.0015	-0.0024	-0.0022	-0.0020	-0.0018	-0.0013	-0.0012
p value	0.1292	0.1363	0.1666	0.1830	0.0413	0.0554	0.0628	0.0830	0.1615	0.2156
RM-RF	0.7452	0.7734	0.7396	0.7833	0.8050	0.8906	0.6958	0.7659	0.6210	0.6810
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.1573		0.2453		0.4872		0.4001		0.3467
p value		0.2291		0.0414		0.0001		0.0005		0.0008
HML		0.0545		0.0466		-0.0982		-0.1160		-0.2101
p value		0.7385		0.7560		0.5280		0.4183		0.1030
adj. R^2	0.3139	0.3131	0.3471	0.3504	0.3626	0.3829	0.3350	0.3520	0.3314	0.3511
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk adjusted returns to net sale portfolios constructed from stocks for which Officers/Directors are net sellers over previous t days (different holding periods). Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk adjusted returns to portfolios constructed by outsiders to replicate Officers/Directors net sale transactions one day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) report the risk adjusted returns according to the CAPM and the three factor model respectively.

4.3.2.2. Corporate Insiders:

Daily AARs to Corporate Insiders for different holding periods are not statistically significantly different from zero (Panel A of Table 4.19). Moreover, outsiders do not earn positive daily average abnormal returns by replicating transactions of Corporate Insiders either (Panel B of Table 4.19).

Corporate Insiders, as a group, do experience statistically significant positive daily average abnormal performance for the 5-day holding period from their net purchases (Panel A of Table 4.20). According to the daily AARs reported in Panel B of Table 4.20, outsiders cannot earn above market returns on a risk adjusted basis by merely purchasing stocks that are net bought by Corporate Insiders.

However, stocks in which Corporate Insiders are net sellers seem to statistically significantly underperform the market on a risk-adjusted basis over holding periods up to 21-days (Panel A of Table 4.21). Since Corporate Insiders are selling these stocks, they are earning positive abnormal returns over holding periods up to 21-days. Similarly, outsiders can avoid negative abnormal returns by not purchasing or selling stocks that are net sold by Corporate Insiders over holding periods up to 21-days (Panel B of Table 4.21).

Table 4.19 Risk Adjusted Returns to Portfolios Constructed from Corporate Insider Transactions

Panel A: Insider Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0012	0.0012	0.0008	0.0007	0.0009	0.0008	-0.0002	-0.0003	-0.0010	-0.0011
p value	0.1731	0.1869	0.3539	0.3700	0.2071	0.2564	0.7732	0.6790	0.0863	0.0705
RM-RF	0.5481	0.5798	0.5490	0.5972	0.4620	0.4636	0.4533	0.4507	0.5038	0.5234
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.1674		0.2583		-0.0023		-0.0237		0.1019
p value		0.0856		0.0041		0.9753		0.7409		0.1093
HML		0.2985		0.3598		0.2936		0.2339		0.2397
p value		0.0143		0.0014		0.0019		0.0092		0.0027
adj. R^2	0.3058	0.3156	0.3380	0.3600	0.3413	0.3529	0.3574	0.3649	0.4646	0.4753
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0004	0.0004	0.0012	0.0011	0.0007	0.0006	-0.0003	-0.0003	-0.0012	-0.0012
p value	0.6710	0.6822	0.1378	0.1624	0.2838	0.3438	0.6976	0.6008	0.0446	0.0378
RM-RF	0.5105	0.5553	0.4845	0.5014	0.4569	0.4622	0.4387	0.4366	0.5147	0.5421
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.2422		0.0833		0.0180		-0.0213		0.1466
p value		0.0201		0.3477		0.8084		0.7675		0.0197
HML		0.2825		0.3266		0.3051		0.2546		0.2243
p value		0.0299		0.0033		0.0011		0.0049		0.0043
adj. R^2	0.2499	0.2622	0.2922	0.3036	0.3418	0.3548	0.3387	0.3481	0.4815	0.4937
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk adjusted returns to portfolios constructed from transactions of Corporate Insiders over different holding periods. Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk adjusted returns to portfolios constructed by outsiders to replicate transactions of Coporate Insiders one day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) report the risk adjusted returns according to the CAPM and the three factor model respectively.

Table 4.20 Risk Adjusted Returns to Net Purchase Portfolios Constructed from Corporate Insider Transactions

Panel A: Insider Net Purchase Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0019	0.0019	0.0013	0.0012	0.0006	0.0005	-0.0006	-0.0006	-0.0011	-0.0011
p value	0.0085	0.0090	0.0684	0.0702	0.3882	0.4221	0.3695	0.3336	0.0575	0.0472
RM-RF	0.7560	0.7933	0.7556	0.8028	0.7414	0.7801	0.7372	0.7869	0.7410	0.8001
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.1988		0.2531		0.2051		0.2682		0.3218
p value		0.0116		0.0007		0.0037		0.0000		0.0000
HML		0.3088		0.3564		0.3533		0.3310		0.3078
p value		0.0017		0.0001		0.0001		0.0001		0.0000
adj. R^2	0.5598	0.5725	0.5800	0.6001	0.5992	0.6173	0.6296	0.6525	0.6665	0.6947
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Net Purchase Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0011	0.0010	0.0008	0.0008	0.0001	0.0001	-0.0007	-0.0007	-0.0013	-0.0013
p value	0.1581	0.1664	0.2380	0.2521	0.8389	0.8858	0.2953	0.2641	0.0286	0.0237
RM-RF	0.7496	0.7861	0.7197	0.7579	0.7350	0.7788	0.7326	0.7833	0.7524	0.8192
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.1956		0.2041		0.2344		0.2741		0.3669
p value		0.0173		0.0075		0.0010		0.0000		0.0000
HML		0.2833		0.3063		0.3521		0.3290		0.2843
p value		0.0058		0.0013		0.0001		0.0001		0.0002
adj. R^2	0.5355	0.5462	0.5506	0.5647	0.5928	0.6130	0.6240	0.6473	0.6674	0.6989
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk adjusted returns to net purchase portfolios constructed from stocks for which Coporate Insiders are net buyers over previous t days (different holding periods). Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk adjusted returns to portfolios constructed by outsiders to replicate Coporate Insiders net purchase transactions one day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) report the risk adjusted returns according to the CAPM and the three factor model respectively.

Table 4.21 Risk Adjusted Returns to Net Sale Portfolios Constructed from Corporate Insider Transactions

Panel A: Insider Net Sale Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	-0.0045	-0.0045	-0.0045	-0.0045	-0.0042	-0.0039	-0.0014	-0.0012	-0.0012	-0.0010
p value	0.0023	0.0020	0.0018	0.0015	0.0011	0.0013	0.2812	0.3225	0.2885	0.3359
RM-RF	0.8038	0.9142	0.9029	1.0078	0.9387	1.1002	0.9237	1.0699	0.9172	1.0526
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.6050		0.5734		0.9096		0.8156		0.7559
p value		0.0001		0.0002		0.0000		0.0000		0.0000
HML		0.4903		0.5129		0.0658		0.2628		0.2200
p value		0.0127		0.0069		0.6902		0.1229		0.1339
adj. R^2	0.2614	0.2898	0.3246	0.3513	0.3911	0.4485	0.3747	0.4209	0.4405	0.4877
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Net Sale Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	-0.0049	-0.0049	-0.0045	-0.0043	-0.0042	-0.0040	-0.0014	-0.0013	-0.0013	-0.0012
p value	0.0011	0.0010	0.0017	0.0017	0.0007	0.0008	0.2418	0.2866	0.2191	0.2625
RM-RF	0.8550	0.9621	1.0466	1.2139	0.9465	1.0977	0.9343	1.0733	0.9150	1.0474
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.5887		0.9323		0.8513		0.7785		0.7415
p value		0.0002		0.0000		0.0000		0.0000		0.0000
HML		0.4307		0.3335		0.0593		0.1819		0.1648
p value		0.0310		0.0707		0.7118		0.2563		0.2459
adj. R^2	0.2807	0.3045	0.3939	0.4442	0.4104	0.4621	0.4088	0.4528	0.4551	0.5017
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk adjusted returns to net sale portfolios constructed from stocks for which Coporate Insiders are net sellers over previous t days (different holding periods). Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk adjusted returns to portfolios constructed by outsiders to replicate Coporate Insiders net sale transactions one day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) report the risk adjusted returns according to the CAPM and the three factor model respectively.

4.3.2.3. Institutional Investors:

Average daily abnormal returns to Institutional Investors and outsiders following their trades for different holding periods are not statistically significantly different from zero (Panels A and Panel B of Table 4.22). Furthermore, performance of the stocks that are net bought by Institutional Investors is not statistically significantly different from zero for the insider and the outsider portfolios over any holding periods (Panels A and B of Table 4.23).

On the other hand, stocks that are net sold by Institutional Investors statistically significantly underperform the market on a risk adjusted basis only for the 5-day holding period. According to results reported in Panel B of Table 4.24, outsiders can avoid negative abnormal returns by selling or not purchasing stocks that are net sold by Institutional Investors over the previous 5 days.

Table 4.22 Risk Adjusted Returns to Portfolios Constructed from Institutional Investor Transactions

Panel A: Insider Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0014	0.0015	0.0012	0.0013	0.0007	0.0008	0.0005	0.0005	0.0007	0.0007
p value	0.1945	0.1704	0.1349	0.1144	0.3365	0.2869	0.4385	0.3747	0.2846	0.2894
RM-RF	-0.0821	-0.0706	-0.1492	-0.1401	-0.1868	-0.1671	-0.1695	-0.1401	-0.1982	-0.1970
p value	0.0776	0.1648	0.0000	0.0003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.0718		0.0574		0.1161		0.1677		0.0060
p value		0.5339		0.5140		0.1363		0.0114		0.9354
HML		-0.1822		-0.1602		-0.1209		-0.0501		0.0202
p value		0.2067		0.1449		0.2142		0.5439		0.8267
adj. R^2	0.0048	0.0052	0.0369	0.0386	0.0729	0.0775	0.0822	0.0930	0.0911	0.0871
Sig. F	0.0776	0.1535	0.0000	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0004	0.0005	0.0011	0.0011	0.0003	0.0004	0.0002	0.0003	0.0005	0.0005
p value	0.6890	0.6255	0.2123	0.1986	0.6759	0.5886	0.7225	0.6141	0.4757	0.4865
RM-RF	-0.2297	-0.2338	-0.1838	-0.1592	-0.2055	-0.1670	-0.2078	-0.1531	-0.2361	-0.2328
p value	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		-0.0121		0.1381		0.2203		0.3091		0.0169
p value		0.9156		0.1406		0.0070		0.0000		0.8188
HML		-0.2989		0.0231		-0.0740		-0.0039		0.0478
p value		0.0372		0.8431		0.4664		0.9652		0.6031
adj. R^2	0.0514	0.0565	0.0496	0.0499	0.0797	0.0928	0.1003	0.1335	0.1256	0.1222
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk adjusted returns to portfolios constructed from transactions of Institutional Investors over different holding periods. Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk adjusted returns to portfolios constructed by outsiders to replicate transactions of Institutional Investors one day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) report the risk adjusted returns according to the CAPM and the three factor model respectively.

Table 4.23 Risk Adjusted Returns to Net Purchase Portfolios Constructed from Institutional Investor Transactions

Panel A: Insider Net Purchase Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0009	0.0010	0.0005	0.0006	0.0002	0.0003	0.0000	0.0000	-0.0005	-0.0004
p value	0.4438	0.3629	0.6152	0.5380	0.7803	0.6929	0.9916	0.9580	0.4691	0.5201
RM-RF	0.7211	0.8302	0.6482	0.7529	0.6481	0.7514	0.6351	0.7241	0.6692	0.7565
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.6098		0.5808		0.5730		0.4900		0.4851
p value		0.0000		0.0000		0.0000		0.0000		0.0000
HML		0.1581		0.2663		0.2792		0.3225		0.2137
p value		0.2812		0.0376		0.0116		0.0007		0.0185
adj. R^2	0.3340	0.3706	0.3445	0.3901	0.4083	0.4624	0.4700	0.5219	0.5212	0.5667
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Net Purchase Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0002	0.0003	0.0002	0.0002	0.0000	0.0000	-0.0004	-0.0004	-0.0008	-0.0007
p value	0.8544	0.7591	0.8602	0.8372	0.9569	0.9665	0.5623	0.5771	0.2900	0.3266
RM-RF	0.6011	0.6965	0.6449	0.7487	0.6248	0.7339	0.6152	0.7034	0.6333	0.7215
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.5337		0.5684		0.6041		0.4853		0.4908
p value		0.0000		0.0000		0.0000		0.0000		0.0000
HML		0.1337		0.4842		0.3205		0.3436		0.1898
p value		0.3226		0.0000		0.0035		0.0004		0.0423
adj. R^2	0.2920	0.3269	0.3888	0.4525	0.3915	0.4551	0.4508	0.5044	0.4799	0.5267
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk adjusted returns to net purchase portfolios constructed from stocks for which Institutional Investors are net buyers over previous t days (different holding periods). Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk adjusted returns to portfolios constructed by outsiders to replicate Institutional Investors net purchase transactions one day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) report the risk adjusted returns according to the CAPM and the three factor model respectively.

Table 4.24 Risk Adjusted Returns to Net Sale Portfolios Constructed from Institutional Investor Transactions

Panel A: Insider Net Sale Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	-0.0022	-0.0022	-0.0014	-0.0015	-0.0012	-0.0013	-0.0005	-0.0005	-0.0009	-0.0008
p value	0.0467	0.0395	0.1435	0.1297	0.1582	0.1338	0.4828	0.4492	0.2455	0.2567
RM-RF	0.9163	1.0080	0.9160	0.9805	0.9787	1.0416	0.8443	0.9038	0.8721	0.9459
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.4979		0.3487		0.3379		0.3217		0.4081
p value		0.0000		0.0009		0.0002		0.0000		0.0000
HML		0.5227		0.4077		0.4523		0.3755		0.2417
p value		0.0004		0.0020		0.0001		0.0001		0.0158
adj. R^2	0.4437	0.4746	0.5087	0.5271	0.6039	0.6252	0.6207	0.6441	0.6123	0.6355
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Net Sale Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	-0.0008	-0.0007	-0.0017	-0.0016	-0.0007	-0.0007	-0.0005	-0.0005	-0.0006	-0.0006
p value	0.5087	0.5240	0.0916	0.0928	0.4024	0.3815	0.5281	0.5094	0.4089	0.4430
RM-RF	0.9186	1.0066	0.9343	1.0151	0.9715	1.0427	0.8488	0.9011	0.8532	0.9285
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.4844		0.4451		0.3866		0.2834		0.4177
p value		0.0001		0.0000		0.0000		0.0007		0.0000
HML		0.3317		0.2956		0.4039		0.3095		0.2009
p value		0.0293		0.0247		0.0005		0.0030		0.0493
adj. R^2	0.4364	0.4578	0.5162	0.5368	0.5975	0.6196	0.5868	0.6021	0.5923	0.6155
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk adjusted returns to net sale portfolios constructed from stocks for which Institutional Investors are net sellers over previous t days (different holding periods). Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk adjusted returns to portfolios constructed by outsiders to replicate Institutional Investors net sale transactions one day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) report the risk adjusted returns according to the CAPM and the three factor model respectively.

4.3.2.4. Shareholders:

According to results tabulated in Panel A of Table 4.25 shareholders earn statistically significant daily AAR from their transactions for the following five days (Panel A of Table 4.25). However, results for the outsider portfolio imply that outsiders cannot earn abnormal returns by replicating transactions of Shareholders reported to the ISE over any holding periods (Panel B of Table 4.25).

Insider and outsider portfolios of stocks that are net purchased by Shareholders do not experience positive abnormal returns over any holding periods (Panels A and B of Table 4.26). According to Panel A of Table 4.27, stocks that are net sold by shareholders perform worse than the market on a risk adjusted basis up to 42-day holding period. Moreover, outsiders can avoid abnormal loss by either selling or not purchasing stocks net sold by Shareholders over holding periods up to 21 days (Panel B of Table 4.27). These results and the fact that shareholders are the only insider group whom are net sellers according to NPR given in Table 4.3 indicate that short lasting daily AAR to shareholders, as a group, arises from their net sales.

Table 4.25 Risk Adjusted Returns to Portfolios Constructed from Shareholder Transactions

Panel A: Insider Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0030	0.0034	0.0011	0.0013	0.0005	0.0007	0.0010	0.0010	0.0002	0.0002
p value	0.0324	0.0150	0.3772	0.2874	0.6027	0.5002	0.3623	0.3383	0.8748	0.8517
RM-RF	0.3752	0.5072	0.3159	0.4094	0.2697	0.3688	0.0345	0.0855	-0.0381	0.0060
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.4516	0.0867	0.3669	0.8961
SMB		0.7271		0.5268		0.5557		0.2831		0.2436
p value		0.0000		0.0001		0.0000		0.0127		0.0200
HML		0.2257		0.0284		0.1030		0.1266		0.1427
p value		0.2229		0.8679		0.4327		0.3708		0.2741
adj. R^2	0.0810	0.1276	0.0687	0.0962	0.0788	0.1307	-0.0010	0.0097	-0.0004	0.0091
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.4516	0.0652	0.3669	0.0721

Panel B: Outsider Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0014	0.0015	0.0003	0.0004	0.0002	0.0003	0.0009	0.0009	0.0001	0.0001
p value	0.3353	0.2774	0.8229	0.7415	0.8751	0.7812	0.3907	0.3884	0.8928	0.8881
RM-RF	0.3730	0.4535	0.2507	0.3344	0.2415	0.3338	0.0222	0.0541	-0.0531	-0.0181
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.6293	0.2815	0.2197	0.7004
SMB		0.4433		0.4225		0.5168		0.1745		0.1912
p value		0.0042		0.0024		0.0000		0.1266		0.0748
HML		0.2204		0.0923		0.1132		0.1508		0.1624
p value		0.2508		0.5802		0.4139		0.2904		0.2252
adj. R^2	0.0776	0.0926	0.0454	0.0622	0.0582	0.0992	-0.0018	0.0009	0.0012	0.0064
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.6293	0.3332	0.2197	0.1231

Panel A of this table presents the risk adjusted returns to portfolios constructed from transactions of Shareholders over different holding periods. Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk adjusted returns to portfolios constructed by outsiders to replicate transactions of Shareholders one day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) report the risk adjusted returns according to the CAPM and the three factor model respectively.

Table 4.26 Risk Adjusted Returns to Net Purchase Portfolios Constructed from Shareholder Transactions

Panel A: Insider Net Purchase Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0026	0.0027	0.0010	0.0011	-0.0007	-0.0006	-0.0008	-0.0007	-0.0011	-0.0010
p value	0.0990	0.0821	0.5189	0.4710	0.5527	0.6219	0.4101	0.4580	0.1482	0.1595
RM-RF	0.6001	0.7239	0.5368	0.6534	0.5813	0.7057	0.5565	0.6705	0.5504	0.6645
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.6856		0.6468		0.6938		0.6338		0.6341
p value		0.0000		0.0001		0.0000		0.0000		0.0000
HML		0.3554		0.3108		0.2178		0.2583		0.2733
p value		0.0894		0.1193		0.1731		0.0394		0.0064
adj. R^2	0.1474	0.1785	0.1320	0.1624	0.2137	0.2613	0.2842	0.3446	0.3674	0.4493
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Net Purchase Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0015	0.0016	-0.0011	-0.0010	-0.0007	-0.0006	-0.0009	-0.0008	-0.0012	-0.0012
p value	0.3443	0.3135	0.4198	0.4512	0.5571	0.6130	0.3178	0.3512	0.1106	0.1157
RM-RF	0.5510	0.6390	0.5007	0.6082	0.5495	0.6667	0.5466	0.6554	0.5467	0.6541
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.4898		0.5968		0.6518		0.6045		0.5961
p value		0.0052		0.0001		0.0000		0.0000		0.0000
HML		0.1750		0.2784		0.2618		0.2646		0.2786
p value		0.4227		0.1351		0.0936		0.0281		0.0053
adj. R^2	0.1199	0.1322	0.1318	0.1612	0.2036	0.2495	0.2932	0.3526	0.3685	0.4429
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk adjusted returns to net purchase portfolios constructed from stocks for which Shareholders are net buyers over previous t days (different holding periods). Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk adjusted returns to portfolios constructed by outsiders to replicate Shareholders net purchase transactions one day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) report the risk adjusted returns according to the CAPM and the three factor model respectively.

Table 4.27 Risk Adjusted Returns to Net Sale Portfolios Constructed from Shareholder Transactions

Panel A: Insider Net Sale Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	-0.0039	-0.0037	-0.0033	-0.0032	-0.0030	-0.0029	-0.0023	-0.0023	-0.0018	-0.0017
p value	0.0049	0.0083	0.0206	0.0237	0.0206	0.0242	0.0464	0.0500	0.1034	0.1127
RM-RF	0.7986	0.8875	0.6410	0.7108	0.5934	0.6814	0.6712	0.7468	0.7565	0.8385
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.4956		0.3846		0.4926		0.4193		0.4558
p value		0.0010		0.0117		0.0004		0.0009		0.0002
HML		0.0210		0.2243		0.1167		0.2048		0.2037
p value		0.9104		0.2394		0.4994		0.1934		0.1728
adj. R^2	0.2931	0.3079	0.2027	0.2124	0.2009	0.2202	0.2803	0.2965	0.3535	0.3730
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Net Sale Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	-0.0026	-0.0025	-0.0034	-0.0033	-0.0026	-0.0025	-0.0011	-0.0010	-0.0017	-0.0016
p value	0.0388	0.0491	0.0071	0.0086	0.0262	0.0274	0.3578	0.3868	0.1436	0.1579
RM-RF	0.5576	0.6181	0.5322	0.6138	0.5873	0.6684	0.6659	0.7371	0.7591	0.8489
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.3340		0.4121		0.4483		0.3968		0.4995
p value		0.0146		0.0035		0.0004		0.0019		0.0001
HML		0.1439		0.1498		0.2547		0.1494		0.2075
p value		0.3956		0.3767		0.1027		0.3469		0.1775
adj. R^2	0.1981	0.2063	0.1779	0.1917	0.2318	0.2533	0.2744	0.2877	0.3406	0.3631
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk adjusted returns to net sale portfolios constructed from stocks for which Shareholders are net sellers over previous t days (different holding periods). Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk adjusted returns to portfolios constructed by outsiders to replicate Shareholders net sale transactions one day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) report the risk adjusted returns according to the CAPM and the three factor model respectively.

Results in this section indicate that most of the insider groups cannot earn abnormal returns on their overall transactions over different holding periods analyzed in this paper. Portfolios constructed from the net purchases of the insiders do not earn statistically significantly positive risk adjusted returns. On the other hand, portfolios constructed from net sales of insiders earn statistically significantly negative risk adjusted returns.

The implication of the results obtained for net purchase and net sale portfolios for different insider groups are consistent with the results given by Doğu (2007). According to Doğu (2007) sales of insiders transmits more information than their purchases. Although, these results seem consistent with the findings of an earlier study, they are still puzzling. There could be several explanations for this puzzling finding.

Firstly, as mentioned in the literature review section, in similar studies done in the US, Officers/Directors are net sellers of their companies' stocks since these groups receive stock options and warrants from their companies as a part of their compensation packages. Thus, sale transactions outnumber purchase transactions due to diversification and liquidity needs of Officers/Directors. Thus, most of these studies infer that insider sales convey less information than purchases.

On the other hand, for the ISE, as mentioned in section 4.1, Directors, Officers, and Corporate Insiders are the net purchasers of their company shares during the sample period of this thesis. However, results indicate that stocks bought by these groups do not perform statistically significantly different from the market on a risk-adjusted basis and stocks sold by these groups statistically significantly perform worse than the market on a risk-adjusted basis over certain holding periods. These results might be due to other market participants' differing reaction to the purchases and sales by insiders. Since frequency of insider sales (purchases) are relatively low (high) compared to purchases (sales) and insiders are generally net

purchasers, other market participants might be overreacting (underreacting) to sale (purchase) transactions.

Secondly, in this part of the analysis, it is assumed that the same type of insiders have the same capability to access "material" information for their companies. According to Seyhun (1988), however, insiders of small firms are more likely to trade based on firm-specific factors, whereas insiders of large companies and companies with high market risk trade based on economy wide factors. In the following section, different portfolios are constructed to analyze the effects of company specific characteristics on profitability of insider trades.

4.3.3. Results Based on the Characteristics of Companies

In order to test whether abnormal returns differ among firms with different characteristics, portfolios are formed according to the size and the book to market ratio of the company for which insider trading occurs. The effect of these company specific characteristics is analyzed only for the combined dataset of Officers, Directors and Corporate Insiders. These groups are not only the insiders in the legal sense, but they are also the most probable groups with access to material nonpublic information. Rather than analyzing abnormal returns to these groups separately, the combined dataset is analyzed to avoid making inferences from the samples containing small number of observations.

4.3.3.1. Firm Size

Companies listed on the ISE are separated into three groups on July 1st of each year based on their market values. Companies in the top 30% are considered as big firms, whereas companies in the bottom 30% are considered as small firms, and the remaining companies are categorized as medium firms. For each category,

portfolios are constructed in order to analyze the effect of firm size on the abnormal returns to insiders and outsiders following the trades of insiders.

4.3.3.1.1. Small Firms

Insiders of small firms do seem to earn daily AAR statistically significantly different from zero for the 5-day holding period (Panel A of Table 4.28). On the other hand, outsiders cannot benefit from the reports of insider transactions (Panel B of Table 4.28).

Results for the net purchase portfolios indicate that stocks of the companies that are net purchased by insiders earn statistically significant positive abnormal returns for up to the 10-day holding period (Panel A of Table 4.29). On the other hand, these abnormal returns are not available to outsiders (Panel B of Table 4.29).

When abnormal return estimates for the net sale portfolio of small firm insiders are analyzed, it is seen that this portfolio earns statistically significant negative abnormal returns for all of the holding periods (Panel A of Table 4.30). Furthermore, outsiders can avoid statistically significant negative risk adjusted returns by either selling or not purchasing stocks that are net sold by insiders over all holding periods (Panel B of Table 4.30).

Table 4.28 Risk Adjusted Returns to Portfolios Constructed from Small Firms

Panel A: Insider Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0021	0.0021	0.0013	0.0013	0.0010	0.0010	0.0001	0.0000	-0.0006	-0.0007
p value	0.0106	0.0091	0.0747	0.0677	0.1220	0.1360	0.8601	0.9364	0.2569	0.2223
RM-RF	0.5775	0.6410	0.5758	0.6361	0.5085	0.5392	0.4956	0.5128	0.5231	0.5508
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.3455		0.3286		0.1617		0.0872		0.1469
p value		0.0001		0.0000		0.0247		0.1920		0.0146
HML		0.3352		0.3166		0.3132		0.2706		0.2585
p value		0.0020		0.0009		0.0005		0.0013		0.0006
adj. R^2	0.3753	0.4047	0.4324	0.4635	0.4062	0.4245	0.4317	0.4439	0.5095	0.5252
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0011	0.0011	0.0011	0.0011	0.0008	0.0007	0.0000	-0.0001	-0.0008	-0.0008
p value	0.1850	0.1760	0.1050	0.1092	0.2514	0.2832	0.9528	0.8679	0.1493	0.1299
RM-RF	0.5572	0.6132	0.5284	0.5675	0.4994	0.5253	0.4858	0.5023	0.5312	0.5647
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.3058		0.2100		0.1347		0.0825		0.1797
p value		0.0004		0.0051		0.0606		0.2188		0.0024
HML		0.2740		0.2895		0.3091		0.2829		0.2489
p value		0.0107		0.0020		0.0006		0.0008		0.0008
adj. R^2	0.3653	0.3874	0.4064	0.4250	0.3991	0.4157	0.4195	0.4328	0.5254	0.5432
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk adjusted returns to portfolios constructed from insider transactions in small firms over different holding periods. Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk adjusted returns to portfolios constructed by outsiders to replicate transactions of insiders in small firms one-day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) reports the risk adjusted returns according to the CAPM and the three factor model respectively.

Table 4.29 Risk Adjusted Returns to Net Purchase Portfolios Constructed from Small Firms

Panel A: Insider Net Purchase Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0023	0.0023	0.0015	0.0015	0.0007	0.0007	-0.0006	-0.0006	-0.0011	-0.0011
p value	0.0048	0.0042	0.0332	0.0299	0.2865	0.2862	0.3102	0.2904	0.0433	0.0356
RM-RF	0.8038	0.8649	0.7787	0.8392	0.7668	0.8177	0.7638	0.8236	0.7741	0.8438
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.3317		0.3276		0.2755		0.3260		0.3830
p value		0.0001		0.0000		0.0001		0.0000		0.0000
HML		0.3618		0.3676		0.3162		0.3066		0.2826
p value		0.0009		0.0001		0.0002		0.0001		0.0000
adj. R^2	0.5367	0.5587	0.5951	0.6216	0.6293	0.6499	0.6692	0.6963	0.7145	0.7488
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Net Purchase Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0013	0.0013	0.0008	0.0008	0.0002	0.0001	-0.0008	-0.0008	-0.0013	-0.0012
p value	0.1058	0.1066	0.2505	0.2549	0.8092	0.8185	0.1773	0.1599	0.0201	0.0161
RM-RF	0.7988	0.8469	0.7459	0.7920	0.7607	0.8123	0.7601	0.8195	0.7850	0.8608
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.2598		0.2493		0.2804		0.3239		0.4186
p value		0.0027		0.0009		0.0000		0.0000		0.0000
HML		0.3133		0.3041		0.3001		0.3067		0.2621
p value		0.0037		0.0012		0.0004		0.0001		0.0001
adj. R^2	0.5404	0.5547	0.5741	0.5908	0.6273	0.6477	0.6650	0.6919	0.7168	0.7542
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk adjusted returns to net purchase portfolios constructed from stocks for which insiders are net buyers in small firms over previous t days (different holding periods). Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk adjusted returns to portfolios constructed by outsiders to replicate insider net purchase transactions in small firms one-day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) reports the risk adjusted returns according to the CAPM and the three factor model respectively.

Table 4.30 Risk Adjusted Returns to Net Sale Portfolios Constructed from Small Firms

Panel A: Insider Net Sale Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	-0.0044	-0.0043	-0.0042	-0.0040	-0.0041	-0.0038	-0.0034	-0.0032	-0.0025	-0.0023
p value	0.0003	0.0004	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0014	0.0015
RM-RF	0.7610	0.8535	0.7937	0.8800	0.8696	0.9879	0.8682	0.9760	0.8743	0.9854
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.5185		0.4865		0.6720		0.6080		0.6251
p value		0.0001		0.0000		0.0000		0.0000		0.0000
HML		0.1097		0.0177		-0.1107		0.0189		0.0581
p value		0.5010		0.8992		0.3704		0.8574		0.5525
adj. R^2	0.3166	0.3377	0.4052	0.4274	0.4960	0.5446	0.5742	0.6184	0.6061	0.6548
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Net Sale Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	-0.0044	-0.0043	-0.0046	-0.0044	-0.0038	-0.0035	-0.0033	-0.0031	-0.0024	-0.0022
p value	0.0003	0.0004	0.0000	0.0000	0.0001	0.0001	0.0000	0.0000	0.0018	0.0020
RM-RF	0.7894	0.8797	0.8758	0.9907	0.8713	1.0040	0.8639	0.9734	0.8745	0.9876
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.5034		0.6496		0.7530		0.6181		0.6375
p value		0.0001		0.0000		0.0000		0.0000		0.0000
HML		0.1723		-0.0253		-0.0984		0.0122		0.0375
p value		0.2885		0.8575		0.4146		0.9057		0.7025
adj. R^2	0.3349	0.3548	0.4418	0.4796	0.5016	0.5630	0.5794	0.6262	0.6039	0.6546
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk adjusted returns to net sale portfolios constructed from stocks for which insiders are net sellers in small firms over previous t days (different holding periods). Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk adjusted returns to portfolios constructed by outsiders to replicate insider net sale transactions in small firms one-day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) reports the risk adjusted returns according to the CAPM and the three factor model respectively.

4.3.3.1.2. Medium Firms

Insiders of medium firms earn daily AARs for up to the 10-day holding period (Panel A of Table 4.31). An interesting result encountered for this category is that the outsider can earn daily average abnormal returns by replicating insider transactions and holding positions for the following ten days as well (Panel B of Table 4.31).

According to results tabulated in Tables 4.32 and 4.33 these significant daily AARs, generally, stem from stocks that are net sold by insiders of medium firms as a group. For the net purchase portfolios analyzed for medium size firms, the statistically significant daily AAR exists only over the 5-day holding period for the insider portfolio (Panels A and B of Table 4.32). As can be seen from Panel A of Table 4.33, statistically significant risk adjusted below market returns to the stocks that are net sold by insiders persist for the following 63 days. Furthermore, outsiders can also avoid abnormal losses by either selling or not purchasing stocks that are net sold by insiders over all holding periods (Panel B of Table 4.33).

Table 4.31 Risk Adjusted Returns to Portfolios Constructed from Medium Firms

Panel A: Insider Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0020	0.0020	0.0013	0.0013	0.0011	0.0010	0.0003	0.0003	-0.0003	-0.0003
p value	0.0102	0.0091	0.0461	0.0451	0.0727	0.0781	0.5205	0.5442	0.5767	0.5548
RM-RF	0.4795	0.5124	0.4672	0.4959	0.4472	0.4691	0.4518	0.4706	0.4678	0.4903
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.1824		0.1564		0.1163		0.1005		0.1212
p value		0.0268		0.0316		0.0712		0.0728		0.0189
HML		0.0971		0.1428		0.1891		0.1578		0.1555
p value		0.3443		0.1157		0.0190		0.0242		0.0159
adj. R^2	0.3220	0.3273	0.3658	0.3723	0.4015	0.4097	0.4760	0.4826	0.5333	0.5421
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0013	0.0014	0.0013	0.0013	0.0008	0.0008	0.0001	0.0001	-0.0005	-0.0005
p value	0.0803	0.0755	0.0435	0.0471	0.1666	0.1800	0.8254	0.8730	0.3212	0.3030
RM-RF	0.4429	0.4673	0.4404	0.4634	0.4407	0.4628	0.4349	0.4520	0.4683	0.4940
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.1354		0.1218		0.1173		0.0896		0.1385
p value		0.1012		0.0834		0.0662		0.1165		0.0074
HML		0.0571		0.2033		0.2056		0.1863		0.1704
p value		0.5792		0.0208		0.0101		0.0092		0.0083
adj. R^2	0.2879	0.2893	0.3532	0.3615	0.3984	0.4082	0.4466	0.4548	0.5322	0.5437
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk adjusted returns to portfolios constructed from insider transactions in medium firms over different holding periods. Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk adjusted returns to portfolios constructed by outsiders to replicate transactions of insiders in medium firms one-day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) reports the risk adjusted returns according to the CAPM and the three factor model respectively.

Table 4.32 Risk Adjusted Returns to Net Purchase Portfolios Constructed from Medium Firms

Panel A: Insider Net Purchase Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0019	0.0019	0.0011	0.0011	0.0007	0.0007	-0.0003	-0.0003	-0.0008	-0.0008
p value	0.0047	0.0034	0.0629	0.0528	0.2138	0.1953	0.5650	0.5685	0.1031	0.0923
RM-RF	0.7836	0.8437	0.7478	0.8061	0.7428	0.7974	0.7447	0.8066	0.7469	0.8157
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.3288		0.3190		0.2981		0.3398		0.3787
p value		0.0000		0.0000		0.0000		0.0000		0.0000
HML		0.2742		0.2767		0.2675		0.2643		0.2560
p value		0.0020		0.0006		0.0004		0.0001		0.0000
adj. R^2	0.6202	0.6422	0.6429	0.6673	0.6710	0.6940	0.7128	0.7425	0.7424	0.7786
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Net Purchase Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0012	0.0013	0.0008	0.0008	0.0003	0.0003	-0.0005	-0.0005	-0.0010	-0.0010
p value	0.0595	0.0514	0.2049	0.1955	0.5737	0.5537	0.3428	0.3314	0.0425	0.0359
RM-RF	0.7624	0.8116	0.7257	0.7724	0.7349	0.7882	0.7299	0.7890	0.7462	0.8175
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.2704		0.2546		0.2914		0.3236		0.3937
p value		0.0001		0.0001		0.0000		0.0000		0.0000
HML		0.1893		0.2438		0.2547		0.2697		0.2463
p value		0.0316		0.0023		0.0008		0.0001		0.0001
adj. R^2	0.6152	0.6288	0.6360	0.6529	0.6625	0.6842	0.6906	0.7186	0.7332	0.7708
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk adjusted returns to net purchase portfolios constructed from stocks for which insiders are net buyers in medium firms over previous t days (different holding periods). Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk adjusted returns to portfolios constructed by outsiders to replicate insider net purchase transactions in medium firms one-day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) reports the risk adjusted returns according to the CAPM and the three factor model respectively.

Table 4.33 Risk Adjusted Returns to Net Sale Portfolios Constructed from Medium Firms

Panel A: Insider Net Sale Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	-0.0033	-0.0032	-0.0025	-0.0024	-0.0034	-0.0033	-0.0027	-0.0026	-0.0020	-0.0019
p value	0.0114	0.0113	0.0295	0.0334	0.0002	0.0002	0.0009	0.0005	0.0085	0.0059
RM-RF	0.8049	0.9298	0.7940	0.9057	0.8660	0.9960	0.8713	1.0090	0.8744	1.0057
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.6908		0.6226		0.7261		0.7646		0.7291
p value		0.0000		0.0000		0.0000		0.0000		0.0000
HML		0.3789		0.2057		0.2090		0.3420		0.3298
p value		0.0278		0.1762		0.0775		0.0007		0.0004
adj. R^2	0.3123	0.3514	0.3617	0.3962	0.5103	0.5677	0.5761	0.6516	0.6174	0.6907
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Net Sale Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	-0.0037	-0.0035	-0.0036	-0.0034	-0.0033	-0.0031	-0.0025	-0.0023	-0.0020	-0.0018
p value	0.0045	0.0051	0.0018	0.0019	0.0004	0.0004	0.0029	0.0020	0.0090	0.0072
RM-RF	0.8284	0.9681	0.8963	1.0394	0.8796	1.0191	0.8715	1.0125	0.8742	1.0052
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.7823		0.8022		0.7835		0.7859		0.7298
p value		0.0000		0.0000		0.0000		0.0000		0.0000
HML		0.1846		0.1551		0.1185		0.2723		0.2540
p value		0.2807		0.2935		0.3113		0.0071		0.0059
adj. R^2	0.3244	0.3691	0.4237	0.4768	0.5182	0.5832	0.5744	0.6513	0.6187	0.6897
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk adjusted returns to net sale portfolios constructed from stocks for which insiders are net sellers in medium firms over previous t days (different holding periods). Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk adjusted returns to portfolios constructed by outsiders to replicate insider net sale transactions in medium firms one-day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) reports the risk adjusted returns according to the CAPM and the three factor model respectively.

4.3.3.1.3. Big Firms

As opposed to their counterparts in small and medium size firms, insiders of big size firms and outsiders following their trades do not earn above market risk adjusted returns from their transactions regardless of the length of the holding period. (Panels A and B of Table 4.34). When abnormal returns to the insider and the outsider net purchase portfolios of this group are analyzed, stocks net purchased by insiders or outsiders do not earn positive AARs for any of the holding periods (Panels A and B of Table 4.35). On the other hand, insider net sale portfolios experience statistically significant negative daily AARs for up to 21-day holding period (Panel A of Table 4.36). Moreover, outsiders can avoid statistically significant negative abnormal returns by either selling or not purchasing stocks that are net sold by insiders over the previous 5 days (Panel B of Table 4.36).

Empirical findings based on firm size are consistent with our expectations. Insiders of big firms, as opposed to their counterparts in small and medium size firms, do not earn statistically significant daily AARs on their overall trades regardless of the holding period. Furthermore, there exist statistically significantly negative AARs for the insider net sale portfolios of small and medium firms over holding periods longer than those of big firms. This can be interpreted as insiders of small, medium and big firms, as a group, sell their companies' shares to avoid below market risk adjusted performance over some holding periods analyzed in this thesis. Furthermore, outsiders can avoid incurring abnormal losses by either selling or not purchasing stocks that are net sold by insiders over all holding periods for small and medium firms, and over 5-day holding period for large firms. On the other hand, positive abnormal return performance of stocks that are net purchased by those insiders persist for shorter holding periods and outsiders cannot implement a trading strategy to earn above market returns on a risk adjusted basis by merely replicating net purchasing activities of insiders analyzed in this subsection.

Table 4.34 Risk Adjusted Returns to Portfolios Constructed from Big Firms

Panel A: Insider Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0007	0.0007	0.0001	0.0001	0.0001	0.0001	-0.0001	-0.0001	-0.0002	-0.0002
p value	0.3950	0.3796	0.8691	0.8446	0.8378	0.8675	0.8708	0.8318	0.7364	0.6848
RM-RF	0.3582	0.4219	0.3545	0.4155	0.3272	0.3610	0.2624	0.2794	0.2072	0.2283
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.3482		0.3350		0.1813		0.0895		0.1103
p value		0.0001		0.0000		0.0152		0.1925		0.0867
HML		0.3026		0.2502		0.2565		0.1818		0.2271
p value		0.0056		0.0146		0.0060		0.0344		0.0049
adj. R^2	0.1845	0.2199	0.2015	0.2349	0.2089	0.2272	0.1683	0.1753	0.1242	0.1402
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0001	0.0002	0.0000	0.0001	-0.0001	-0.0001	0.0000	0.0000	-0.0003	-0.0003
p value	0.8827	0.8462	0.9566	0.9402	0.9395	0.9133	0.9732	0.9823	0.6043	0.5584
RM-RF	0.3091	0.3727	0.3283	0.3854	0.3046	0.3378	0.2140	0.2406	0.1931	0.2153
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.3510		0.3129		0.1782		0.1441		0.1172
p value		0.0001		0.0001		0.0168		0.0398		0.0668
HML		0.2161		0.2490		0.2368		0.1588		0.2254
p value		0.0571		0.0144		0.0110		0.0694		0.0048
adj. R^2	0.1350	0.1643	0.1802	0.2113	0.1871	0.2039	0.1140	0.1238	0.1108	0.1278
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk adjusted returns to portfolios constructed from insider transactions in big firms over different holding periods. Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk adjusted returns to portfolios constructed by outsiders to replicate transactions of insiders in big firms one-day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) report the risk adjusted returns according to the CAPM and the three factor model respectively.

Table 4.35 Risk Adjusted Returns to Net Purchase Portfolios Constructed from Big Firms

Panel A: Insider Net Purchase Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0010	0.0010	0.0003	0.0003	-0.0001	-0.0001	-0.0008	-0.0008	-0.0012	-0.0011
p value	0.1233	0.1009	0.6291	0.5731	0.7907	0.8149	0.1285	0.1224	0.0178	0.0145
RM-RF	0.8041	0.8688	0.7782	0.8447	0.7843	0.8400	0.7817	0.8484	0.7887	0.8583
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.3561		0.3664		0.3057		0.3675		0.3848
p value		0.0000		0.0000		0.0000		0.0000		0.0000
HML		0.2459		0.2356		0.2210		0.2440		0.2248
p value		0.0035		0.0028		0.0020		0.0002		0.0003
adj. R^2	0.6533	0.6770	0.6653	0.6920	0.7129	0.7335	0.7338	0.7641	0.7576	0.7900
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Net Purchase Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0005	0.0006	0.0000	0.0000	-0.0005	-0.0004	-0.0010	-0.0010	-0.0014	-0.0013
p value	0.4111	0.3622	0.9902	0.9348	0.4022	0.4241	0.0629	0.0579	0.0060	0.0045
RM-RF	0.7866	0.8457	0.7599	0.8199	0.7805	0.8415	0.7751	0.8440	0.7895	0.8668
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.3272		0.3320		0.3373		0.3803		0.4289
p value		0.0000		0.0000		0.0000		0.0000		0.0000
HML		0.1678		0.1853		0.1984		0.2409		0.2046
p value		0.0550		0.0210		0.0058		0.0004		0.0010
adj. R^2	0.6296	0.6474	0.6506	0.6718	0.7068	0.7300	0.7173	0.7490	0.7515	0.7895
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk adjusted returns to net purchase portfolios constructed from stocks for which insiders are net buyers in big firms over previous t days (different holding periods). Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk adjusted returns to portfolios constructed by outsiders to replicate insider net purchase transactions in big firms one-day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) report the risk adjusted returns according to the CAPM and the three factor model respectively.

Table 4.36 Adjusted Returns to Net Sale Portfolios Constructed from Big Firms

Panel A: Insider Net Sale Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	-0.0040	-0.0040	-0.0020	-0.0020	-0.0017	-0.0016	-0.0006	-0.0005	-0.0005	-0.0004
p value	0.0001	0.0001	0.0355	0.0279	0.0353	0.0372	0.3911	0.4191	0.5083	0.5775
RM-RF	0.8678	0.9018	0.8911	0.9108	0.8984	0.9643	0.7931	0.8345	0.8501	0.9058
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.1830		0.0984		0.3652		0.2299		0.3136
p value		0.1051		0.3287		0.0000		0.0013		0.0002
HML		0.2434		0.3392		0.1918		0.0992		0.0218
p value		0.0844		0.0072		0.0726		0.2646		0.8367
adj. R^2	0.4531	0.4570	0.5213	0.5276	0.5996	0.6157	0.6319	0.6394	0.5806	0.5916
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Net Sale Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	-0.0022	-0.0023	-0.0013	-0.0013	-0.0007	-0.0006	-0.0006	-0.0006	-0.0002	-0.0001
p value	0.0404	0.0383	0.2010	0.1893	0.4030	0.4392	0.3924	0.4163	0.7902	0.8850
RM-RF	0.8794	0.9098	0.9377	0.9618	0.9031	0.9605	0.8119	0.8419	0.8373	0.8939
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.1632		0.1279		0.3197		0.1674		0.3194
p value		0.1682		0.2282		0.0003		0.0394		0.0002
HML		0.2262		0.2208		0.1186		0.0559		-0.0031
p value		0.1264		0.0961		0.2746		0.5810		0.9765
adj. R^2	0.4364	0.4388	0.5230	0.5250	0.5973	0.6082	0.5842	0.5865	0.5724	0.5842
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk adjusted returns to net sale portfolios constructed from stocks for which insiders are net sellers in big firms over previous t days (different holding periods). Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk adjusted returns to portfolios constructed by outsiders to replicate insider net sale transactions in big firms one-day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) report the risk adjusted returns according to the CAPM and the three factor model respectively.

4.3.3.2. Book to Market Ratio (B/M ratio)

Companies listed on the ISE are divided into three groups on July 1st of each year based on their B/M ratios as of the end of the previous calendar year. Based on B/M ratio rankings, companies in the top 30% are considered as high-B/M firms, whereas companies in the bottom 30% are considered as low-B/M firms, and the remaining companies are categorized as medium-B/M firms. For each category, portfolios are constructed in order to analyze the effect of B/M ratio on the abnormal returns to insiders and outsiders following the trades of insiders.

4.3.3.2.1. Low Book to Market Firms

Insiders of the low B/M ratio companies and outsiders replicating their trades do not earn daily abnormal returns from their overall transactions over any holding periods (Panels A and B of Table 4.37). When net purchase portfolios of insiders and outsiders are investigated, there exists a significant positive abnormal return over the 5-day holding period for the insider portfolio only (Panels A and B of Table 4.38). On the other hand, the portfolios constructed from stocks that are net sold by insiders earn statistically significant negative returns up to the 21-day holding period (Panel A, Table 4.39). According to the result tabulated in Panels B of Table 4.39, outsiders can only benefit from information content of insider sale reports by either selling or not purchasing stocks that are net sold by insiders over the previous 5 days.

Table 4.37 Risk Adjusted Returns to Portfolios Constructed from Low Book to Market Ratio Firms

Panel A: Insider Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0013	0.0014	0.0007	0.0007	0.0003	0.0003	-0.0001	-0.0001	-0.0001	-0.0001
p value	0.1127	0.0914	0.3658	0.3429	0.6355	0.6530	0.9161	0.8902	0.8745	0.8245
RM-RF	0.4172	0.4904	0.3891	0.4415	0.3883	0.4267	0.3270	0.3514	0.2590	0.2830
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.4047		0.2887		0.2074		0.1305		0.1265
p value		0.0000		0.0005		0.0060		0.0541		0.0455
HML		0.2208		0.1958		0.2606		0.1854		0.2322
p value		0.0419		0.0568		0.0057		0.0286		0.0034
adj. R^2	0.2360	0.2732	0.2340	0.2559	0.2672	0.2868	0.2445	0.2544	0.1874	0.2050
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0009	0.0010	0.0004	0.0004	0.0001	0.0000	0.0000	0.0000	-0.0002	-0.0003
p value	0.2677	0.2368	0.6106	0.5976	0.9310	0.9618	0.9871	0.9918	0.6939	0.6474
RM-RF	0.3578	0.4125	0.3661	0.4164	0.3700	0.4047	0.2721	0.3035	0.2458	0.2722
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.3042		0.2752		0.1865		0.1708		0.1399
p value		0.0005		0.0007		0.0135		0.0140		0.0259
HML		0.1301		0.2330		0.2616		0.1728		0.2388
p value		0.2322		0.0204		0.0056		0.0462		0.0024
adj. R^2	0.1871	0.2070	0.2206	0.2445	0.2487	0.2667	0.1751	0.1885	0.1734	0.1939
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk-adjusted returns to portfolios constructed from insider transactions in low B/M ratio firms over different holding periods. Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk-adjusted returns to portfolios constructed by outsiders to replicate transactions of insiders in low B/M ratio firms one day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) report the risk adjusted returns according to the CAPM and the three factor model respectively.

Table 4.38 Risk Adjusted Returns to Net Purchase Portfolios Constructed from Low Book to Market Ratio Firms

Panel A: Insider Net Purchase Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0016	0.0016	0.0011	0.0011	0.0004	0.0004	-0.0005	-0.0005	-0.0010	-0.0009
p value	0.0196	0.0151	0.0948	0.0803	0.4899	0.4598	0.3236	0.3298	0.0518	0.0481
RM-RF	0.7893	0.8460	0.7520	0.8088	0.7649	0.8165	0.7606	0.8221	0.7656	0.8296
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.3128		0.3118		0.2836		0.3388		0.3534
p value		0.0000		0.0000		0.0000		0.0000		0.0000
HML		0.2084		0.2302		0.2120		0.2262		0.2134
p value		0.0191		0.0057		0.0065		0.0011		0.0009
adj. R^2	0.6243	0.6417	0.6307	0.6511	0.6696	0.6870	0.7083	0.7343	0.7397	0.7681
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Net Purchase Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0012	0.0013	0.0007	0.0007	0.0000	0.0000	-0.0007	-0.0007	-0.0012	-0.0011
p value	0.0687	0.0555	0.2965	0.2655	0.9736	0.9338	0.1703	0.1677	0.0189	0.0166
RM-RF	0.7607	0.8156	0.7330	0.7846	0.7625	0.8162	0.7510	0.8125	0.7666	0.8357
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.3041		0.2846		0.2957		0.3387		0.3822
p value		0.0000		0.0000		0.0000		0.0000		0.0000
HML		0.1543		0.1760		0.1925		0.2313		0.2010
p value		0.0914		0.0344		0.0119		0.0010		0.0015
adj. R^2	0.5952	0.6104	0.6215	0.6376	0.6751	0.6932	0.6998	0.7264	0.7417	0.7738
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk-adjusted returns to net purchase portfolios constructed from stocks for which insiders are net buyers in low B/M ratio firms over previous t days (different holding periods). Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk-adjusted returns to portfolios constructed by outsiders to replicate insider net purchase transactions in low B/M ratio firms one day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) report the risk adjusted returns according to the CAPM and the three factor model respectively.

Table 4.39 Risk Adjusted Returns to Net Sale Portfolios Constructed from Low Book to Market Ratio Firms

Panel A: Insider Net Sale Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	-0.0046	-0.0046	-0.0024	-0.0025	-0.0023	-0.0022	-0.0008	-0.0007	-0.0009	-0.0007
p value	0.0001	0.0001	0.0122	0.0115	0.0055	0.0069	0.2717	0.3227	0.2947	0.3641
RM-RF	0.8535	0.8912	0.8955	0.9304	0.8951	0.9679	0.7769	0.8194	0.8200	0.8785
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.2020		0.1886		0.4090		0.2418		0.3331
p value		0.1080		0.0734		0.0000		0.0020		0.0002
HML		0.2934		0.2208		0.0535		-0.0392		-0.0771
p value		0.0617		0.0932		0.6317		0.6867		0.4811
adj. R^2	0.3923	0.3972	0.5035	0.5075	0.5755	0.5931	0.5792	0.5869	0.5451	0.5589
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Net Sale Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	-0.0030	-0.0029	-0.0017	-0.0017	-0.0013	-0.0011	-0.0008	-0.0007	-0.0006	-0.0005
p value	0.0104	0.0102	0.0878	0.0913	0.1448	0.1790	0.3140	0.3594	0.4644	0.5711
RM-RF	0.8531	0.9062	0.9568	1.0070	0.8942	0.9701	0.7926	0.8242	0.8048	0.8646
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.2903		0.2769		0.4283		0.1802		0.3422
p value		0.0198		0.0110		0.0000		0.0363		0.0001
HML		0.2444		0.1762		0.0205		-0.0584		-0.1177
p value		0.1155		0.1939		0.8577		0.5858		0.2748
adj. R^2	0.3962	0.4035	0.5196	0.5258	0.5632	0.5823	0.5439	0.5470	0.5422	0.5583
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk-adjusted returns to net sale portfolios constructed from stocks for which insiders are net sellers in low B/M ratio firms over previous t days (different holding periods). Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk-adjusted returns to portfolios constructed by outsiders to replicate insider net sale transactions in low B/M ratio firms one day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) report the risk adjusted returns according to the CAPM and the three factor model respectively.

4.3.3.2.2. Medium Book to Market Firms

Insiders of the medium B/M ratio companies do not earn daily abnormal returns from their transactions over any of the holding periods (Panel A, Table 4.40). However, when the net purchase portfolio performances are examined, it is seen that positive and statistically significant daily AARs are earned by insiders of medium B/M firm over 5-day holding period (Panel A, Table 4.41). According to results tabulated in Panel A of Table 4.42, insiders of medium B/M firms, as a group, sell their companies stocks to avoid statistically significant negative daily AARs over all holding periods.

Results for the outsiders overall and the net purchase portfolios imply that outsiders cannot implement a trading strategy resulting in above market risk adjusted returns over any of the holding periods (Panel B of Tables 4.40 and 4.41). On the other hand, negative and statistically significant daily AARs exist for all holding periods for the outsider net sale portfolios. Thus, outsiders can avoid statistically significant negative daily AARs by either selling or not purchasing stocks that are net sold by these insiders over all holding periods (Panel B, Table 4.42).

Table 4.40 Risk Adjusted Returns to Portfolios Constructed from Medium Book to Market Ratio Firms

Panel A: Insider Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0015	0.0015	0.0010	0.0010	0.0011	0.0011	0.0004	0.0004	-0.0003	-0.0003
p value	0.0505	0.0522	0.1718	0.1682	0.0830	0.0946	0.4895	0.5387	0.5715	0.5373
RM-RF	0.4592	0.5013	0.4642	0.5132	0.4092	0.4299	0.4180	0.4332	0.4531	0.4771
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.2261		0.2665		0.1076		0.0777		0.1283
p value		0.0077		0.0005		0.1157		0.2141		0.0276
HML		0.3098		0.2808		0.2507		0.2183		0.1975
p value		0.0035		0.0031		0.0035		0.0053		0.0067
adj. R^2	0.2874	0.3071	0.3370	0.3624	0.3309	0.3434	0.3829	0.3923	0.4564	0.4677
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0008	0.0009	0.0010	0.0010	0.0009	0.0008	0.0002	0.0001	-0.0005	-0.0005
p value	0.3124	0.3059	0.1347	0.1360	0.1861	0.2022	0.7633	0.8244	0.3530	0.3338
RM-RF	0.4381	0.4826	0.4357	0.4758	0.3971	0.4202	0.4037	0.4169	0.4464	0.4727
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.2431		0.2164		0.1216		0.0665		0.1413
p value		0.0073		0.0039		0.0833		0.3081		0.0176
HML		0.2137		0.2559		0.2270		0.2140		0.1836
p value		0.0585		0.0063		0.0098		0.0089		0.0136
adj. R^2	0.2449	0.2584	0.3178	0.3369	0.3072	0.3180	0.3473	0.3555	0.4385	0.4496
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk-adjusted returns to portfolios constructed from insider transactions in medium B/M ratio firms over different holding periods. Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk-adjusted returns to portfolios constructed by outsiders to replicate transactions of insiders in medium B/M ratio firms one day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) report the risk adjusted returns according to the CAPM and the three factor model respectively.

Table 4.41 Risk Adjusted Returns to Net Purchase Portfolios Constructed from Medium Book to Market Ratio Firms

Panel A: Insider Net Purchase Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0017	0.0017	0.0007	0.0007	0.0004	0.0005	-0.0005	-0.0005	-0.0010	-0.0009
p value	0.0171	0.0139	0.2515	0.2194	0.4333	0.4103	0.3382	0.3280	0.0478	0.0392
RM-RF	0.7961	0.8599	0.7779	0.8476	0.7702	0.8284	0.7747	0.8429	0.7772	0.8505
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.3475		0.3820		0.3179		0.3743		0.4039
p value		0.0000		0.0000		0.0000		0.0000		0.0000
HML		0.3377		0.3025		0.2864		0.2881		0.2661
p value		0.0003		0.0003		0.0001		0.0000		0.0000
adj. R^2	0.6079	0.6339	0.6415	0.6725	0.6850	0.7101	0.7213	0.7550	0.7461	0.7840
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Net Purchase Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0007	0.0007	0.0003	0.0003	0.0000	0.0000	-0.0008	-0.0008	-0.0013	-0.0012
p value	0.3344	0.3125	0.6680	0.6395	0.9928	0.9659	0.1494	0.1388	0.0145	0.0111
RM-RF	0.8058	0.8635	0.7557	0.8141	0.7607	0.8230	0.7602	0.8272	0.7768	0.8559
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.3164		0.3204		0.3417		0.3675		0.4375
p value		0.0000		0.0000		0.0000		0.0000		0.0000
HML		0.2440		0.2497		0.2624		0.2811		0.2458
p value		0.0111		0.0031		0.0008		0.0001		0.0002
adj. R^2	0.5985	0.6158	0.6260	0.6479	0.6622	0.6884	0.6883	0.7202	0.7296	0.7709
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk-adjusted returns to net purchase portfolios constructed from stocks for which insiders are net buyers in medium B/M ratio firms over previous t days (different holding periods). Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk-adjusted returns to portfolios constructed by outsiders to replicate insider net purchase transactions in medium B/M ratio firms one day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) report the risk adjusted returns according to the CAPM and the three factor model respectively.

Table 4.42 Risk Adjusted Returns to Net Sale Portfolios Constructed from Medium Book to Market Ratio Firms

Panel A: Insider Net Sale Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	-0.0030	-0.0028	-0.0026	-0.0024	-0.0033	-0.0031	-0.0028	-0.0027	-0.0022	-0.0021
p value	0.0153	0.0187	0.0223	0.0288	0.0006	0.0006	0.0005	0.0003	0.0022	0.0016
RM-RF	0.8478	0.9539	0.8561	0.9596	0.8971	1.0177	0.8877	1.0100	0.8936	1.0140
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.5950		0.5838		0.6790		0.6826		0.6717
p value		0.0000		0.0000		0.0000		0.0000		0.0000
HML		0.0980		0.0235		0.0449		0.2057		0.2228
p value		0.5479		0.8766		0.7166		0.0425		0.0134
adj. R^2	0.3626	0.3889	0.4018	0.4297	0.5122	0.5579	0.5932	0.6498	0.6445	0.7041
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Net Sale Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	-0.0031	-0.0029	-0.0034	-0.0032	-0.0032	-0.0030	-0.0026	-0.0025	-0.0021	-0.0020
p value	0.0247	0.0291	0.0049	0.0061	0.0009	0.0010	0.0013	0.0010	0.0042	0.0033
RM-RF	0.7889	0.8894	0.8963	1.0052	0.8956	1.0178	0.8757	0.9987	0.8898	1.0126
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.5621		0.6121		0.6890		0.6871		0.6848
p value		0.0001		0.0000		0.0000		0.0000		0.0000
HML		0.1373		0.0724		0.0338		0.2098		0.2256
p value		0.4497		0.6461		0.7805		0.0394		0.0126
adj. R^2	0.2864	0.3072	0.4035	0.4315	0.5183	0.5663	0.5842	0.6423	0.6399	0.7018
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk-adjusted returns to net sale portfolios constructed from stocks for which insiders are net sellers in medium B/M ratio firms over previous t days (different holding periods). Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk-adjusted returns to portfolios constructed by outsiders to replicate insider net sale transactions in medium B/M ratio firms one day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) report the risk adjusted returns according to the CAPM and the three factor model respectively.

4.3.3.2.3. High Book to Market Firms

According to results tabulated in Panel A of Table 4.43, insiders of high B/M firms earn statistically significant daily average abnormal returns from their transactions for the following 5 days. However, these abnormal returns are not available to outsiders (Panel B of Table 4.43).

Insiders of high B/M firms, as a group, earn statistically significant positive daily AAR from their net purchases only over the 5-day holding period (Panel A, Table 4.44). On the other hand, insider net sale portfolios experience statistically significant negative daily average abnormal returns for all holding periods (Panel A of Table 4.45). Therefore, insiders of high B/M firms avoid abnormal losses by selling their company shares.

Risk adjusted return estimates of outsider net purchase portfolios indicate that outsiders cannot implement a trading strategy and earn above market returns regardless of the holding period (Panel B of Table 4.44). However, risk adjusted returns estimates related to outsider net sale portfolios implies that outsiders can avoid statistically significant negative AARs by either selling or not purchasing stocks of companies that are net sold by insiders over all holding periods (Panel B of Table 4.45).

According to the empirical result of this subsection, only insiders of high B/M ratio firms earn statistically significant abnormal returns from their transactions over a 5-day holding period. Furthermore, regardless of the book to market ratio of the firm, insider groups earn statistically significant daily AARs from their net purchases over the 5-day holding period. However, these short period returns from overall insider trades are not accessible for outsiders. Results of the net sale portfolios indicate that whenever insiders of the medium and high B/M firms are net sellers, shares of their companies experience statistically significant negative daily AARs

for all holding periods, whereas for low B/M firms, statistically significant negative performance exist up to 21-day holding periods. On the other hand, outsiders can avoid statistically significant negative daily AARs by either not purchasing or selling shares of medium or high (low) B/M firms that are net sold by insiders for all holding periods (5-day holding period).

Table 4.43 Risk Adjusted Returns to Portfolios Constructed from High Book to Market Ratio Firms

Panel A: Insider Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0017	0.0017	0.0008	0.0008	0.0005	0.0005	-0.0001	-0.0001	-0.0007	-0.0007
p value	0.0290	0.0253	0.2667	0.2636	0.3742	0.4008	0.9186	0.8580	0.1963	0.1743
RM-RF	0.4871	0.5340	0.5000	0.5376	0.4541	0.4763	0.4385	0.4528	0.4556	0.4792
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.2586		0.2048		0.1172		0.0729		0.1257
p value		0.0017		0.0053		0.0768		0.2343		0.0277
HML		0.1681		0.2000		0.2139		0.2028		0.2057
p value		0.1007		0.0291		0.0099		0.0083		0.0040
adj. R^2	0.3273	0.3421	0.3913	0.4044	0.3951	0.4047	0.4156	0.4234	0.4683	0.4804
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0008	0.0008	0.0007	0.0007	0.0004	0.0004	-0.0001	-0.0002	-0.0008	-0.0009
p value	0.2597	0.2470	0.2988	0.3118	0.4925	0.5287	0.8478	0.7762	0.1079	0.0933
RM-RF	0.4761	0.5206	0.4612	0.4949	0.4532	0.4796	0.4357	0.4528	0.4695	0.4983
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.2446		0.1809		0.1399		0.0873		0.1542
p value		0.0022		0.0103		0.0286		0.1523		0.0054
HML		0.1864		0.2508		0.2499		0.2408		0.2197
p value		0.0606		0.0044		0.0018		0.0016		0.0015
adj. R^2	0.3309	0.3459	0.3713	0.3874	0.4094	0.4246	0.4136	0.4258	0.4971	0.5132
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk-adjusted returns to portfolios constructed from insider transactions in high B/M ratio firms over different holding periods. Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk-adjusted returns to portfolios constructed by outsiders to replicate transactions of insiders in high B/M ratio firms one day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) report the risk adjusted returns according to the CAPM and the three factor model respectively.

Table 4.44 Risk Adjusted Returns to Net Purchase Portfolios Constructed from High Book to Market Ratio Firms

Panel A: Insider Net Purchase Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0019	0.0019	0.0009	0.0009	0.0004	0.0004	-0.0006	-0.0006	-0.0010	-0.0010
p value	0.0057	0.0043	0.1434	0.1341	0.4818	0.4852	0.2704	0.2491	0.0454	0.0360
RM-RF	0.8027	0.8644	0.7734	0.8297	0.7606	0.8092	0.7575	0.8164	0.7677	0.8383
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.3367		0.3058		0.2635		0.3213		0.3877
p value		0.0000		0.0000		0.0000		0.0000		0.0000
HML		0.3119		0.3238		0.2959		0.2988		0.2858
p value		0.0004		0.0001		0.0001		0.0000		0.0000
adj. R^2	0.6302	0.6542	0.6588	0.6836	0.6713	0.6915	0.6980	0.7258	0.7327	0.7694
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Net Purchase Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	0.0011	0.0011	0.0006	0.0006	0.0001	0.0000	-0.0007	-0.0007	-0.0012	-0.0011
p value	0.0921	0.0895	0.3175	0.3309	0.9297	0.9434	0.1869	0.1662	0.0252	0.0196
RM-RF	0.7870	0.8304	0.7420	0.7811	0.7525	0.8018	0.7519	0.8099	0.7758	0.8517
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.2358		0.2099		0.2674		0.3160		0.4185
p value		0.0012		0.0014		0.0000		0.0000		0.0000
HML		0.2457		0.2865		0.2869		0.3041		0.2695
p value		0.0069		0.0005		0.0002		0.0000		0.0000
adj. R^2	0.6168	0.6291	0.6347	0.6496	0.6690	0.6894	0.6891	0.7166	0.7296	0.7692
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk-adjusted returns to net purchase portfolios constructed from stocks for which insiders are net buyers in high B/M ratio firms over previous t days (different holding periods). Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk-adjusted returns to portfolios constructed by outsiders to replicate insider net purchase transactions in high B/M ratio firms one day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) report the risk adjusted returns according to the CAPM and the three factor model respectively.

Table 4.45 Risk Adjusted Returns to Net Sale Portfolios Constructed from High Book to Market Ratio Firms

Panel A: Insider Net Sale Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	-0.0044	-0.0043	-0.0032	-0.0031	-0.0030	-0.0029	-0.0026	-0.0025	-0.0015	-0.0015
p value	0.0002	0.0002	0.0020	0.0019	0.0008	0.0007	0.0005	0.0002	0.0390	0.0355
RM-RF	0.7602	0.8466	0.7782	0.8617	0.8865	0.9959	0.8901	0.9985	0.9037	1.0065
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.4734		0.4608		0.6065		0.5984		0.5684
p value		0.0002		0.0000		0.0000		0.0000		0.0000
HML		0.3840		0.2875		0.2891		0.3659		0.3175
p value		0.0147		0.0352		0.0115		0.0001		0.0008
adj. R^2	0.3316	0.3561	0.4073	0.4318	0.5460	0.5891	0.6366	0.6893	0.6393	0.6841
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel B: Outsider Net Sale Portfolios										
Holding	**[0,5]**		**[0,10]**		**[0,21]**		**[0,42]**		**[0,63]**	
Period	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**
alpha	-0.0034	-0.0033	-0.0035	-0.0034	-0.0030	-0.0029	-0.0026	-0.0025	-0.0015	-0.0014
p value	0.0030	0.0035	0.0006	0.0007	0.0006	0.0005	0.0005	0.0003	0.0476	0.0488
RM-RF	0.8340	0.9280	0.8752	0.9749	0.8955	1.0187	0.8958	1.0090	0.9000	1.0038
p value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SMB		0.5254		0.5561		0.6878		0.6296		0.5773
p value		0.0000		0.0000		0.0000		0.0000		0.0000
HML		0.1557		0.1830		0.2109		0.2637		0.2423
p value		0.3122		0.1723		0.0552		0.0039		0.0110
adj. R^2	0.3828	0.4053	0.4697	0.4991	0.5624	0.6158	0.6445	0.6979	0.6353	0.6788
Sig. F	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Panel A of this table presents the risk-adjusted returns to net sale portfolios constructed from stocks for which insiders are net sellers in high B/M ratio firms over previous t days (different holding periods). Risk adjusted returns are calculated by using the CAPM and Fama-French three-factor model. Panel B presents risk-adjusted returns to portfolios constructed by outsiders to replicate insider net sale transactions in high B/M ratio firms one day after the announcement of these transactions. Alpha is the regression intercept, and the RM-RF, the SMB and the HML are the risk premiums for the market, small minus big and high minus low risk factors. P-values for these coefficient estimates are reported in the rows labeled as p-value. The last two rows report the adjusted R-square and significance of F-statistic for the regressions. Columns (1) and (2) report the risk adjusted returns according to the CAPM and the three factor model respectively.

CHAPTER 5

CONCLUSION

In this thesis, the return performance of insiders who are required to report their transactions in accordance with the Capital Markets Board's decree is examined over various holding periods (5-, 10-, 21-, 42- and 63-day holding periods). Similarly, the return performance of outsiders replicating the transactions of these insiders is also analyzed over the same holding periods.

For the period of the analysis (January 2007 to December 2008), attachments to company news and daily bulletins are investigated for insider transactions and the dataset needed for empirical analysis is created. The overall dataset and subsamples of this dataset are analyzed to estimate the return performance of insiders and outsiders. These subsamples are based on the relative size of transaction, the type of insider, the size and the B/M ratio of the company.

Findings of these analyses can be summarized as follows. In general, neither the insiders nor the outsiders can earn average abnormal returns from their overall transactions. On the other hand, insiders earn statistically significant returns from their net purchase transactions over short holding periods. However, outsiders replicating purchases of insiders cannot earn statistically significant positive returns in general. Returns to insider net sale transactions are statistically significant over longer holding periods. Outsiders can also benefit from following insider sale transactions. These findings indicate an asymmetric reaction to insider purchase and sale transactions. This asymmetric reaction is consistent with insiders being net purchasers of their company shares during the period analyzed in this thesis.

Analyses based on the subsample of insider trades point out the importance of different trade, insider and company characteristics on the abnormal returns to the insider and the outsider portfolios. For these subsample analysis, overall and the net purchase portfolio results are not different from the results for the overall insider trades. However, the net sale portfolio results indicate that the net sales of insiders are concentrated in low relative trade volumes. Furthermore, Corporate Insiders seems to be the group that earns consistent abnormal returns from their sale transactions over longer holding periods. Similarly, outsiders following insider trades benefit the most from sale transactions of Corporate Insiders. This finding indicates that corporate insiders might be trading based on material non-public information. Insiders and outsiders of small and medium firms earn abnormal returns from the net sale transactions of insiders over holding periods longer than those of big firms. This finding might be an indication of higher informational asymmetries in the market for small and medium firms in relation to big firms. Finally, the net sale transactions of insiders in medium and high B/M ratio firms allow both insiders and outsiders to earn abnormal returns over holding periods longer than those of low B/M ratio firms.

Results of this study implicate similar conclusions to those of Doğu (2007), who analyzes a different time horizon for the ISE by using event study methodology. Since the study conducted by Doğu (2007) presents the standardized cumulative abnormal returns, abnormal estimate returns provided by this study and the former study are not comparable.

Evidences presented in this thesis have important implications for the efficiency of the Istanbul Stock Exchange. Results indicate that the Istanbul Stock Exchange is not Semi Strong or Strong Form Efficient.

There exist several limitations of this study. First, although the risk adjusted returns are estimated by constructing value-weighted portfolios throughout the empirical

analysis, equally weighting of each period might underestimate daily average abnormal return estimates if the trading activities of insiders clustered in time. Furthermore, daily changing portfolio sizes might cause heteroscedasticity. According to Fama (1998), these problems can be alleviated by an adjustment for heteroskedasticity. Thus, estimating daily average abnormal returns using weighted least squares regression, where weighting factors are based on the daily market value of the portfolios, can be used as a correction for heteroskedasticity. Furthermore, neglecting transaction costs might cause overestimation of the risk adjusted returns provided in this study. Finally, since insider portfolios constructed using the closing the price of the day the transaction occurred instead of the actual prices at which insiders trade, abnormal return estimates of the insider portfolios might be understated.

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