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Are Internet Firms Different? Evidence from Insider Trading

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Abstract:
This study investigates whether the information content of insider transactions, with a focus on sell transactions, is different for high growth, high volatility Internet-based firms. Prior research on more "traditional" firms has found a small, but significant negative abnormal return with insider sells, which points to an association of insider sells with negative information about the firm by outsiders. We employ several models to examine over 1,000 inside transactions for more than 100 NETDEX firms to find that for Internet firms, insider sells are not followed by a significant negative abnormal return. Firm size effects differ between the different methods employed. In conclusion, it appears that while insider sales in traditional firms are motivated by information asymmetry reason, insider sales in Internet firms are not. We conclude that Internet firms are different indeed.

ARE INTERNET FIRMS DIFFERENT?
EVIDENCE FROM INSIDER TRADING

1. Introduction

This paper analyzes whether insider transactions in Internet firms differ from those in "traditional" firms. Are Internet firms different? Sure, they are high growth and high volatile stocks, but they are not the only ones with these characteristics. A number of recent papers find that at least there is something special about them. Arosio et al. (2000) find that Internet-stock IPOs are substantially underpriced. Junttila (2001) and Ofek and Richardson (2001) find that market rationality appears to be limited in the Internet-stock sector. The valuation of Internet firms is tough, which makes it also hard to accurately assess a company's stock price as the stock price is supposed to reflect the firm's ultimate value.

One way to gain information about the accurateness of a stock price is to analyze insider-trading patterns for that stock. Seyhun (1998ab) explores the value of insider trading to assess how a company is performing. He finds that on average insiders have proved prescient. According to Seyhun's extensive research, stocks that are bought by insiders outperform the market by 4.5% and stocks sold by insiders under-perform the market by 2.7%. Insider trading can thus offer some indication of a firm's "true" value, which indicates the importance of understanding the information content of such transactions. For "traditional" firms, insider trading has meant something quite logical as inside sells point to a current overvaluation and inside buys to an undervaluation of the stock. Insider trades in these firms are motivated by information asymmetry reason. Insider trading in Internet firms may, however, mean something quite different than insider trading in more traditional firms. For Internet firms, stock price volatility is high and insider ownership extensive, which makes the wealth-position of the manager quite risky. If the firm performs poorly or even fails,

managers might not just lose their income but also a large part of their personal wealth. Insider sales in Internet firms may produce positive excess returns. Diversification rather than instant profit seeking will then be a motive for inside trades by managers of Internet firms, a proposition this paper will seek to explore. To this extent, we will account for firm size in relation to insider trading in Internet stocks. In case diversification is an important motive, this would be reflected in more positive excess returns for smaller firms. However, if this relationship cannot be established, it suggests, once again, that market rationality is limited in Internet stocks.

Our study is related to Meulbroek's (2000) research, who looks after the compensation of executives in Internet firms. She finds that sales in Internet-based companies do not produce negative excess returns. As such, it appears that market participants do not, on average, interpret managerial sales in Internet-based firms as a signal of overvaluation. In her opinion, it is the lack of diversification, combined with the high volatility of Internet-based firms, and the limited control managers have over that volatility, that gives managers the incentive to diversify by selling their stock holdings. In general, our research confirms Meulbroek's results, as we find that most insider sells in internet-based firms are not followed by negative abnormal returns. However, we can't find support for the interpretation that it is diversification that drives this result. We use various models to derive our results. Our database consists of 114 NETDEX firms, against 58 firms from Hambrecht and Quist's Internet Index with Meulbroek. To assess the diversification motive, we also investigate firm size effects. We analyze a different and more recent time period than Meulbroek (1999-2000 versus 1996-1998). Our paper is complementary to Meulbroek's in that it derives almost identical results with respect to excess returns, but for a lot more firms and by using different models. As such, it appears that our results are a lot more robust. But in contrast to Meulbroek, on the basis of our analysis of firm-size effects, we can not conclude that diversification by managers is responsible for the findings. There remains considerable scope for irrational ("hype") behavior in Internet stock

valuation. As such, our findings are more in line with those from other research after Internet firms (e.g. Arosio et al., 2000; Junttila, 2001; Ofek and Richardson, 2001).

This paper is organized as follows. Section 2 summarizes the main research on insider trading and stock price reactions to provide a benchmark for the results of this study. Section 3 describes the methodology and data employed. The results are discussed in Section 4. Section 5 gives the conclusions of this study.

2. Previous Research on Insider Trading and Stock Price Reactions

The relation between stock prices and insider transactions has been an area of research that has provoked considerable interest. The logical relationship between the two variables seems to be, when it is assumed that the insiders are profit seekers, that they will sell their companies' stock when they think it is overvalued and buy it when they think it is undervalued. This insider trading will then have an effect on the firm's stock-price due to the perceived information content of the insider transactions by outsiders, with sell-transactions accelerating the price downwards and buy-transactions accelerating the price upwards. The relationship of sell transactions being accompanied by a negative price reaction and buy transactions by a positive price reaction turns out to be less striking than one might expect. This is caused mainly by the extensive regulations intended to prevent insiders from profiting from their exclusive position. In the United States, the Securities Exchange Act of 1934 and the Williams Act Amendments of 1968 are the primary pieces of legislation to regulate insider trading. These regulations mainly pertain to the definition of insiders, trading by insiders and disclosure of information on holdings and transactions of insiders. The logical relationship holds throughout most academic research, even though the magnitude of the effect is sometimes very small.

Several variations have been made in the study of the relation between insider transactions and stock price movements. Lorie and Niederhoffer (1968), Jaffe (1974),

and Seyhun (1986) look at insider trading and firm-specific future price movements. Lorie and Niederhoffer are the first to use exact data (for example, daily price fluctuations instead of monthly price fluctuations) as they investigate stock performance when there is an excess of two or more buyers or sellers among insiders of a company in the preceding month. In their sample of about 8,000 transactions, they find that insiders tend to sell more often than usual before a price decrease and buy more often than usual before a price increase. Jaffe investigates a random sample of about 1,000 trading months covering 200 large firms in the period 1962-1968. He finds that insiders trade with abnormal returns of about 2.5% (of the total return) over outsiders and he also concludes that the *Official Summary* of the SEC contains information on possible future stock prices. This latter finding is inconsistent with a true efficient market in which prices "fully reflect" available information (see also Fama, 1970). Seyhun studies approximately 60,000 transactions from 1971-1981 and finds that, on average, corporate insider sells are accompanied by a statistically significant negative excess return of around 0.9% over the month following the month in which the insider sell takes place.

Chowdhurry et al. (1993) and Seyhun (1992, 1998ab) look at aggregate insider trading and its effect on aggregate stock returns. The former analyze about 140,000 transactions over the 1975-1986 period and conclude that there is some predictive content associated with aggregate insider trading but that the magnitude is small. Seyhun (1992), in contrast, finds in his pool of about 845,000 transactions a strong relationship between the aggregate net number of open market purchases and sells by corporate insiders in their own company and future aggregate stock returns for the 1975-1989 period. Seyhun explains the predictive ability of aggregate insider trading by changes in business conditions and movements away from fundamentals. Seyhun (1998a) adds that insiders are best positioned to interpret the implications of macroeconomic developments for their own firms and thus for their own firm's stock prices. This should also hold for the aggregate, which Seyhun concludes that it does. Richardson and Venkatesh (1995) look specifically at insider trading and *long-run* return performance. They investigate about 100,000 transactions for 1980-1987 and find that insider transactions have both a long-term anticipatory and a reactive

component with all of the results driven by the timing of insider sells, as opposed to purchases. Meulbroek (1992) examines *illegal* insider trading. The study-sample consists of individuals charged with insider trading by the SEC in civil cases during the period 1980-1989. According to the SEC, illegal insider transactions are those made on the basis of material information that the investor possesses or should posses and which is not available to the investing public. Meulbroek finds that the stock market detects illegal insider trading and includes a large portion of the information into the stock-price before such trading information becomes public.

All of the previously mentioned studies have been on what we call "traditional" firms. With the exception of Meulbroek (2000), very little research has been done on the effects of insider trading on stock prices of firms whose primary turnover is generated through the Internet. Meulbroek analyzes insider transactions in 58 Internet-based firms during 1996-1998. She finds that sales in these companies do not produce negative excess returns. For an Internet-based firm, the mean return on an insider selling day is +0.82%, net-of-market movements. Meulbroek argues this result suggests that market participants do not regard managerial sales in Internet firms as a signal of overvaluation. The relatively high incidence of managerial sales in Internet-based firms may instead reflect the high value managers place on holding a diversified portfolio. From this, Meulbroek argues that the compensation-mix of managers might not be optimal. Related is the study by Schultz and Zaman (2001). They examine the motives of Internet firms for going public. To this extent, they examine the behavior of the individuals closest to them, such as their managers, underwriters and venture capitalists. Schultz and Zaman find only weak evidence that these firms are going public to take advantage of irrationally high prices. They find that Internet firms are hurrying to go public to grab market share.

Internet firms differ from traditional firms as returns tend to be considerably more volatile, and growth can be much more extreme. Insiders own on average a larger percentage of the firm. Furthermore, a senior executive in an Internet firm is frequently financially dependent upon his or her firm in two ways, namely income-wise and wealth-wise. A fair share of the executive's wealth usually consists of

shares in the firm, especially since growth in Internet firms that have not failed has been high. The personal wealth of the executive will fluctuate tremendously as stock prices are very volatile and the executive has not diversified away against the unsystematic risk of his or her portfolio. To lower risk, it is very important for such an individual to diversify holdings and not have all the peas in one pie. Diversification can be the leading motive for insider selling among internet-firm executives, which sets them apart from executives in traditional firms.

This paper analyzes insider trading effects with Internet firms and managerial diversification as the motive for these effects. The hypothesis this paper will try to substantiate is that the information content of insider transactions in Internet firms differs from the information content of insider transactions in traditional firms. We will test this hypothesis by examining whether and how stock returns are related to insider sells and how the investing public perceives sells in an Internet firm. In other words, what information does such a trade convey about the firm. For traditional firms, prior research has convincingly shown that insider selling is followed by negative excess returns (Lorie and Niederhoffer, 1968; Seyhun, 1986). If similar analysis of insider trading in internet firms shows that at least there is no negative excess return associated with a sell, then evidence might be provided that the information content is not negative and immediate profit is probably not the leading motive in the case of Internet firms. According to Meulbroek (2000), diversification is the most logical alternative motive. We try to test this idea as well. As such, we go into a division of size to see whether the results are the same for small and large firms. We postulate that in case diversification is the motive for selling shares, we would witness a negative relationship between firm size and excess returns from insider sells. Insider buys are included in the methodology as well, although insider buys in Internet firms constitute only a very small part of the total of inside transactions.

3. Methodology and Data

3.1 Methodology

There are four main motivations associated with inside trades. Insiders sell or buy stock of their own firm when they think it is over- or undervalued, for diversification purposes, for noise causing reasons, or for personal reasons. The latter two cannot be investigated easily on a large scale and, in line with the other research done on the topic (like Jaffe, 1974), are assumed only to add insignificantly to the results. Information about the noise causing reasons will follow in the data-section. In order to investigate the information contents of insider trades in Internet firms, this study examines the relation between insider trades and the subsequent performance of a security. The focus of the analysis is firm specific. Economy-wide aggregate effects, illegal trades, and long-run price effects are not included. To improve the robustness of the results, we will employ basically two different methods. The first method is similar to the one used by Lorie and Niederhoffer (1968) and focuses on *monthly* price fluctuations. The second method looks at *daily* price fluctuations resembling the manner in which Seyhun (1986) looks at stock prices and insider trading; Meulbroek (2000) also employs this approach. We will first discuss the similarities of the two methods in data-analysis and the way in which excess returns are calculated. This will be followed by an exposition of both methods.

The analysis will primarily focus on the signal (buy or sell) and not on the amount of shares traded. One striking feature of the data is that there is great variation in the number of shares traded. Lorie and Niederhoffer (1968) offer a logical explanation for this phenomenon, namely that different kinds of insiders trade in significantly different amounts of shares. This indicates that the size of the transaction does not necessarily infer something about the importance of the information conveyed in the trade as the size might just depend on who trades.

With respect to excess (abnormal) returns, there are two primary techniques mentioned in the literature.[1] The first technique (Method I) utilized by, for example, Jaffe (1974), uses variations of the Capital Asset Pricing Model (CAPM). Seyhun (1986) discusses this method and suggests that the CAPM overstates the abnormal returns realized from insider trading, as there is a particular systematic bias in the residuals. Extensive documentation and evidence of this bias can be found in Reinganum (1981) who finds that the CAPM incorrectly specifies the equilibrium pricing mechanism. Applied to the case of Internet firms, there are two more objections to the use of the CAPM. As the returns and risks associated with Internet firms are continuously changing, individual firm betas become hard to measure and tointerpret. Also, as many firms in the NETDEX have only since recently been in business, estimating beta from only a very limited pool of data may not be very reliable. Therefore, we also employ Seyhun's alternative methodology. This second technique to calculate excess returns (Method II) is the net-of-market method in which returns of stocks are netted with the return of a particular index or combination of indices to assess how the stock performs compared to the market. The net-of-market method does not exhibit any bias in residuals and does not overstate abnormal returns. One downfall of the method is that results can be influenced by the choice of index to represent the market. To minimize this influence, we will use the net-of-market technique with two different indices representing the market, the NETDEX and the NASDAQ.

Method I

Method I analyzes monthly stock price fluctuations and insider trading in a variety of ways that we will assign I-1 (A, B and C) and I-2.

Variation I-1 analyzes insider trading before large price changes in a stock defined as 10% or more. Lorie and Niederhoffer (1968) use an 8% cut-off, but as Internet stocks are on average more volatile than the stocks in the subject pool of Lorie and

[1] Other techniques or models for the calculation of abnormal returns are the Scholes-Williams model and the mean-returns adjusted model, see Seyhun (1986).

Niederhoffer, we have raised that percentage with 25% to account for this significantly larger volatility. Large price changes are particularly interesting as they may constitute large gains or losses to traders and thus should amplify the motivations of insiders. We look at insider transactions before large price changes in three ways:

I-1A Determine if the last transaction in the six months prior to the large price change is a buy or sell action.

I-1B Determine if the number of buys minus the number of sells in the six months prior to the large price change is positive or negative.

I-1C Determine if the number of shares bought minus the number of shares sold in the six months prior to the large price change is positive or negative.

If there are no buys or sells before a large price change, that occurrence is excluded from the analysis. This can, for example, be the case when a company has only been in business for a short amount of time when such a price change occurs. For I-1B and I-1C it holds that if the number of buys and sells or the number of shares bought and sold is equal, then that occurrence is excluded from further analysis as well. For I-1B this amounts to four occasions and for I-1C to three occasions.

To test the significance of the observed differences between price increases and decreases in combination with buys and sells (I-1A), positive and negative differences between numbers of buys minus sells (I-1B) or numbers of shares bought minus sold (I-1C), a z-value is calculated. The observed sample fractions are tested for statistical significance by using a simple inference method for fractions. The expected sample fraction for the number of changes over the total number of observations for both the buy and sell activity (I-1A) is 0.50 under the Null hypothesis. This is because if it were solely up to chance whether we would observe an occurrence of a buy or sell transaction before a large price change, we would expect a buy occurrence in about 50% of the cases and a sell occurrence in about 50% of the cases. This is analogous for I-1B and I-1C.

Then, the z-value for I-1A, I-1B and I-1C is defined as follows:

$$z = (Þ - p_0) / \sqrt{(p_0 (1 - p_0) / n)} \quad (1)$$

Where Þ is the observed sample fraction with a price increase, p_0 is the expected fraction under the Null hypothesis, n is the number of observations. The significance levels of the results are determined by calculating the corresponding p-value.

Variation I-2 looks at the price movement of a stock subsequent to the month in which there is a clear insider trader signal. Similar to Lorie and Niederhoffer (1968), we define a clear signal as an excess of either two or more buy transactions or two or more sell transactions. By defining a clear signal as two or more trades, some sporadic trades for personal reasons are excluded automatically. In a month in which there is such a signal, the month-end price movement of the stock in comparison to the month-end fluctuation in the NETDEX or NASDAQ is analyzed. Then, the abnormal return for security i on day τ, $AR_{i,\tau}$, with τ being the last day of the month in which there is an excess of two or more buyers or sellers, is calculated as follows:

$$AR_{i,\tau} = r_{i,\tau} - r_{m,\tau} \quad (2)$$

Where $r_{i,\tau}$ is the with-dividend return to security i on day τ, and $r_{m,\tau}$ is the with dividend return to a portfolio of either all NETDEX or all NASDAQ stocks on day τ. All abnormal returns are then counted by signal (positive or negative). The expected sample fraction for the number of months with a certain signal, thus in which the stock outperforms the index or vice versa, is 0.50 under the Null hypothesis. This is because if it were solely up to chance, with a clear inside trade signal, we would expect to see the stock outperform the index in about 50% of the cases and the index outperform the stock in about 50% of the cases. The significance of the results is measured by a simple statistical test similar to the one used in method I-1 where z is defined as follows:

$$z = (Þ^* - p_0) / \sqrt{(p_0 (1 - p_0) / n)} \quad (3)$$

Where Þ* is the observed sample fraction of cases in which the stock outperforms the index, p_0 is the expected fraction under the Null hypothesis, and n is the number of observations. Significance levels of the results are determined by calculating the corresponding P-value.

Method II

Based on the net-of-market model as used by Seyhun (1986), the abnormal return $AR_{i,t}$ for security i, on insider trading day t is calculated as follows:

$$AR_{i,t} = r_{i,t} - r_{m,t} \qquad (4)$$

Where $r_{i,t}$ is the with-dividend return to security i on day t and $r_{m,t}$ is the with dividend return to a portfolio of either all NETDEX or all NASDAQ stocks on day t. Per security, abnormal returns are evaluated separately for sell and buy days, which we will qualify as event days. An event day t is considered to be a sell day when the number of sells exceeds the number of buys on that day for that particular security. An event day is considered to be a buy day when the number of buys exceeds the number of sells on that day for that particular security. If the number of sells equals the number of buys on a particular event day, that day is excluded from the analysis. For each event day, abnormal returns are calculated for days t-2, t-1, t, t+1, t+2 to analyze the effects of possible information-leaking before a trade and possible lack of complete efficient markets. With $AR_{i,t-2}$, $AR_{i,t-1}$, $AR_{i,t+1}$ and $AR_{i,t+2}$ any anticipatory or prolonged effects can be evaluated. Seyhun (1986) corrects for potential changes in market parameters by adding two more parameters in the equation. As our research period is ten times shorter than the period Seyhun evaluated, we will disregard changes in market parameters, as they are likely to be negligible.

The average abnormal return for the instance of the event day, AAR_t, is calculated by averaging the abnormal returns for all 114 securities for all event days of each security.

$$AAR_t = 1/N_k \sum AR_{i,t} \qquad \text{for k = sell or buy, for i = 1, 114, for t = 1, } N_k \qquad (5)$$

Where N_k is the number of event days with k denoting either sell event days or buy event days. For this study, N_{buy} is 91 and N_{sell} is 839. $AAR_{t-2,}$ $AAR_{t-1,}$ $AAR_{t+1 \text{ and}}$ AAR_{t+2} are also calculated. The expected value of each average abnormal return is zero. Any observed deviation from zero should be tested for significance to evaluate whether the observation is simply due to random chance or points to the presence of an influential factor. The significance of the average abnormal returns is measured by standardizing them by their sample standard error SE(AAR). The statistical t-value of AAR_t is calculated as follows:

$$\text{t-value} = (AAR_t - \mu_0) / (SE(AAR_t) / \sqrt{N_k}) \qquad \text{for } N_k\text{-1 degrees of freedom} \qquad (6)$$

Where μ_0 is the expected value of AAR_t which in this case equals zero.

3.2 Data

The research-population consists of all firms present in the NETDEX- index in the period from March 31, 1999 to March 31, 2000 and from which stock-price information is available through the Datastream resource.[2] This period has been chosen based on the availability of the needed data free of charge. The NETDEX is a regularly updated geometric average of more than 100 public companies whose primary turnover is derived from the Internet.[3] Appendix 1 gives the key characteristics of our sample of 114 firms. Summary statistics of the database are presented in table 1. Almost all firms in the NETDEX are traded on the NASDAQ exchange. Average insider ownership with NETDEX firms is rather high with almost 50%. In comparison, the average insider ownership of all firms in the S&P 500 is

[2] The following NETDEX companies were excluded on this basis: Adforce Inc., Comps.Com Inc., Walt Disney – Go.com, Mindspring Enterprises, Preview Travel Inc., Telebanc Financial Corp., USweb Corporation, Worldtalk Communications, Zdnet.

[3] http://cfs.stockpoint.com/poppe/pages/netdex_profile.asp

20.5%. Also, the average of the available beta's of the sample lies around 2, which is very high if one considers that the average market beta is 1 and for example the average beta of S&P 500 firms is 0.98 during our research period. This finding supports the view that the returns of Internet firms are very volatile when compared to the average mainstream firm.

The Securities and Exchange Commission (SEC) requires insiders to report any transactions they make in their own company's stock within 10 days following the last day of the month in which the trading occurred. Insiders are defined as officers, directors, and owners of at least 10 percent of any class of common stock. This information is publicly available through publications of the SEC, the *Wall Street Journal*, the *Insiders Chronicle*, and numerous financial web-sites.[4] The data for this paper on insider transactions comes from the widely used and cited source http://www.insidertrader.com. As data on insider transactions are only free of charge for a period of 13 months through this source, this analysis has been done over a period of one year. Note that only "legal" insider transactions are thus included in this analysis, as illegal insider transactions are very unlikely to have been reported to the SEC. The data on stock prices was gathered from Datastream.

This study only includes open market transactions, which is consistent with most other studies on insider transactions. Open market transactions are transactions made on an exchange, usually through a broker. Non open-market transactions, such as trades related to gifts or dividends, are very clearly marked on http://www.insidertrader.com and are excluded, as they are less likely to have been induced by information signals according to existing literature. Option purchases are also excluded as their meaning is highly questioned in the literature, and they are nearly always excluded from analysis as well. For the research sample, a total of

[4] For example, http://www.CBS.marketwatch.com, http://www.Quicken.com, http://www.insidertrader.com, http://investor.msn.com, http://www.thomsoninvest.net, http://quote.yahoo.com.

2,043 transactions is studied, of which 649 are excluded as they are option purchases. Of the remaining 1,394 transactions, 91.5% is a sell transaction and 8.5% is a buy.

[INSERT TABLE 1 ABOUT HERE]

Table 1 gives the characteristics of our data sample and shows a breakdown by firm size. The first notable characteristic is that some firms in the sample are very large compared to others. The sample ranges from do-it-at-home companies to huge multinationals with more than 12,000 employees. A breakdown of the results according to firm size does not seem like a wasted luxury with such diversity. Firm size is measured before the event data. The number of shares traded per transaction and the total number of insider transactions per firm during the research period show an increasing trend with increasing firm size. The buy-to-sell ratio shows a decreasing trend with increasing firm size. Slight deviations from these trends can be explained by the presence of outliers. One such clear example is, for example, the buy-to-sell ratio of 0.64 in the >100 Million-<250 Million group. Cobalt Group Inc. and Cyberian Outpost Inc. both have a considerable number of insider buys, which heavily influences the buy to sell ratio. If these two are left out of the sample, a buy to sell ratio of 0.26 results, which follows the observed trend very well. The amount of insider sells is much larger than the amount of insider buys. As mentioned before, the average percentage of sell transactions of all firms is about 91% which is considerably larger than, for example, the average percentage of sell transactions of all firms found by Seyhun (1992) of about 50%.

The following can cause possible errors in the data set or constitute possible grounds for noise in the results: Insiders might mistakenly not accurately fill out forms 3, 4, or 5 from the SEC in which they report their inside transactions, or the SEC might transpose the data incorrectly. An insider may also purposefully try to play with the rules and price reactions by letting friends or relatives trade on their special information, as there is no reporting requirement to reveal these kinds of trades. Other ways to play with the rules are reciprocal passing of information by insiders of different companies, making random trades to camouflage the ones that are made on

special information and what Jaffe (1974) calls “gamesmanship”: As insiders will know what effect their behavior can have on stock prices they might, for example, just start buying their own stock with the hope that outsiders will drive up the price by starting to buy as well. We have checked the data for noticeable errors such as when insider trades supposedly take place when the company is not even in existence yet.[5] It is very hard to control for such things as trading by friends and relatives or gamesmanship so it is to hope that these will not significantly influence the results. The authors discussed in section 2 have not incorporated these factors either for the simple reason that it is rarely possible to acquire the information to take them into account.

4. Results

4.1 Overall results

We will discuss the results of this study in several layers. First, we discuss the overall results, then we go into the effect of firm size, deviations form the event day (with Method II), and inside buys. The main focus of this paper and its hypothesis is on sell transactions for all firms in the sample, with for method II an emphasis on event day t. The first important observation that has been made earlier in the paper is that, contrary to the findings of studies on traditional firms, for example Seyhun (1992), insider sells clearly dominate over insider buys in Internet firms. Of the total amount of transactions analyzed in this study, 91.5% is a sell action. With respect to the choice for the event-day itself as benchmark used for comparison in method II, the following can be said. Most studies found that markets work efficiently in the case of insider trading, which means that the price adjustment is immediate after the trade.

[5] For the companies Fashionmall.com Inc., FlashNet Communications, Cobalt Group Inc., Quokka Sports Inc., TiVo Inc. and Homestore.com Inc., one or two of the reported transactions were eliminated for this reason.

To be able to compare the results for Internet firms with the results for traditional firms, event day t warrants the closest observation. To provide more depth to the analysis, the influence of division in size of firm, the effect of deviations from day t and an exposition of the results for buy actions will also follow.

[INSERT TABLES 2 AND 3 ABOUT HERE]

Table 2 provides a summary for sell trades in all firms for all methods with the results and significance level and the appropriate conclusions. Method I-1A finds that sells are followed by a large price increase in about 54% of the cases, which is significant at the 90% level. Method I-1B finds that when the number of sells exceeds the number of buys in the six months preceding a large price change, then this price change is an increase in about 54% of the cases. This result is even significant at the 95% level. Method I-1C finds, with a significance of 90%, that when the number of shares sold exceeds the number of shares bought in the six months prior to a large price change, then this price change is an increase in about 54% of the cases. The underlying data for method I-1 can be found in table 3 in which the total number of cases are presented for each type of insider activity and price change with the corresponding z- and p-values. For example, for the “all firms” category under method I-1A, large price increases are followed by sells in 274 instances and large price decreases are followed by sells in 235 instances. This difference is unlikely to be only due to chance as the result carries a z-value of 1.73, a p-value of 0.084 and thus a significance level of 90%. The results for method I-1 support our hypothesis as they provide (some) evidence that insider sells are followed by a positive price reaction, which contrasts with the results of Lorie and Niederhoffer (1968) for traditional firms. Lorie and Niederhoffer find in their study that a sell happens more often before a price decrease and their results are highly significant with a p-value smaller than 0.0005. As can be seen from table 2, Method I-2 shows with both the NETDEX and the NASDAQ as the reference-index, a slight upper hand of negative abnormal returns. This result is insignificant, which indicates that no evidence is provided that sells are structurally followed by a negative abnormal return as the observation can be due to random chance.

[INSERT TABLE 4 ABOUT HERE]

Table 4 gives the exact number of cases for when the stock performs better or worse than the NETDEX or NASDAQ in the case of an excess of two or more sellers (or buyers). In total, there are 237 instances in the sample in which there is a month with an excess of two or more sellers, of which 116 (NETDEX) or 115 (NASDAQ) are cases in which the stock outperforms the market index. These two numbers deviate only slightly from the number of instances that is expected under the Null hypothesis, namely 118.5 (50% of 237). The corresponding z-values of the deviations of 116 and 115 from 118.5 are –0.32 and –0.45 respectively, which clearly points to insignificance. Thus the Null hypothesis cannot be rejected and no other reason than a chance-event is supported to explain the minor deviations from the 50% mark. To support the hypothesis that insider sells (transactions) in Internet firms do not carry the same information contents as with traditional firms, the results should at least not show a significant number of negative abnormal returns, which is indeed the case with the results for this method. In comparison, Lorie and Niederhoffer (1968) find for traditional firms 124 instances of months with an excess of two or more sellers, of which only 43 are cases with the stock outperforming the market. The corresponding z-value is –3.41, which points to a highly significant result of a dominance of negative abnormal returns following inside sells.

For the net-of-market method (method II), table 4 shows that insider sells are accompanied on the event day by a positive abnormal return of 1.40% for the NETDEX and 1.37% for the NASDAQ as reference-index. These results are highly significant with t-values of 4.89 and 4.73 respectively. For each of the transactions, the abnormal return of the stock-price on that particular day (and the four days surrounding that day) is calculated with both the NETDEX and NASDAQ. From this information for all individual firms, the AAR and its standard error are calculated for "all firms". The results for this method support our hypothesis and seem to point to a conclusion opposite to Seyhun (1986), who presents a negative abnormal return with insider sells in the case of traditional firms. He finds a negative abnormal return of

0.9% with a t-value of –3.3. As such, it appears that in the case of sells abnormal returns for Internet firms behave quite differently to abnormal returns for traditional firms.

In the design of the methodology, we decided to use two indices to represent the market to improve the robustness of the results. In retrospect, we observe that the results of method I-2 and method II are similar for both the NETDEX and NASDAQ. This is not very surprising as almost all firms in the NETDEX are on the NASDAQ too. The NASDAQ is, however, far more encompassing than the NETDEX. The movements of the two composites are quite similar with peaks and valleys moving synchronously on most days. The fluctuations in the NETDEX, however, are much more extreme. The daily fluctuations in the value of the NETDEX over the research period have a standard deviation of 3.40% as compared to the NASDAQ with a standard deviation of the daily fluctuations of 1.86%. The results of this research are not very susceptible to the differences in fluctuation volatility between the two indices.

The fact that positive abnormal returns can be observed is harder to explain from the existing theory than the fact that no significant negative abnormal returns are present. A possible explanation for a positive price reaction after an inside sell could be limited market rationality in the Internet stock market (see also Junttila, 2001, and Ofek and Richardson, 2001). As insider ownership is high, the public float of Internet firm shares tends to be low. When an insider sells, shares suddenly become available to the investing public to buy. Afraid to miss out on this opportunity, demand might rise after the short-lived increase in supply and the price could move up for a short time period.

In summary, all (variations of) methods show results for Internet-based firms that clearly differ from what has been found in previous research on “traditional” firms. Through the years, research has found that inside sells give a negative signal about a traditional firm. For Internet firms, method I-2 shows no significant negative abnormal return. Methods I-1 and II even show a result that directly contradicts the

view that sells give a negative signal about the performance of the firm, as price increases and highly significant positive abnormal returns are observed immediately after an inside sell. Comparability of prior research and this study might falter because the time period covered is not exactly the same, the reference indexes are not fully equal and the methodologies might differ slightly. With respect to the time period, Lorie and Niederhoffer already found negative information signals with inside sells in 1968, as did Seyhun (1986, 1992, 1998a). With respect to the index used, Seyhun's last two studies included the NASDAQ index as one of the references for the market. With respect to methodology, slight alterations have been made to the Lorie and Niederhoffer method and the Seyhun method, but they have been justified in this paper. Results for studies on inside trades and price reactions have generally also proved quite robust for differences in methodology as with the wide variety of methods employed the results are surprisingly close in concurrence. Thus, assuming that the results for traditional firms can be transposed to the situation of this study with slightly different parameters, the hypothesis that insider sells (transactions) in Internet firms do not carry the same information contents as for "traditional" firms is supported. As such, we may conclude that Internet firms are different indeed.

The methods I-1, I-2 and II do differ in the level of how much they show a different result from what has been found for traditional firms. It is hard to pinpoint one exact reason why method I-2 might not provide such strong evidence as the other methods. One reason might be I-2 is the method with the lowest number of cases. With respect to sells, method I-1 has an N of about 500, method I-2 carries an N of 237 and for method II, N is 839. The influence of this factor on the results is hard to estimate exactly. What can be said is that Lorie and Niederhoffer find very strong evidence for associating sells with negative abnormal returns and our study for Internet firms very clearly shows results in method I-2 that do not support that same conclusion. Thus, it appears that we may conclude that Internet firms differ from "traditional" ones when it comes to the effect of insider trading. Meulbroek (2000) argues this mainly is because of the diversification motive with its management. The next subsection will go into this matter.

4.2 The Effect of Firm Size

Seyhun (1986) finds a clear negative relation between the abnormal returns to insiders and firm size. However, when the size of the Internet-based firms is taken into account, some interesting results can be observed. Table 3 shows that methods I-1A, I-1B and I-1C give a significant result for the smallest group of firms (<100 Million) that does not match the result for "all firms". Sells, positive net number of sells and positive number of net shares sold are followed by a large price increase in only 29% (I-1A, I-1B) or 26% (I-1C) of the cases. These results are significant at the 95% level. For the smallest group of firms, the hypothesis of this paper is clearly not supported. For the middle groups of firms, the results are mostly not significant at all, but noticeable is that in general the results are increasingly supportive of the hypothesis the larger the firm becomes. The largest two groups show that sells, positive net number of sells and positive number of net shares sold, are followed by a large price increase in 57% to 63% of the cases. For the group >2 Billion-<10 Billion, these results are significant at the 90% level. For the >10 Billion group, the results are significant at the 95% level. Figure 1 shows the sample fractions by size group for methods I-1A, I-1B and I-1C and illustrates the trend of increasing sample fraction with increasing firm size. This seems to be contradicting the diversification motive with Internet firms, as put forward by Meulbroek (2000). From this motive, it would follow that it are the smallest firms whose managers are least diversified. Hence, one would expect the largest positive price effects with insider sells in the smallest firms. However, our study does not confirm this idea.

[INSERT FIGURE 1 ABOUT HERE]

As can be seen in table 4, method I-2 leads to only one significant result for sell trades in all of the size categories. In the group >100 Million-<250 Million, with the NETDEX representing the market, the stock outperforms the market in only one out of eight cases when there is an excess of two or more sellers. This result does not support the diversification motive either. It must, of course, be scrutinized quite

carefully as it is based on only eight cases. All other results of method I-2 provide a fraction of cases when the stock outperforms the market that moves close around the 50% mark. Any deviations from 50% that are observed are insignificant.

[INSERT TABLE 5 AND FIGURE 2 ABOUT HERE]

The results of method II in table 5 for all size-groups show a positive abnormal return with a sell trade, with both the NETDEX and NASDAQ as reference index. These results are in line with the results for the "all firms" category. Only from the >250 Million-<750 Million group on do the results carry (some) significance. There is no clear pattern in the size of the abnormal returns with increasing firm size, neither for the NETDEX nor the NASDAQ, as can be seen in figure 2. Noticeable is that the average abnormal return of the smallest size-group is very high compared to the average abnormal return of the largest size-group.

Thus, where Seyhun (1986) finds a significant negative relation between the abnormal returns to insiders and the firm size, such an observation cannot be made for the Internet firm sample. Applying Lorie and Niederhoffer's model, we find that there is a positive relation between the two. Applying Seyhun's net-of-market model, we can not establish a clear or significant pattern between firm size and insider returns. Both findings contrast with the diversification motive as put forward by Meulbroek (2000). This motive would result in a negative (or increasingly smaller positive) and significant relationship between firm size and the price effects of insider deals in Internet firms.

4.3 Deviations from the Event Day

Table 5 shows the results for method II with deviations from the event day. Average abnormal returns with their corresponding t- and P-value are calculated for days t-2, t-1, t+1 and t+2. These results show certain patterns. Previous research has paid little attention to results for deviations from t, as markets repeatedly have been found to function efficiently in the case of insider trading. We would like to make a few

comments about our findings for the results on the days before and after the event day because this can be a fruitful area for further research as it deals directly with the much-debated topic of market efficiency. For the "all firms" category, days t-2 and t-1 show significant positive abnormal returns for the NETDEX of 0.41% and 0.83%. The abnormal return increases with the approach to the event day, which might point to information about the inside trade becoming public before the trade occurs. Some companies, for example Microsoft, are known to announce inside trades of their managers way in advance and some companies even have set days announced in their Annual Report on which managers will trade own shares. We do not know to what degree this is the case for the firms in the research sample. The same trend of positive abnormal returns up to day t is seen in the case of the NASDAQ representing the market. Interesting is that on day t+2 a significant negative abnormal return of 0.48% is observed. This result is not in support of the hypothesis that inside sells are not a negative signal about the firm if the market is not efficient in its incorporation of new information in stock prices. It must be said that the further a day deviates from event day t, the more likely it is that other news, trades or actions influence the size and signal of abnormal returns. Seyhun (1986) finds insufficient pattern in his results for deviations from the event day and draws conclusions on his findings for the shortest time-period around the event day, thus assuming market efficiency. For the deviations from day t for the different size groups, no clear patterns can be observed among the significant results.

4.4 Inside Buys

[INSERT TABLE 6 ABOUT HERE]

A summary of the results for buys is in table 6. Buy data are also in tables 3 through 5, which can all be interpreted in a similar manner as for sell transactions. Method I-1A shows that buys are followed by a large price increase in 44% of the cases, a result that is not significant as the z-value is –1.07. Method I-1B shows that when the number of buys exceeds the number of sells in the six-month period prior to a large price change, then the price change is an increase in about 42% of the cases. This

result has a z-value of –1.56 and is not significant either. Method I-1C shows that when the amount of shares bought exceeds the number of shares sold in the six-month period preceding a large price change, then the change is an increase in about 44% of the cases, an insignificant result with a z-value of –1.10. Method I-2 shows an insignificant result for the NETDEX, but a highly significant result for the NASDAQ as reference index. In the case of a month with an excess of two or more buy transactions for a particular stock, that individual stock outperforms the market as represented by the NASDAQ in about 17% of the cases, a result with a z-value of 0.021 and a significance of 95% level. However, this result comes from only 12 cases, as it occurred only 12 times in the whole sample that a month had an excess of two or more buys. Lorie and Niederhoffer (1968) find for method I-1 the highly significant result that buys happen more often before a price increase. For method I-2 they find (for traditional firms) 55 instances of months with an excess of two or more buyers, of which 36 are cases with the stock outperforming the market. The corresponding z-value is 2.29, which points to a highly significant result of dominance of positive abnormal returns following inside buys.

Under method II, a slight positive abnormal return accompanies insider buys of 0.63 (NETDEX) and 0.73 (NASDAQ). These abnormal returns have t-values of 0.87 and 0.82 respectively and, thus, are not significant. In comparison, Seyhun (1986) finds (for traditional firms) a positive abnormal return of 1.1% for inside buys and this return is highly significant. In summary, none of the methods, with the exception of I-2 (NASDAQ), present significant results for inside buys. A division in size-groups leads to no significant results in any of the size groups with any of the methods on event day t. Deviation from t leads to some significant results in the “all firms” category as the results move from negative abnormal returns before the event day to positive abnormal returns from day t through t+2 for both the NETDEX and NASDAQ. Perhaps an inside buy in Internet-based firms provides a positive signal for outside investors about the firm that is similar to traditional firms. The information content of inside buys in Internet firms might provide an interesting area for further research as they seem to match traditional firms, contrary to the case of insider sells.

5. Conclusion

Evaluation of inside trade patterns has proven useful for analyzing the stock prices of traditional firms for which prior research has found that inside sells give out a negative signal about the company (see Lorie and Niederhoffer, 1968; Seyhun, 1986). When insiders in such firms sell, it points to overvaluation of the stock for outsiders and a negative abnormal return results. Internet firms differ in two very important aspects from traditional firms as insider ownership is extensive and volatility high. These two characteristics lead to a very risky position for the manager as both income and wealth are subject to large fluctuations and even instant loss. In this respect, it has been suggested that diversification might be the leading motive for inside trades by managers of Internet firms (see Meulbroek, 2000). From this, it follows that if inside sells do not have negative information content, no negative abnormal return should be observed.

We both investigate the effects of insider trading in Internet firms and the diversification motive. First, we use various methods to analyze over 1,000 insider deals in 114 NETDEX firms during 13 months. We find that no negative abnormal return can be observed with inside sells. Of the five (sub-) methods employed, only one gives an insignificant result. The other four even show positive price reactions and positive abnormal returns with an inside sell, irrespective of the index used to represent the market. Another indication that insider transactions in Internet-based firms probably have a different meaning than they do in traditional firms is the large amount of inside sells as opposed to inside buys in Internet firms. For traditional firms, inside buys and sells are about 50-50 in the composition of inside trades, whereas for Internet-based firms this split moves to around the 90-10 mark. Inside sells dominate among inside transactions and thus the informational content of inside transactions is almost exclusively associated with sells.

Second, we investigate diversification as an explanation for the non-negative effect of insider sells. To this extent, we use firm size as a proxy for the extent to which the firm's manager is diversified in wealth and income. The notion behind this is the idea that it is likely that the managers of the smallest Internet-based firms are likely to be the ones that are least diversified. From our dataset, it appears is that the buy/sell ratio decreases when firm size increases. When sells start to become more prominent among insider transactions, no negative signal is observed and the diversification motive seems to be supported. But apart from this casual observation, there is no sound empirical basis for the diversification motive. We investigated sample fractions with a price increase as well as average abnormal groups for different firm sizes. For both methods, we find no clear and significant relation between firm size and the size of the price effects of insider deals. Thus, it appears that there is no support for the hypothesis that there is a significant and negative relation between the abnormal returns to insiders and Internet firm size. Then, limited market rationality is a more likely explanation for the observed price effects. This conclusion is in line with other research after Internet firms (e.g. Arosio et al., 2000; Junttila, 2001; Ofek and Richardson, 2001). It appears that Internet firms are different indeed.

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Table 1 Data Characteristics of the Research Sample

		FIRM SIZE						
			>100m.	>250m.	>750m.	>2b.	>10b.	
		<100m.	<250m.	<750m.	<2b.	<10b.		**All Firms**
Number of Firms in Sample		10	15	19	22	31	17	114
Market Capitalization	Mean	65	175	415	1,148	4,331	31,385	6,177
(03/2000, in millions)	SD	29	46	109	342	2,067	36,742	17,534
Number of Shares Traded per Insider Transaction	Mean	46,633	58,126	70,427	70,316	75,795	119,361	76,416
	SD	51,838	84,707	109,116	72,498	62,011	141,667	91,014
Number of Insider Transactions per Firm	Mean	4.4	4.3	8.3	8.5	14.6	28.8	12.2
(31/3/1999-31/3/2000)	SD	6.0	4.5	8.6	7.0	9.7	16.9	12.4
Buy to Sell Ratio		0.29	0.64	0.26	0.11	0.05	0.02	0.09

Table 2		**Summary of the Results for Sell Transactions**			
Method	Index	Results of the study	Significance level		Conclusions
			z- or t- value	p-value	
I-1A		In the case of large price changes, sells are followed by a large price increase in about 54% of the cases.	1.73	0.084	The results are significant at the 90% level. They provide some evidence that sells are followed by a positive price reaction.
I-1B		In the case of large price changes, when the number of sells exceeds the number of buys in the six-month period preceding the change, then the price change is an increase in about 54% of the cases.	1.97	0.049	The results are significant at the 95% level. They provide evidence that sells are followed by a positive price reaction.
I-IC		In the case of large price changes, when the number of shares sold exceeds the number of shares bought in the six-month period preceding the change, then the price change is an increase in about 54% of the cases.	1.86	0.063	The results are significant at the 90% level. They provide some evidence that sells are followed by a positive price reaction.
I-2	NET-DEX	In the case of a month with an excess of 2 or more sell transactions, the stock outperforms the market in about 49% of the cases.	-0.32	0.749	The results are insignificant and thus do not provide evidence that sells might be followed by a negative abnormal return.
	NAS-DAQ	In the case of a month with an excess of 2 or more sell transactions, the stock outperforms the market in about 49% of the cases.	-0.45	0.653	*Idem.*
II	NET-DEX	Insider sells are accompanied by a positive abnormal return of 1.40% on the event day itself.	4.89	<< .0005	The results are highly significant. They provide evidence for the opposite conclusion that Seyhun made as he observed negative abnormal returns
	NAS-DAQ	Insider sells are accompanied by a positive abnormal return of 1.37% on the event day itself.	4.73	<< .0005	*Idem.*

Table 3 Results per size group of methods I-1A, I-1B and I-1C

Firm Size	Part		Type of Insider Activity	Price Change		n	Sample Fraction with Price Increase	H_o fraction	z-value	p-value
				Increase	Decrease					
				(Number of Changes)	(Number of Changes)					
< 100 mn	I-1A	Last Transaction	Buy	3	8	11	0.27	0.50	-1.51	0.131
			Sell	8	20	28	0.29	0.50	-2.27	0.023
	I-1B	Number of Buys Minus	Positive	3	8	11	0.27	0.50	-1.51	0.131
		Number of Sells	Negative	8	20	28	0.29	0.50	-2.27	0.023
	I-1C	Number of Shares Bought Minus	Positive	5	11	16	0.31	0.50	-1.50	0.134
		Number of Shares Sold	Negative	6	17	23	0.26	0.50	-2.29	0.022
> 100 mn < 250 mn	I-1A	Last Transaction	Buy	6	11	17	0.35	0.50	-1.21	0.226
			Sell	15	26	41	0.37	0.50	-1.72	0.085
	I-1B	Number of Buys Minus	Positive	6	13	19	0.32	0.50	-1.61	0.107
		Number of Sells	Negative	15	24	39	0.38	0.50	-1.44	0.150
	I-1C	Number of Shares Bought Minus	Positive	6	13	19	0.32	0.50	-1.61	0.107
		Number of Shares Sold	Negative	15	24	39	0.38	0.50	-1.44	0.150
>250 mn <750 mn	I-1A	Last Transaction	Buy	12	10	22	0.55	0.50	0.43	0.667
			Sell	24	30	54	0.44	0.50	-0.82	0.412
	I-1B	Number of Buys Minus	Positive	13	8	21	0.62	0.50	1.09	0.276
		Number of Sells	Negative	24	30	54	0.44	0.50	-0.82	0.412
	I-1C	Number of Shares Bought Minus	Positive	10	8	18	0.56	0.50	0.47	0.638
		Number of Shares Sold	Negative	26	32	58	0.45	0.50	-0.79	0.430

>750 mn < 2 bn	I-1A	Last Transaction	Buy	11	12	23	0.48	0.50	-0.21	0.834
			Sell	56	40	96	0.58	0.50	1.63	0.103
	I-1B	Number of Buys Minus	Positive	12	13	25	0.48	0.50	-0.20	0.841
		Number of Sells	Negative	55	39	94	0.59	0.50	1.65	0.099
	I-1C	Number of Shares Bought Minus	Positive	11	10	21	0.52	0.50	0.22	0.826
		Number of Shares Sold	Negative	56	42	98	0.57	0.50	1.41	0.159
> 2 bn < 10 bn	I-1A	Last Transaction	Buy	7	7	14	0.50	0.50	0.00	1.000
			Sell	90	67	157	0.57	0.50	1.84	0.066
	I-1B	Number of Buys Minus	Positive	5	9	14	0.36	0.50	-1.07	0.285
		Number of Sells	Negative	88	66	154	0.57	0.50	1.77	0.077
	I-1C	Number of Shares Bought Minus	Positive	4	3	7	0.57	0.50	0.38	0.704
		Number of Shares Sold	Negative	92	69	161	0.57	0.50	1.81	0.070
> 10 bn	I-1A	Last Transaction	Buy	0	1	1	0.00	0.50	-1.00	0.317
			Sell	81	52	133	0.61	0.50	2.51	0.012
	I-1B	Number of Buys Minus	Positive	0	3	3	0.00	0.50	-1.73	0.084
		Number of Sells	Negative	82	49	131	0.63	0.50	2.88	0.004
	I-1C	Number of Shares Bought Minus	Positive	0	1	1	0.00	0.50	-1.00	0.317
		Number of Shares Sold	Negative	82	51	133	0.62	0.50	2.69	0.007
ALL FIRMS	I-1A	Last Transaction	Buy	39	49	88	0.44	0.50	-1.07	0.285
			Sell	274	235	509	0.54	0.50	1.73	0.084
	I-1B	Number of Buys Minus	Positive	39	54	93	0.42	0.50	-1.56	0.119
		Number of Sells	Negative	272	228	500	0.54	0.50	1.97	0.049
	I-1C	Number of Shares Bought Minus	Positive	36	46	82	0.44	0.50	-1.10	0.271
		Number of Shares Sold	Negative	277	235	512	0.54	0.50	1.86	0.063

Table 4		**Results per size group of method I-2**									
		Price Movements of Stock Relative to Market									
Firm Size	Type of Insider Activity	NETDEX					NASDAQ				
		+ (number of cases)	- (number of cases)	+ (fraction of cases)	z-value	p-value	+ (number of cases)	- (number of cases)	+ (fraction of cases)	z-value	p-value
< 100 mn	Excess of 2 or More Buyers	0	0	-	-	-	0	0	-	-	-
	Excess of 2 or More Sellers	2	5	0.29	-1.13	0.258	2	5	0.29	-1.13	0.258
> 100 mn < 250 mn	Excess of 2 or More Buyers	2	2	0.50	0.00	1.000	1	3	0.25	-1.00	0.317
	Excess of 2 or More Sellers	1	7	0.13	-2.12	0.034	3	5	0.38	-0.71	0.478
>250 mn <750 mn	Excess of 2 or More Buyers	1	2	0.33	-0.58	0.562	1	2	0.33	-0.58	0.562
	Excess of 2 or More Sellers	16	12	0.57	0.76	0.447	12	16	0.43	-0.76	0.447
>750 mn < 2 bn	Excess of 2 or More Buyers	1	1	0.50	0.00	1.000	0	2	0.00	-1.41	0.159
	Excess of 2 or More Sellers	16	22	0.42	-0.97	0.332	19	19	0.50	0.00	1.000
> 2 bn < 10 bn	Excess of 2 or More Buyers	0	2	0.00	-1.41	0.159	0	2	0.00	-1.41	0.159
	Excess of 2 or More Sellers	37	40	0.48	-0.34	0.734	36	41	0.47	-0.57	0.116
> 10 bn	Excess of 2 or More Buyers	0	1	0.00	-1.00	0.317	0	1	0.00	-1.00	0.317
	Excess of 2 or More Sellers	44	35	0.56	1.01	0.312	43	36	0.54	0.79	0.430
ALL FIRMS	Excess of 2 or More Buyers	4	8	0.33	-1.15	0.250	2	10	0.17	-2.31	0.021
	Excess of 2 or More Sellers	116	121	0.49	-0.32	0.749	115	122	0.49	-0.45	0.653

Table 5 Results per size group of method II

NET-DEX		FIRM SIZE																			
		< 100 mn			> 100 mn, < 250 mn			> 250 mn, < 750 mn			> 750 mn, < 2 bn			> 2 bn, < 10 bn			> 10 bn			**All Firms**		
		AAR	t-value	P-value	AAR	t-value	P-value	AAR	t-value	P-value	AAR	t-value	P-value	AAR	t-value	P-value	AAR	t-value	P-value	AAR	t-value	P-value
Sell	t-2	1.94%	1.07	0.295	1.09%	0.63	0.533	-0.11%	-0.16	0.873	0.67%	0.92	0.360	0.29%	0.97	0.333	0.40%	1.46	0.145	0.41%	2.04	0.042
	t-1	0.60%	0.35	0.729	-2.36%	-1.94	0.062	1.49%	1.70	0.093	1.78%	2.15	0.034	1.08%	3.16	0.002	0.38%	1.56	0.120	0.83%	3.85	0.000
	t	8.04%	1.33	0.196	1.60%	1.03	0.311	2.43%	2.68	0.009	3.14%	3.62	0.000	0.75%	2.20	0.029	0.48%	1.81	0.071	1.40%	4.89	0.000
	t+1	-2.61%	-1.46	0.157	-0.43%	-0.48	0.635	0.69%	0.81	0.420	0.26%	0.47	0.639	-0.15%	-0.50	0.617	0.32%	1.30	0.195	0.08%	0.42	0.675
	t+2	-0.94%	-1.00	0.327	-0.56%	-0.75	0.459	-0.73%	-1.00	0.320	-0.26%	-0.38	0.705	-0.40%	-1.40	0.163	0.15%	0.62	0.536	-0.24%	-1.34	0.181
Buy	t-2	-2.62%	-2.05	0.071	-3.90%	-4.16	0.000	-1.11%	-0.70	0.492	-0.63%	-0.67	0.512	1.27%	0.84	0.415	-3.14%	-3.72	0.006	-1.66%	-2.96	0.004
	t-1	-1.38%	-1.19	0.264	-0.11%	-0.12	0.906	-1.71%	-1.22	0.236	-1.10%	-0.45	0.658	-2.61%	-3.45	0.004	-1.23%	-0.44	0.672	-1.29%	-1.98	0.051
	t	1.03%	0.48	0.643	-0.21%	-0.16	0.874	0.17%	0.09	0.929	1.19%	0.70	0.493	1.56%	0.92	0.373	0.81%	0.27	0.794	0.63%	0.87	0.387
	t+1	1.49%	0.44	0.670	-2.41%	-2.58	0.017	3.32%	1.13	0.271	6.65%	1.78	0.093	1.40%	0.71	0.489	2.48%	0.89	0.399	2.01%	1.76	0.082
	t+2	-2.84%	-1.05	0.321	-1.65%	-1.75	0.094	4.53%	1.71	0.102	3.63%	1.26	0.225	-0.78%	-0.38	0.710	-0.83%	-0.49	0.637	0.85%	0.87	0.387
NAS-DAQ		FIRM SIZE						.													
		< 100 mn			> 100 mn, < 250 mn			> 250 mn, < 750 mn			> 750 mn, < 2 bn			> 2 bn, < 10 bn			> 10 bn			**All Firms**		
		AAR	t-value	P-value	AAR	t-value	P-value	AAR	t-value	P-value	AAR	t-value	P-value	AAR	t-value	P-value	AAR	t-value	P-value	AAR	t-value	P-value
Sell	t-2	1.92%	1.00	0.327	0.81%	0.47	0.642	-0.29%	-0.42	0.675	0.94%	1.25	0.214	0.35%	1.16	0.247	0.19%	0.64	0.523	0.36%	1.72	0.086
	t-1	0.19%	0.10	0.921	-2.08%	-1.68	0.103	1.34%	1.57	0.120	2.03%	2.38	0.019	1.11%	3.23	0.001	0.27%	0.97	0.333	0.81%	3.66	0.000
	t	8.27%	1.35	0.189	2.01%	1.30	0.204	2.17%	2.34	0.021	3.28%	3.77	0.000	0.57%	1.69	0.092	0.55%	1.94	0.053	1.37%	4.73	0.000
	t+1	-2.67%	-1.47	0.154	-0.12%	-0.13	0.897	0.48%	0.58	0.563	0.14%	0.25	0.803	-0.19%	-0.57	0.569	-0.02%	-0.07	0.944	-0.08%	-0.42	0.675
	t+2	-0.85%	-0.84	0.409	-0.65%	-0.90	0.375	-0.90%	-1.30	0.197	-0.27%	-0.37	0.712	-0.64%	-1.85	0.065	-0.23%	-0.91	0.364	-0.48%	-2.46	0.014
Buy	t-2	-2.97%	-2.37	0.042	-3.59%	-3.72	0.001	-1.86%	-1.34	0.195	-1.68%	-1.36	0.192	1.80%	1.38	0.189	-4.27%	-2.72	0.026	-1.99%	-3.59	0.001
	t-1	-1.67%	-2.19	0.056	0.55%	0.52	0.608	-1.88%	-1.18	0.251	-2.29%	-0.89	0.386	-3.52%	-3.76	0.002	-0.80%	-0.25	0.809	-1.51%	-2.10	0.038
	t	1.36%	0.59	0.570	0.16%	0.12	0.906	-0.61%	-0.33	0.745	1.10%	0.54	0.596	2.62%	0.76	0.460	0.91%	0.29	0.779	0.73%	0.82	0.414
	t+1	0.58%	0.17	0.869	-2.63%	-3.05	0.006	3.55%	1.24	0.229	6.42%	1.64	0.119	1.09%	0.60	0.558	2.09%	0.65	0.534	1.79%	1.56	0.122
	t+2	-1.55%	-0.57	0.583	-1.88%	-2.10	0.047	3.76%	1.38	0.182	3.06%	0.98	0.341	-1.32%	-0.60	0.558	-1.30%	-0.78	0.458	0.51%	0.51	0.135

Table 6		Summary of the Results for Buy Transactions			
Method	Reference Index	Results of the study	Significance level		Conclusions
			z- or t- value	p-value	
I-1A		In the case of large price changes, buys are followed by a large price increase in about 44% of the cases.	-1.07	0.285	The results are insignificant. No evidence that buys are followed by a positive or negative price reaction.
I-1B		In the case of large price changes, when the number of buys exceeds the number of sells in the six-month period preceding the change, then the price change is an increase in about 42% of the cases.	-1.56	0.119	The results are insignificant. They provide no evidence that buys are followed by a positive or negative price reaction.
I-IC		In the case of large price changes, when the number of shares bought exceeds the number of shares sold in the six-month period preceding the change, then the price change is an increase in about 44% of the cases.	-1.10	0.271	The results are insignificant. They provide no evidence that buys are followed by a positive or negative price reaction.
I-2	NETDEX	In the case of a month with an excess of 2 or more buy transactions, the stock outperforms the market in about 33% of the cases.	-1.15	0.250	The results are insignificant and thus do not provide evidence that buys are followed by a negative or positive abnormal return.
	NASDAQ	In the case of a month with an excess of 2 or more buy transactions, the stock outperforms the market in about 17% of the cases.	-2.31	0.021	The results are significant at the 95% level. They provide evidence that buys are followed by a negative abnormal return.
II	NETDEX	Insider buys are accompanied by a positive abnormal return of 0.63% on the eventday itself.	0.87	0.387	The results are insignificant. They do not provide evidence for positive abnormal returns with insider buys.
	NASDAQ	Insider buys are accompanied by a positive abnormal return of 0.73% on the eventday itself.	0.82	0.414	*Idem.*

Figure 1
Sample Fractions with a Price Increase

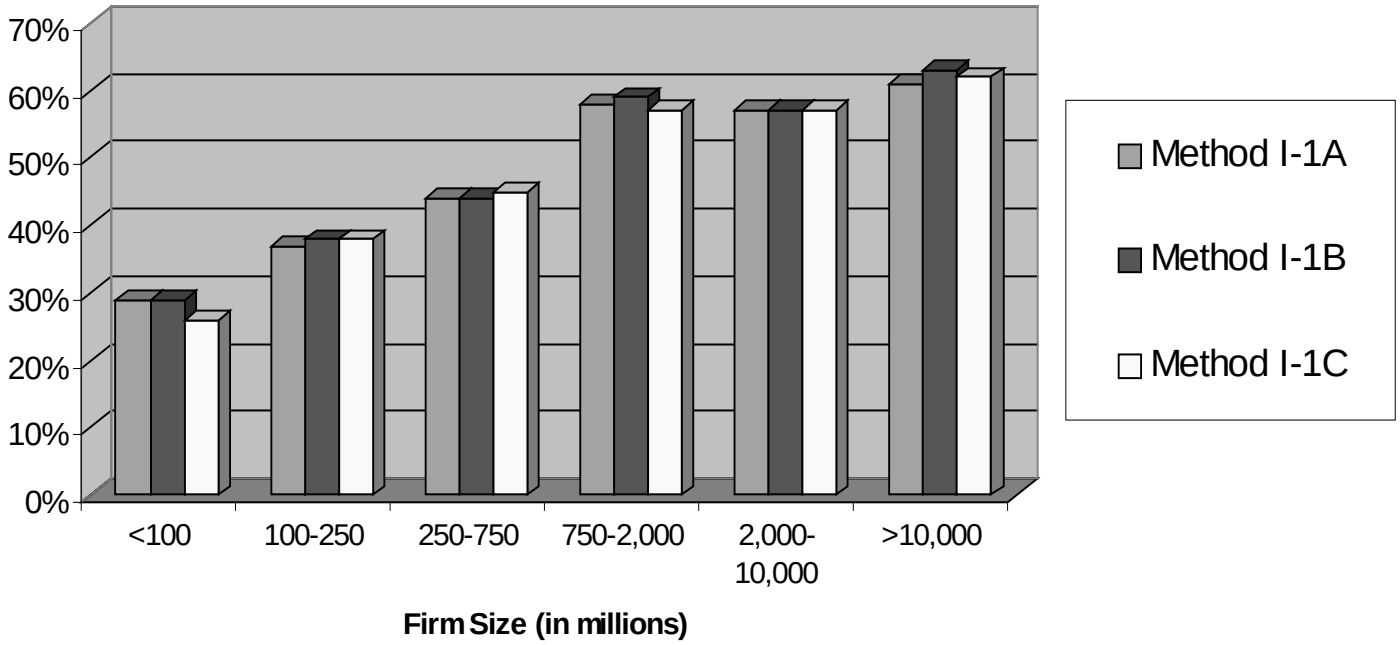
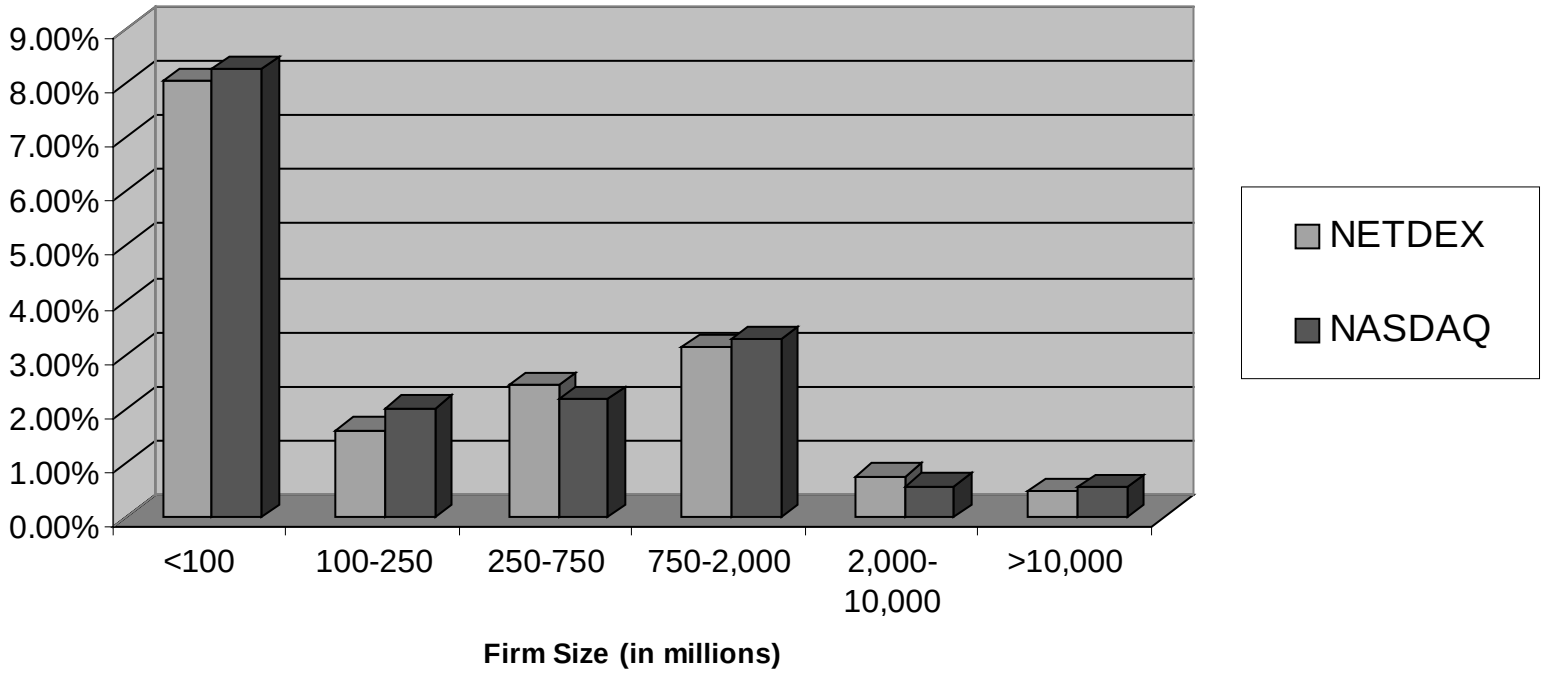


Figure 2
Average Abnormal Return on the Event Day



Appendix 1	**Research Sample of 114 NETDEX Companies**					
Source: http://www.insidertrader.com						
Company	Ticker	Insider Ownership	Beta (if known)	Insider Sell Transactions	Insider Buy Transactions	Total Insider Transactions
@Plan.Inc	APLN	78.6%		2	0	2
24/7 Media Inc.	TFSM	26.8%		3	0	3
About.com Inc.	BOUT	40.2%		8	0	8
Allaire Corporation	ALLR	35.0%		12	0	12
Alloy Online Inc.	ALOY	53.0%		0	0	0
Amazon.com Inc.	AMZN	61.0%	2.5	16	0	16
America Online Inc.	AOL	2.0%	2.4	24	0	24
Ask Jeeves Inc.	ASKJ	35.0%		2	0	2
Autobytel.com Inc.	ABTL	79.2%		0	1	1
Autoweb.Com	AWEB	72.9%		6	0	6
barnesandnoble.com inc.	BNBN	0.9%		0	0	0
Bluefly Inc.	BFLY	28.9%	1.3	0	2	2
Careerbuilder Inc.	CBDR	76.0%		1	0	1
MarketWatch.com Inc.	MKTW	75.2%		19	0	19
Cdnow Inc.	CDNW	67.1%	2.5	2	0	2
Charter Communications	CHTR	23.5%		0	5	5
Cheap Tickets Inc.	CTIX	61.1%		4	0	4
Cmgi Inc.	CMGI	30.0%	3	27	0	27
Cnet Networks Inc.	CNET	63.0%	0.9	15	0	15
Concentric Network Corp.	CNCX	41.1%	2.3	9	0	9
Concur Technologies Inc.	CNQR	54.8%		11	4	15
Covad Communications Grp.	COVD	73.7%		27	1	28
Critical Path Inc.	CPTH	29.1%		22	0	22
Cybercash Inc.	CYCH	44.1%	2.2	1	2	3
Cyberian Outpost Inc.	COOL	50.9%		5	9	14
Cybershop.com Inc.	CYSP	46.8%		4	0	4
Digital River Inc.	DRIV	26.2%		26	1	27
DoubleClick Inc.	DCLK	26.0%	3.8	24	0	24
E*Trade Group Inc.	EGRP	45.0%	3.3	40	1	41
Earthlink Inc.	ELNK	49.0%	1.9	6	1	7
Earthweb Inc.	EWBX	49.5%		11	3	14
eBay Inc.	EBAY	73.0%		38	0	38
Entrust Technologies	ENTU	80.9%		15	1	16
eToys Inc.	ETYS	65.0%		4	0	4
Excite @Home	ATHM	74.0%	2.3	49	0	49
Exodus Communications	EXDS	14.0%	2.8	51	0	51
Fashionmall.com Inc.	FASH	49.3%		0	1	1
Fatbrain.com Inc.	FATB	58.0%		2	0	2
Fvc.com Inc.	FVCX	49.8%		15	3	18
FlashNet Communications	FLAS	48.7%		0	1	1

Fundtech Ltd.	FNDT	43.1%	0.4	2	0	2
Gemstar International Gr.	GMST	44.0%	0.8	2	0	2
Global Sports Inc.	GSPT	75.7%	0.4	0	0	0
GoTo.com Inc.	GOTO	65.9%		0	0	0
Harbinger Corporation	HRBC	18.9%	1.6	7	1	8
Healthon/WebMd Corp.	HLTH	34.0%		11	9	20
HearMe Inc.	HEAR	49.2%		10	14	24
homestore.com Inc.	HOMS	43.1%		12	0	12
Internet Capital Group	ICGE	36.0%		4	4	8
Infospace.com Inc.	INSP	49.0%		19	1	20
Inktomi Corporation	INKT	24.0%		38	0	38
InsWeb Corporation	INSW	74.0%		1	0	1
Internet America Inc.	GEEK	26.3%		11	0	11
internet.com Corporation	INTM	64.0%		0	5	5
Intraware Inc.	ITRA	47.1%		13	0	13
Intuit Inc.	INTU	47.0%	1.6	20	0	20
Iss Group Inc.	ISSX	54.0%	2.4	27	0	27
iTurf Inc.	TURF	64.6%		2	0	2
iVillage Inc.	IVIL	45.0%		1	2	3
Knight/Trimark Group Inc.	NITE	46.0%		16	0	16
Liberate Technologies	LBRT	59.1%		11	0	11
LookSmart Ltd.	LOOK	77.0%		11	1	12
Lycos Inc.	LCOS	30.0%	3.0	26	1	27
Marimba Inc.	MRBA	41.2%		3	1	4
Media Metrix Inc.	MMXI	35.9%		5	0	5
Modem Media.Poppe Tyson	MMPT	70.9%		4	1	5
Multex.com Inc.	MLTX	33.9%		5	0	5
Musicmaker.com Inc.	HITS	74.5%		0	0	0
Nbc Internet Inc.	NBCI	66.8%		7	0	7
Net Perceptions	NETP	39.2%		6	2	8
NetObjects Inc.	NETO	63.9%		3	0	3
Network Solutions Inc.	NSOL	53.0%	3.2	16	1	17
Networks Associates Inc.	NETA	24.0%	1.1	2	1	3
NextCard Inc.	NXCD	54.0%		1	2	3
Northpoint Communications	NPNT	73.6%		21	0	21
Open Market Inc.	OMKT	18.1%	2.3	14	0	14
pcOrder.com Inc.	PCOR	84.4%		8	0	8
Peapod Inc.	PPOD	53.7%	1	15	4	19
Portal Software Inc.	PRSF	62.9%		25	0	25
priceline.com Inc.	PCLN	87.0%		20	1	21
Prodigy Communications	PRGY	65.0%		8	1	9
Psinet Inc.	PSIX	35.0%	1.5	3	0	3
Quokka Sports Inc.	QKKA	81.1%		0	2	2
Razorfish Inc.	RAZF	51.0%		3	0	3
RealNetworks Inc.	RNWK	75.0%	2.3	22	0	22
Rowecom Inc.	ROWE	70.2%		3	0	3

Scient Corp.	SCNT	67.0%		10	1	11
Rsa Security Inc.	RSAS	23.1%	2.4	24	0	24
Secure Computing Corp.	SCUR	28.0%	1.6	2	4	6
Silknet Software Inc.	SILK	56.1%		12	1	13
SportsLine.com Inc.	SPLN	44.9%	1.1	9	0	9
Spyglass Inc.	SPYG	9.3%	1.8	23	1	24
Stamps.com Inc.	STMP	64.9%		3	2	5
StarMedia Network Inc.	STRM	48.9%		5	0	5
Sterling Commerce Inc.	SE	29.0%	1.7	6	0	6
Streamline.com Inc.	SLNE	75.5%		3	3	6
Student Advantage Inc.	STAD	75.0%		8	0	8
Cobalt Group Inc.	CBLT	73.3%		1	6	7
theglobe.com inc.	TGLO	58.0%		1	2	3
Ticketmaster Online-City	TMCS	51.4%		9	1	10
TiVo Inc.	TIVO	67.9%		0	0	0
Transaction Systems Arch.	TSAI	21.0%	0.4	5	2	7
uBid Inc.	UBID	13.1%		0	0	0
Us Search.com Inc.	SRCH	65.6%		1	2	3
Value America Inc.	VUSA	85.9%		3	1	4
Verio Inc.	VRIO	32.0%		12	0	12
VeriSign Inc.	VRSN	24.0%	1.8	61	0	61
VerticalNet Inc.	VERT	58.0%		23	0	23
Vignette Corporation	VIGN	17.0%		53	1	54
Wavo Corporation	WAVO	33.0%	1.7	0	0	0
WebTrends Corporation	WEBT	48.0%		30	0	30
WorldGate Communications	WGAT	42.0%		14	1	15
Yahoo! Inc.	YHOO	60.0%	3.3	19	0	19
Youbet.com Inc.	UBET	28.1%		0	0	0
	Mean	49.9%	1.96	11.2	1.0	12.2
	Sum			1,276	118	1,394
How to read this appendix:						
For example, Cybershop.com Inc. or CYSP has an insider ownership of 46,8% and four inside						
sell transactions, no inside buy transactions and thus four total inside transactions.						
The beta for CYSP is not available.						