**Fifteen Minutes of Fame? The Market Impact of Internet Stock Picks**
Peter Antunovich and Asani Sarkar
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## Abstract

We examine 120 Nasdaq and Over-the-Counter "buy" recommendations made by Internet sites from April 1999 to June 2001. The stock picks show substantial short- and long-run price and liquidity gains, although no new information is revealed about them. For example, liquidity one year after the pick day remains higher for these stocks than for a sample matched according to size, book-to-market value, and liquidity in the preceding year. In addition, after controlling for fundamental and microstructure factors, we find that stocks with lower initial liquidity have greater improvements in liquidity on the pick day. Further, stocks with lower initial liquidity and higher pick-day liquidity have higher pick-day excess returns. These results suggest that stocks have multiple liquidity equilibria, and that the stock picks, by coordinating uninformed trading activity, push initially illiquid stocks to a higher liquidity equilibrium. Finally, we find that stocks with higher initial media exposure enjoy greater liquidity gains and lower excess returns on the pick day.

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Antunovich: Morgan Stanley Dean Witter & Co., New York, N.Y. (e-mail: peter_a@yahoo.com); Sarkar: Research and Market Analysis Group, Federal Reserve Bank of New York, New York, N.Y. (e-mail: asani.sarkar@ny.frb.org). The authors thank the following for comments: Jonathan Berk, Larry Glosten, Charlie Himmelberg, Prem Jain, Charles Jones, Jim Mahoney, Marco Pagano, Lubos Pastor, Bob Schwartz, Rene Stulz, Dimitri Vayanos, Ingrid Werner, and seminar participants at the American Finance Association Meetings in 2003, the Federal Reserve Bank of New York, and Rutgers University. We thank Michael Emmet and Priya Gandhi for excellent research assistance. The views expressed in the paper are those of the authors and do not necessarily reflect the position of the Federal Reserve Bank of New York or the Federal Reserve System.

# Fifteen Minutes of Fame?
# The Market Impact of Internet Stock Picks

The low cost of setting up a web site, and the ability to quickly and cheaply disseminate information to a large number of subscribers, has given rise to a new breed of "stock pickers": the so-called "momentum" web sites. Every week, on a pre-specified day and time,[1] the momentum sites would announce their pick – typically a buy recommendation for a stock. To "sell" the pick, the sites emphasized the stock's large past returns, low float, lack of visibility or growth potential. They also claimed large percentage gains for prior picks. However, no new information was offered about the stocks themselves, other than references to publicly available company press releases. In fact, some recommended firms later released statements denying any material changes to their financial conditions.[2] Before the pick, the sites attempted to coordinate synchronous buying by large numbers of investors. They informed subscribers via email and exhorted them to learn of the pick by logging on to the site's home page around the pick time.[3] They also attempted to coordinate with other stock picking sites.

In this paper, we examine the impact of 60 Nasdaq and 60 OTC Bulletin Board (OTCBB) picks by Internet web sites on the valuation and liquidity of the stocks. Our sample period is April 1999 to June 2001, after which the sites mostly became moribund. We find substantial increases in trading activity and liquidity on the pick day. The cumulative returns from market open to three minutes after the pick time is 40%. Compared to 20 trades and 24,000 shares *per*

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[1] Most sites would make their picks during trading hours. Initially, some sites posted their picks before the market open but soon stopped, presumably because market makers could observe the order flow.

[2] For example, after its stock was posted, Derma Sciences Inc. issued a press release stating that "the company is not aware of any recent corporate developments that would serve as a basis for substantial increases in its common stock's trading volume or price." (Press Release, Derma Sciences Inc., November 15 1999).

[3] Subscribers provide their e-mail addresses to the momentum web sites and receive reminders about forthcoming

*day* in normal times, the activity is 22 trades and 17,000 shares *per minute* around the pick time. Up to 90% of trades is for purchase. Liquidity improves throughout the day.

If markets are efficient, the stock picks should not have any lasting market impact. Surprisingly, all measures of liquidity (bid-ask spreads, adverse selection costs, depth, and number of market makers) and trading activity are higher 60 days after the pick day, while volatility is lower, relative to initial levels. Liquidity remains higher one year after the event, compared to a sample of stocks matched on size, the book-to-market ratio and liquidity in the pre-event year. For the Nasdaq picks, returns and shares outstanding are also higher one year after the event relative to the matched sample.

Next, we propose an explanation for the liquidity and return gains following the stock picks. Although the sites produce no new information about the stocks, they may increase their liquidity by coordinating uninformed trading activity (as suggested by the decline in adverse selection costs following the stock picks). Models of liquidity externality, such as Pagano (1989a, 1989b) and Dow (2002), argue that such coordination may push the stocks to a higher liquidity, Pareto-superior equilibrium. Consistent with these models, we find that, after controlling for fundamental and microstructure factors, stocks with lower initial liquidity (i.e. higher proportional bid-ask spreads) have larger liquidity gains (i.e. larger percent decreases in proportional spreads) on the pick day. Also, stocks with lower initial liquidity and higher pick-day liquidity have higher pick-day excess returns, consistent with Amihud and Mendelson (1986). Hence, publicity by itself may increase stock returns due to externalities in liquidity.

A complementary explanation is that investors trade more of those securities of which they are better aware, as proposed in Merton's (1987) Investor Recognition Hypothesis (IRH). We

stock picks and notification of the selections. The sites typically do not charge for the subscription.

find that stock picks with higher initial media exposure have bigger liquidity gains and lower excess returns on the pick day, showing that lack of visibility may contribute to illiquidity. Further, media exposure increases following the stock picks, indicating improved visibility.[4]

Pagano (1989a) and Dow (2002), among others, offer models of multiple liquidity equilibria. Pagano (1989a) shows that stocks with high transactions costs can get stuck in a low-trade-high-volatility equilibrium due to a liquidity externality: an investor's conjecture that others will not trade is self-fulfilling in equilibrium. Consistent with Pagano (1989a), we find that stocks with lower initial trading frequency or higher volatility have greater trading increases or volatility reductions on the event day. In Dow (2002), illiquidity derives from asymmetric information and multiple equilibria with high and low bid-ask spreads can exist even without transactions costs. Consistent with Dow (2002), we find that stocks with higher initial adverse selection costs have greater reductions in these costs on the event day.

In related work, Admati and Pfleiderer (1988) show how bunching by uninformed traders leads to liquid and illiquid periods, although their model has a unique liquidity equilibrium. Also, on-the-run Treasury notes trade at a yield discount to off-the-run Treasury notes (Fleming, 2001) even though they are close substitutes. One reason may be that investors expect that the notes will not be traded once they go off-the-run, and these expectations are self-fulfilling.[5] Dow (2002) discusses other models of liquidity externality.

Past research shows that stock- price reactions to events can be disproportionate to its direct news content.[6] More recently, there is evidence of substantial valuation effects from events with

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[4] Several papers have studied the relation of media exposure to investments. Falkenstein (1996) finds that mutual funds avoid stocks with low media exposure. Chen et al (2002) show that media exposure increases (decreases) following additions (deletions) to the S&P 500 index. Baker et al (2002) find that international cross-listings lead to increased media attention, and interpret this as supporting the IRH hypothesis.

[5] I thank Jonathan Berk for drawing my attention to this example.

[6] For example, in Romer (1993), rational reassessments of fundamentals occur without the arrival of outside news.

*no* news content. Klibanoff et al (1998) find that prices of closed-end country funds react much stronger to prominent (i.e. front-page) news than to less-salient news. Huberman and Regev (2001) show that prominent news of a cancer-curing drug, although previously published, had a massive, long-lasting impact on the drug company stocks. Cooper, Dimitrov and Rau (2001) find dramatic price increases following corporate name changes to Internet-related dotcom names, independent of the firm's level of involvement with the Internet. Rashes (2001) documents the comovement of stocks with similar ticker symbols. Finally, Chan (2002) shows that stocks with large price movements but no identifiable news show reversal in the next month.

We contribute to the literature by analyzing the liquidity effects from a no-news event, and the correlation between valuation and liquidity, whereas the prior research focuses exclusively on returns.[7] Further, our sample has some unique advantages. Our events cannot be interpreted as signals of future firm value unlike, arguably, company-name changes or the dissemination of old news via more prominent channels. Also, the stock picks are from a broad cross-section of industries.[8] Finally, event *time* data allows analysis of *intraday* announcement effects and real-time market efficiency, as in Busse and Greene (2002).

In other respects, however, our sample is special. The Nasdaq stocks have an average market value of less than $8 million and, compared to firms with similar market value and book-to-market value in the pre-event year, they are less liquid. They also have negative excess returns leading up to the pick date. In addition, the typical stock has low visibility with little

In Daniel, Hirshleifer and Subrahmanyam (2002), investors over-weight private signals and discount pubic signals due to behavioral biases. In experimental economics, "information mirages" (i.e. overreaction to uninformative trades) occur (Camerer and Wigelt, 1991). Empirically, Cutler, Poterba and Summers (1989) conclude that economic fundamentals or news cannot fully explain extreme market movements.

[7] Rashes (2001) briefly compares the bid-ask spread on high-volume and normal-volume days.

[8] Only about 22% of the picks are from technology-related industries, broadly-defined. Using regression analysis, we formally show that the liquidity and valuation gains are not an Internet phenomenon.

media coverage and no analyst following.[9] Some of these characteristics tend to facilitate market manipulation and, indeed, the momentum web sites were popularly known as "pump and dump" sites. In the conclusion, we comment in greater detail on the evidence for manipulation and, more generally, about the costs and benefits (if any) to investors from the web sites.

The rest of the paper is organized as follows. Section one describes the data, and presents descriptive statistics. Section two discusses the empirical methodology. Sections three and four study the market impact at the intraday and daily frequencies, respectively. In sections five and six, we explore the determinants of liquidity gains and excess returns on the pick day. Section seven discusses the long-run performance of the picks. Finally, section eight concludes.

## 1. Data and Summary Statistics

We manually collect 127 stock picks of seven Internet web sites from April 1999 to June 2001. To the best of our knowledge, these stocks constitute all picks by the web sites over this period. Table 1 lists the web site names, and the number of stocks picked by each.

**Please insert Table 1 here**

We omit 7 picks with confounding information (e.g. an earnings announcement) on the event date. In our sample, 60 picks are Nasdaq stocks selected between April 1999 to April 2000, and 60 picks are OTCBB stocks selected between May 1999 to June 2001. Table 1 shows the year-wise breakdown of the stock picks: note that only 2 picks are from 2001. 5 Nasdaq stocks and 4 OTCBB stocks were recommended twice. Next, we describe the Nasdaq and OTCBB data (section *A*), and summary statistics (section *B*).

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[9] In contrast, stocks followed on message boards mainly come from the technology sector, have high trading volume, high positive past returns, low book-to-market ratios and high analyst following (Wysocki, 1999). Also, short-sellers used the boards to disseminate negative information.

*A. Data*

We use intraday transactions, inside quote and dealer quote data from the NASTRAQ database provided by Nasdaq. The transaction data reports the trade price, quantity and time. The inside quote data report changes in the inside bid and ask quotes. The dealer quote data lists bid and ask prices and depth quoted by market makers. Daily OTCBB stock data, obtained from Bloomberg, includes open and closing prices, closing bid and ask quotes, and daily volume. Outliers in the OTCBB data are cross-checked with 10K filings to remove data errors. In addition, for all data, we delete observations when:

1. The trade price or volume is missing.
2. The trade occurs outside the regular trading hours.
3. If the price is less than the bid price or it is greater than the ask price.
4. If the ask price is less than the bid price.
5. Quoted bid or ask prices that are zero or negative.

When the trade execution time is not missing, then the trades are matched to the most recent quotes. When the trade execution time is missing, we use the reported time. If either the trade execution time is missing or the reported time and the execution time do not match, we require a lag of at least two seconds between the trade and the previous quote.

5 stocks were delisted from Nasdaq following the pick date, out of which 4 stocks traded on the OTCBB market the day after delisting. For these stocks, we use the closing quote and volume data from the OTCBB market to calculate returns, the bid-ask spread and trading activity for the post-delisting period. The remaining delisted stock did not trade on the OTCBB market. We set its buy-and-hold return (BHR) and bid-ask spread in the post-delisting period equal to the average BHR and bid-ask spread, respectively, of the other 4 *delisted* stocks in that interval.

One OTCBB firm was liquidated 4 days after the pick date. We set the final price equal to the per-share liquidation proceeds, as determined in court during bankruptcy proceedings.

*B. Summary statistics*

We obtain the Standard Industrial Classification (SIC) codes for 117 out of 120 stock picks and classify the stock picks by industry (results not shown). Each industry is broadly defined to include firms involved in equipment manufacturing, services or trade. 16 picks are from computer-related industries while another 10 picks are in electronics or telecommunications. So, at most 26 picks, or about 22% of the total, are technology-related companies. The remaining picks are from a broad range of industries, such as health and manufacturing.

Table 2 reports performance indicators for the 60 Nasdaq stock picks in our sample.

**Please insert Table 2 here**

The accounting-based measures are calculated for the fiscal year-end prior to the event year (the *reference year*). The accounting data, obtained from Compustat, Bloomberg and 10K filings, are for 59 recommended Nasdaq firms since one firm was recommended twice in the same fiscal year. We also report statistics for a sample of 59 Nasdaq firms, matched on market value (MV) and book-to-market value (BMV) in the *reference year*. We start with the 30 Nasdaq firms recommended in 1999. Using CRSP data, we find all firms trading on Nasdaq in 1998 that were not in our sample of recommended stocks.[10] Out of these, we select 30 firms by minimizing the Euclidean distance between a recommended firm and the selected firm, calculated using MV and BMV values for fiscal year-end 1998 obtained from Compustat. The variables are standardized

[10] We use CRSP rather than Compustat to obtain the initial sample of Nasdaq-traded firms because Compustat only records the current exchange listing of a stock. In particular, firms that traded on Nasdaq in the reference year but subsequently moved to OTC appears on Compustat as an OTC firm.

prior to computation, since variables with large variances tend to have more effect on the distance measure, compared to variables with small variance. We repeat the process for the 29 firms recommended in 2000 and 2001, using MV and BMV values for fiscal year-end 1999.

Table 2 shows that compared to the matched sample, the Nasdaq picks have lower shares outstanding (SOUT) and mean TURNOVER, and higher proportional quoted half-spread (PQBAS), indicating lower liquidity relative to the matched firms. Compared to the matched firms, the picks have higher revenue-to-market value (RMV) and median earnings but lower mean earnings per share (EPS) and mean net income-to-market value (NMV). Overall, the Nasdaq picks have lower liquidity compared to the matched firms but superior revenues.

Table 2 also reports NEWS, the total number of news items about the firm in the Bloomberg news archive for the *six months* prior to the pick month. The mean NEWS is 7 with a range of zero to 36, suggesting that visibility varies substantially across stocks. By comparison, Gadarowksi (2001) finds that, for NYSE/AMEX nonfinancial firms, the average *annual* number of news stories is 22 with a range of zero to 524. For international firms, Baker et al (2002) find an average of 5 to 9 news stories *annually*.

Results for the 60 OTCBB stock picks (not shown) indicate that the OTCBB picks have lower SOUT and inferior revenue and earnings compared to the MV-BMV-matched OTCBB sample. The mean PQBAS is also lower compared to the matched sample, but the median PQBAS and TURNOVER are higher for the OTCBB picks. The median PQBAS exceeds 15%, almost 4 times that of the Nasdaq picks. Visibility and excess returns are similar to the Nasdaq picks, as the mean NEWS is about 6 and excess returns are about -32%.

## 2. Empirical Methodology

For intraday intervals, we calculate the buy-and-hold return (BHR) as the log of the last quote mid-point in that interval minus the log of the last quote mid-point in the previous interval. For daily intervals, we calculate the excess return in an interval [a,b] as:

$$\text{Excess Return} = \log\left(\frac{M_b}{M_{a-1}}\right) - \log\left(\frac{Rus_b}{Rus_{a-1}}\right) \tag{1}$$

where $M_t$ is the closing mid-quote and $Rus_t$ is the closing Russell 2000 index for day $t$=($a$-1, $b$). The measure of volatility for Nasdaq stocks is STDR, the standard deviation of intraday returns.[11] For OTCBB stocks, we use APRCH, the absolute value of the daily price change:

$$\text{APRCH} = 100*\text{ABS}((Close\text{-}Open)/Close), \tag{2}$$

where *Close* is the closing price and *Open* is the opening price of the day.

The bid-ask spread measures are the proportional quoted and effective half-spreads PQBAS and PEBAS, and the proportional Roll (1984) covariance estimator PRBAS. The PQBAS is:

$$PQBAS = (A - B)/2M , \tag{3}$$

where $A$ ($B$) is the ask (bid) quote, and $M$=($A$+$B$)/2 is the quote mid-point. The PEBAS is:

$$PEBAS = |P - M|/M , \tag{4}$$

where $P$ is the trade price. If transactions occur inside the quoted spread, then PQBAS overstates the actual trading cost and PEBAS < PQBAS. Finally, the Roll half-spread PRBAS in an interval [a, b] is defined as:

$$PRBAS = \sqrt{-Cov(P)}\left[1 - \frac{\kappa + 4}{8(n-1)}\right]/M_b, \tag{5}$$

where $M_b$ is the last mid-point in the interval [a, b], κ is the kurtosis of the price changes, and $n$

[11] Alternative benchmark indices, such as the Nasdaq index, and alternative volatility measures, such as the

is the number of price changes in the interval. The term in square brackets adjusts for the downward bias in the Roll estimator in a small sample due to Jensen's inequality.[12]

Next, we define adverse selection costs. Since the serial covariance of returns is due only to the portion of the spread not due to adverse selection (Glosten, 1987), the Roll covariance ignores adverse selection costs. Schultz (2000) calls this the adverse selection bias in the Roll covariance and calculates the bias as:

$$\text{ROLLAS} = \sqrt{EBAS^2 - \delta EBAS} - EBAS \tag{6}$$

where EBAS is the effective half-spread. δ is the percent of the EBAS due to adverse selection:

$$\delta = \sum_{t=1}^{T} \frac{(M_t - M_{t-1})(Q_{t-1} - Q_{t-2})}{T}, \tag{7}$$

where $T$ is the number of trades in the interval. We normalize ROLLAS by dividing by the last quote mid-point in the interval to obtain the proportional adverse selection bias:

$$\text{PROLLAS} = \text{ROLLAS}/M \tag{8}$$

We also estimate the adverse selection component of the spread, as in Madhavan, Richardson, and Roomans (1997). Except for the event day, these estimates prove less reliable for our sample than PROLLAS, and so we only report results for the latter.

Finally, we define the price impact in an interval. Start with the price change in an interval $t$:

$$\Delta P_t = M_t - M_{t-1}(1 + I_t R_t), \tag{9}$$

where $M_t$ is the closing quote midpoint in interval $t$, $I_t$=1 for daily intervals and $I_t$=0 for intraday intervals, and $R_t$ is the daily return on the Russell 2000 index. Note that we use market-

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standard deviation of buy (or sell) prices and the sum of absolute returns, give qualitatively similar results.

[12] Huang and Stoll (1996) estimate the Roll spread based on intraday data. Schultz (2000) argues that the Roll spread, estimated with intraday data, is a reliable estimator of the bid-ask spread for Nasdaq stocks in his sample.

adjusted price changes for daily, but not for intraday, intervals. We use the quote mid-point, instead of the price, to abstract from the bid-ask bounce. Then, the price impact is:[13]

$$\text{PRIMP} = \frac{\Delta P_t}{PVIMB_t}, \tag{10}$$

where $PVIMB_t$ is the percent volume imbalance in interval $t$, defined as

$$PVIMB_t = 100 * \frac{\text{Sell Volume} - \text{Buy Volume}}{\text{Total Volume}} \tag{11}$$

Buys and sells are determined by comparing transactions prices to the prevailing quotes at the trade time, as in Ellis, Michaely and O'Hara (2000). The trade indicator $Q_t$=1 (sell) if the trade price is closer to the bid and $Q_t$=-1 (buy) if the trade price is closer to the ask. $Q_t$=0 if the trade price is exactly equal to the quote mid-point.

Finally, for each interval, we report TDEPTH, the sum of the bid and ask depths quoted by market makers at the inside bid and ask prices; PBDEPTH, the bid depth as a percent of TDEPTH; and MMAKERS, the number of market makers.

We test whether the mean activity or liquidity measure in an interval, over all trades in the interval, is different relative to a control mean. We use a $t$ test, proposed by Dunnett (1955), for situations where multiple test-means are compared to the same control mean. The test statistic controls for: (1) the fact that each of the test means is being compared to the same control, and (2) the overall type 1 error rate for all comparisons (i.e. the experimentwise error rate).

## 3. The Intra-day Market Impact of Stock Picks

Figure 1 plots the behavior on the pick day of the cumulated buy-and-hold return CUMRET,

[13] The price impact measure (10) is similar to Stoll (2000) who regresses $\Delta P_t$ on a constant, $N_t$ and $N_{t-1}$ for daily intervals. However, the estimated coefficient on $N_{t-1}$ is insignificant in more than 95 percent of his regressions. Our price impact measure is applicable to both intraday and daily intervals.

PQBAS and VOLUME per minute. PQBAS is multiplied by 2 and VOLUME is divided by 1,000 for easier graphing.

**Please insert Figure 1 here**

The first interval is [open, -3): the interval from market open to 3 minutes before the pick time. All other intervals are of 3 minutes duration. For example, the second and third intervals are [-3,0): the 3 minute period up to the pick time, and [0,3): the event-interval, from the pick time to 3 minutes after the pick time. CUMRET is around 40% from market open to the event-interval, decreases thereafter and ends the day at about 25%. VOLUME per minute is less than 1 initially, exceeds 5 in the event-interval, drops sharply thereafter but still remains at a relatively high level at the end of the day. PQBAS is around 11% initially, falls to around 8% in the event-interval, continues to decrease thereafter, and is around 5% at the end of the day.

In Table 3, we report measures of activity and liquidity for eight intra-day intervals.

**Please insert Table 3 here**

The first three intervals are [open, -3), [-3,0) and [0,3). The remaining intervals are [3,9): from 3 to 9 minutes after the pick time, [9,15): from 9 to 15 minutes after the pick time, [15,30): from 15 to 30 minutes after the pick time, [30,60): from 30 to 60 minutes after the pick time, and [60, close]: from 60 minutes after the pick time to the market close. Except for returns, a * indicates that the mean is significantly different at the 5 percent level or less from the mean in the [open, -3) interval, according to Dunnett's *t* test. For returns, * indicates that the mean is significantly different from zero at the 5 percent level or less.

In Panel A of Table 3, we report measures of activity, returns and risk. The buy-and-hold return BHR is significantly positive from the market open to three minutes after the pick time, statistically zero from then on to 60 minutes before close and significantly negative in the [60, close] interval. The surge in prices prior to the pick time may be due to news leakage, buying by owners of the web sites, errors in the pick time reported by the web sites or slow uploads by the web sites.[14] The standard deviation of returns per minute is STDR divided by the square root of the interval length. It is significantly higher, relative to the market open, from 3 minutes before to 15 minutes after the event. The number of trades NTRADE per minute increases from less than 1 initially to 6 in the [-3,0) interval and 22 in the event-interval. The increase in volume and NTRADE is significant up to 30 minutes after the event. Trade size declines by about 200 shares in the event-interval, and remains lower by 100 shares at the end of the day, possibly indicating increased activity by retail or day traders. There is a large buy imbalance from the market open to 30 minutes after the event. For example, the percent volume imbalance PVIMB is between -0.35 and –0.07 in this period.

Panel B of Table 3 reports the intra-day liquidity measures. PQBAS and PEBAS decline throughout the day. The decline is statistically significant from the [3, 9) interval till market close, at which point they are about 2% lower relative to initial levels. While the proportional Roll covariance PRBAS fluctuates, it too ends the day about 1.5% lower than the opening level. Consistent with increased activity by uninformed traders, the adverse selection measure PROLLAS declines monotonically throughout the day. The adverse selection component of the spread (not reported) is also lower from 3 minutes after pick time till market close, relative to the prior period. The price impact PRIMP is higher for three minutes after the event, but the change is not significant. The number of market makers MMAKERS per minute increases sharply from 3 minutes before to 30 minutes after the pick time, in tandem with the surge in trading activity during this period, before returning to normal levels by market close. The total depth TDEPTH

[14] In particular, since the time required to upload information to the web page is 1 to 3 minutes, the web sites may

is also higher during this period although the changes are not significant. The share of the bid depth in the total depth PBDEPTH is significantly lower from 3 minutes after to 60 minutes after the pick, consistent with market makers selling from inventory to outside customers.

A comparison of our intraday results with those of Busse and Green (2001) is informative. They study large, liquid stocks and find that the price impact of analyst opinions, as reported by CNBC TV, lasts 1 minute for a positive opinion, with a reversal over the next 3 minutes. They find a price run-up in the 5 minutes prior to the event and a doubling of trading intensity in the minute after the event with a preponderance of buy trades. These results are remarkably similar to ours', in spite of substantial differences in the size and liquidity of the sample firms. Our paper also shows that liquidity improves despite tremendous buying pressure and that market makers supply more liquidity as demand for it increases. Both our studies attest to the increasingly rapid reaction of prices to events, whether driven by information or not, and even for the smallest of listed stocks.

## 4. The Market Impact of Stock Picks Before and After the Pick Day

For the Nasdaq stock picks, Figure 2 plots the cumulated excess returns from 100 days before to the pre-pick day (CUMRET1) and from the pick day to 60 days after the pick day (CUMRET2). Also plotted are daily VOLUME (divided by 20,000) and PQBAS (against the left y-axis).

**Please insert Figure 2 here**

Prices decrease till shortly before the pick day and so CUMRET1 is negative. CUMRET2 is almost 25% on the pick day, fall slightly below zero 10 days after the pick day, and fluctuate

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have started the uplink process slightly before the reported pick time.

around zero from then on. VOLUME spikes on the event day, falls right after but remains higher than initial levels. PQBAS varies between 5% and 6% initially, drops to 3.3% on the pick day, rises thereafter but remains well below 5% for the entire post-pick period.

In Table 4, we report daily means of activity and liquidity measures for six intervals: [-100, -6]: from 100 to 6 days before the pick day, [-5, -1]: from 5 days to the day before the pick date, [0,0]: the pick day, [1,10]: the 10 days after the pick date, [11,20]: from 11 to 20 days after the pick date, and [21,60]: from 21 to 60 days after the pick day.

**Please insert Table 4 here**

A * indicates that the mean is significantly different at the 5 percent level or below from the mean in the [-100, -6] interval, according to Dunnett's *t* test. For returns, * indicates that the mean is significantly different from zero at the 5 percent level or less. In section *A*, we discuss sample 1 consisting of all 60 Nasdaq stock picks. In section *B*, we study the relation between returns and liquidity by comparing samples 2 and 3 (defined in the section). In section *C*, we discuss early and late stock picks (sample 4) and control for post-pick news events (sample 5). We discuss OTCBB stock picks in section *D.*

*A. Activity and Liquidity Before and After the Pick Day: All Nasdaq Stock Picks*

Panel A of Table 4 reports activity, risk and returns of Nasdaq stocks. Consider sample 1. In the [-100, -6] interval, excess returns are almost -30% but turns positive in the 5 days before the pick date. Cooper et al (2001) also report a pre-event rise in prices for their sample. Excess returns are almost 24% on the pick day and –24% in the following 10 days. After 10 days, excess returns are not significantly different from zero. NTRADE is around 22 during the [-100, -6] interval, jumps to 586 on the pick day and drops to 41 after 60 days, still significantly higher than initial levels. The trade size is significantly lower (by about 200 shares) after 60 days, consistent with increased retail trading. STDR is significantly lower after 60 days. PVIMB is initially positive, implying excess sell imbalance, turns negative on the pick day due to strong buying demand, and becomes positive again after the pick day.

Panel B of Table 4 reports measures of liquidity and adverse selection. Consider sample 1 again. Even after 60 days, all three spread measures remain below initial levels by about 0.7% to 0.8%, a statistically significant decline. PEBAS and PQBAS decline sharply on the pick day and then increase for 20 days (but remaining below initial levels) before leveling off. PRBAS also follows a similar path, except that it reaches bottom in the [1,10] interval rather on the pick day. Consistent with increased uninformed trading, PROLLAS declines from initial levels, and charts a path similar to the spreads. PRIMP increases relative to initial levels, but the change is not significant. MMAKERS increases from 8.11 in the [-100, -6] interval to 11.08 on the pick day before falling to 8.68 in the [21,60] interval, still significantly higher than initial levels. TDEPTH increases by 800 shares on the pick day and remains high for another 20 days relative to initial levels. PBDEPTH declines from 0.53 initially to 0.44 on the pick day as buying pressure increases but rises to 0.50 in the next 10 days as the buy imbalance disappears.

*B. Returns and Liquidity of Nasdaq Stocks After Pick Day: A Closer Look*

The previous results show that, following stock picks, the liquidity gains persist but the return gains do not. To study the relation between liquidity and returns more closely, we create two additional samples from 54 Nasdaq stocks picks with positive pick-day excess returns. We cumulate the daily buy-and-hold excess return of these picks from the pick day onwards.

- Sample 2 consists of 19 Nasdaq stocks with positive pick-day excess returns that were *not* dissipated after 10 days (i.e. the cumulated excess return is positive for *each* of the 10 days).

- Sample 3 consists of 35 Nasdaq stocks with positive pick-day excess returns that *were dissipated* within 10 days (i.e. the cumulated excess return becomes negative at this time).

The results for samples 2 and 3 are in Table 4. To focus on the relationship between returns and liquidity, we only show results for the 10 days after the pick date. Panel A shows that, compared to sample 3, stocks in sample 2 have lower excess returns initially but higher pick-day excess returns and, by construction, higher returns in the following 10 days. Trading activity increases more for sample 2 stocks. For example, 10 days after the pick day, VOLUME is almost thrice the initial level for sample 2 stocks, compared to about twice for sample 3 stocks. STDR falls significantly relative to initial levels for sample 2 stocks but not for sample 3 stocks.

Panel B of Table 4 shows that, while liquidity increases for stocks in sample 2, there is no change in liquidity for stocks in sample 3. For sample 2 stocks, PQBAS and PEBAS are lower by 1.25% or more, PRBAS is lower by 0.8% and PROLLAS is lower by 0.3% after 10 days, relative to initial levels. In contrast, for sample 3 stocks, bid-ask spreads and PROLLAS are lower on the pick day but revert back to initial levels after 10 days. Finally, for stocks in sample 2, MMAKERS increases from 9 to 10 after ten days, but for sample 3 stocks MMAKERS is initially 8, increases to 10 on the pick day, and drops back to 8 after 10 days.

We conclude that liquidity and returns in the post-pick period are closely linked. While liquidity does not improve for stocks whose pick-day excess returns are dissipated within 10 days, the opposite is true for stocks that retain their pick-day excess returns for 10 days.

*C. Additional investigations*

Does the market impact of stock picks disappear for later picks? Rashes (2001) finds that abnormal returns due to investor confusion is reversed in a short period of time. In Camerer and Wigelt (1991), "information mirages" are less frequent in later than in early periods as traders learn whether there are insiders by observing nonprice information, such as the speed of trading.

We repeat our tests for 29 stocks (comprising sample 4) picked after 1999. Panel A of Table 4 shows that excess returns are –15% in the [21,60] interval for sample 4 stocks, compared to about 1% for all stocks (i.e. sample 1 stocks). Further, for sample 4 stocks, trading activity is higher for 20 days after the event but then reverts to initial levels. For example, VOLUME is about 14,000 shares initially, jumps to almost 400,000 shares on the pick day but is only about 16,000 shares after 20 days. Panel B shows that, for sample 4 stocks, the liquidity gains disappear 20 days after the pick day. For example, PEBAS is 3.97% initially, drops to 3.32% in the [1,10] interval but then increases to 3.82% in the [21,60] interval. PRBAS is lower and MMAKERS is higher even after 60 days for sample 4 stocks, but the improvement relative to initial levels is about half that for all stocks. We conclude that, for later stock picks, valuation and liquidity improve but are weaker and less lasting compared to the earlier stock picks.

The improved valuation and liquidity in the post-pick period may be due to positive corporate news. We search the Bloomberg news archive for company news associated with large positive returns. We repeat our tests for the 44 companies (comprising sample 5) without positive news in the 60 days after the pick.[15] Table 5 shows that, for the sample 5 stocks, improvements in valuation and liquidity in the post-pick period are similar in magnitude and duration to those of all stocks. Hence, our original results are robust to post-pick news events.

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[15] Examples of news leading to large positive returns are an award of a new patent, intention to develop a new web

To check for outliers, we omit 6 firms with negative pick-day excess returns and 6 firms with the highest pick-day excess returns. We also remove outliers on the basis of trading activity and liquidity variables. In all cases, the results are similar to those for the whole sample.

*D. The Market Impact of Stock Picks Before and After the Pick Date: OTCBB Stocks*

Figure 3 plots CUMRET1, CUMRET2, VOLUME (divided by 20,000) and PQBAS for OTCBB stock picks from 100 days before to 60 days after the pick day. CUMRET1 and CUMRET2 are defined as in Figure 2. PQBAS is plotted on the right y-axis.

**Please insert Figure 3 here**

Prices decrease till shortly before the pick day, surges just before and on the pick day and then falls. CUMRET2 falls slightly below zero 13 days after the pick day and, unlike the Nasdaq picks, is strongly negative at the end of 60 days. VOLUME jumps on the event day, falls just after but remains higher than initial levels. PQBAS drops from 16% initially to around 13% on the pick day and then drifts up by another 1% or so after 60 days. Thus, liquidity gains for the OTCBB picks persist up to 60 days after the event. Additional tests (not reported) show that the liquidity gains are greater for picks with more persistent return gains and they do not diminish for later picks. Unlike the Nasdaq picks, however, excess returns are strongly negative from 11 days to 60 days after the stock picks and volatility does not decrease in the post-pick period.

In summary, liquidity is higher 60 days after the stock picks relative to initial levels for both Nasdaq and OTCBB stock picks. The liquidity gains are greater for stocks with more durable return gains. Although weaker and less lasting for later Nasdaq picks, the liquidity gains are still significant. Finally, the liquidity gains cannot be attributed to good news in the post-pick period.

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site, acquisitions or a positive investment opinion on the stock.

## 5. Determinants of Liquidity Gains on the Pick Date

In this section, we explore a number of hypotheses to explain the improvement in liquidity on the pick date for Nasdaq and OTCBB stocks. We estimate a cross-sectional regression where the dependent variable is the change in PQBAS for a stock, defined as:

- CPQBAS $=100 * \frac{PQBAS[0,0] - PQBAS[-5,-1]}{PQBAS[-5,-1]}$

In words, CPQBAS is the percent change in a stock's PQBAS on the pick date (day 0) relative to the average PQBAS in the 5 day period prior to the pick date.

Below, we discuss the explanatory variables, relating each set of variables to various hypotheses regarding the pick-day improvement in liquidity.

*Fundamental factors.* Prior research shows that fundamental-to-price ratios are correlated with future returns. If pick-day returns are correlated with changes in liquidity (as we shall see later), then these ratios may also determine liquidity changes on the pick day. We use the Fama and French (1992) variables, measured as of the fiscal year-end prior to the event-year:

- Log(MV): the natural log of the stock's market value.
- BMV+: max(BMV,0).
- BMV_DUM: a dummy variable equal to one when BMV is non-positive and zero otherwise.
- EPS+: max(EPS,0).
- EPS_DUM: a dummy variable equal to one when EPS is non-positive and zero otherwise.

*Microstructure factors.* Since microstructure theory argues that liquidity decreases with risk and increases with trading activity, we conjecture that *changes* in liquidity are related to *changes* in volatility and volume, measured over the same period as the change in liquidity:

- CVOLATILITY = $100 * \frac{VOLATILITY[0,0] - VOLATILITY[-5,-1]}{VOLATILITY[-5,-1]}$,

- CVOLUME = $100*\frac{VOLUME[0,0]-VOLUME[-5,-1]}{VOLUME[-5,-1]}$,

where the volatility measure is STDR for Nasdaq stocks and APRCH for OTCBB stocks.

*Liquidity externality*. Due to a coordination problem, stocks may have multiple liquidity equilibria. The stock picks, by increasing uninformed trading, may push a stock from a low-liquidity equilibrium to a high-liquidity equilibrium. We hypothesize that stocks with low *initial* liquidity should have proportionately higher increases in liquidity on the pick day. For example, an increase of 1,000 shares from the stock pick is likely to prove more beneficial for a stock with initial trading volume of 10,000 shares relative to a stock with initial volume of 100,000 shares. The measure of initial liquidity is.

- PQBAS[-100, -6], the average PQBAS from 100 days to 6 days before the pick date.

A *negative* coefficient indicates that stocks with higher initial bid-ask spreads enjoy larger relative decreases in spreads (i.e. increases in liquidity) on the pick date. In the next section, we experiment with alternative measures of liquidity.

*Visibility*. Falkenstein (1996) and Chan (2002) find that the number of news stories is correlated with firm size, price and turnover, while Gadarowski (2002) finds that it is correlated with analyst coverage. In the regression, our proxy for visibility is:

- log(NEWS): the natural log of the number of news items in the 6 months before the event month. Since NEWS is zero for one stock, we add $10^{-4}$ to ensure that the log is defined.

A *negative* coefficient on log(NEWS) implies that stocks with higher initial media exposure have higher pick day liquidity gains.

*A. Results*

The results are in Table 5. The *t*-statistics are corrected for heteroskedasticity using the

Newey-West (1987) procedure with the Hansen (1982) generalized method of moments (GMM) technique. A * indicates estimates significantly different from zero at the 5% level or less.

**Please insert Table 5 here**

Panel A of Table 5 reports results for the Nasdaq stock picks. With only the fundamental factors, the adjusted R-square is almost 10%. While MV, BMV_DUM and EPS_DUM are all significant, only EPS_DUM is significant in later specifications. Its coefficient is positive, indicating that, for stocks with prior negative earnings, PQBAS increases an additional 16% on the pick day. When we add CVOLATILITY and CVOLUME, the adjusted R-square jumps to almost 31%. An increase in volatility increases PQBAS while an increase in volume decreases it, and both changes are significant. Next, we add PQBAS[-100, -6] and the adjusted R-square improves further to about 36%. Its coefficient is negative and significant, indicating that stocks with higher initial PQBAS have larger percent decreases in PQBAS on the pick date, consistent with the hypothesis of *liquidity externality*. After including log(NEWS), the adjusted R-square exceeds 51%. Its coefficient is significant and negative, indicating that stocks with *higher* media exposure initially have larger liquidity gains: investors trade more of those stocks that are better known to them. Hence, the results also support the hypothesis of *visibility*.

Results for the OTCBB stock picks (not reported) show that, like the Nasdaq picks, stocks with prior negative earnings suffer an illiquidity premium. An increase in volatility decreases liquidity in all specifications. However, an increase in volume also increases the bid-ask spread, although by a miniscule amount, perhaps because the illiquid OTCBB markets are unable to absorb large changes in volume. Neither PQBAS[-100, -6] nor log(NEWS) is significant.

*B. Robustness checks*

We repeat the analysis with alternative measures of liquidity. When we replace PQBAS with PEBAS, the proportional effective half-spread, the results (not reported) are similar. In particular, the hypotheses of liquidity externality and visibility are strongly supported.

In Dow (2002), illiquidity derives from asymmetric information and there are multiple equilibria with different levels of the bid-ask spread. While the quoted and effective bid-ask spreads include the effect of adverse selection, we also use as the dependent variable CPROLLAS, the percent change in proportional adverse selection costs (PROLLAS) from 5 days before to the event-day. The initial liquidity variable is:

- PROLLAS[-100, -6], the average PROLLAS from 100 days to 6 days before the pick date.

In Pagano (1989a), illiquidity is the risk or price volatility of the asset. Few traders and high price volatility characterize a low-liquidity equilibrium. We proxy the number of traders by the number of trades NTRADE. Thus, our dependent variables are log(CNTRADE) and CVOLATILITY, the (log of) the percent change in the number of trades and the percent change in volatility, respectively, from the [-5,-1] interval to the event day. In Pagano (1989a), multiple equilibria exist only if transaction costs (defined as lump sum participation fees) are high enough. We use PQBAS as a measure of transaction cost, and define the initial liquidity variables as:

- log(NTRADE*(1/PQBAS))[-100,-6], and
- VOLATILITY*PQBAS[-100,-6]

A low (high) value of the former (latter) is associated with a high-transactions-cost-low-liquidity equilibrium. When CVOLATILITY is the dependent variable, we only use stocks where CVOLATILITY<0 (i.e. when volatility declines on the event day). Finally, as a different measure of liquidity, we use CDEPTH, the change in the quoted depth from the [-5, -1] interval to the event day, as the dependent variable and DEPTH[100,-6] as the initial liquidity variable.

The results, which are in Panel B of Table 5, strongly support the hypothesis of liquidity externality. All the initial liquidity variables, except depth, have negative and significant coefficients. For example, when CPROLLAS is the dependent variable, the coefficient on PROLLAS[-100, -6] is about –12.5, indicating that an increase of 1% in the initial adverse selection cost is associated with a 12.5% reduction in PROLLAS on the event-day. This result is consistent with Dow (2002). The evidence also supports Pagano (1989a). For both Nasdaq and OTCBB picks, stocks with higher volatility and higher transaction costs have greater liquidity gains on the event day. So do Nasdaq picks with lower trading frequency and higher transaction costs. The coefficient on log(NEWS) is negative and significant at the 5% level or less in two cases; it is also negative and significant at the 10% level or less when CVOLATILITY is the dependent variable. Thus, there is additional support for the *visibility* hypothesis as well.

To proxy for visibility, the literature also uses measures of the *investor base*[16] such as SCOST, the *shadow cost of incomplete information* (in units of expected returns) and the shares-outstanding SOUT.[17] We include SCOST and SOUT in the regression, but find that the estimated coefficients are not significant.

In summary, initially illiquid stocks have greater liquidity gains on the event day, consistent with network effects in liquidity. We also find specific support for the liquidity externality models of Pagano (1989a) and Dow (2002). Finally, Nasdaq stock picks with greater initial media exposure have larger liquidity gains on the event day, consistent with Merton (1987).

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[16] In a dynamic version of the IRH, consumption streams, normalized by relative risk aversions, replace the investor base as a proxy for visibility (Shapiro, 2002).

[17] Following Kadlec and McConnell (1994), the shadow cost is (MV/SOUT)*(RSTD/TMV), where RSTD is the standard deviation of the stock's excess returns in the [-100,-6] interval and TMV is the total market capitalization in the pre-event year.

## 6. Determinants of Excess Returns on the Pick Day

In this section, we examine the determinants of excess returns on the pick day. The hypotheses to be tested are:

*Fundamental factors.* These are the five Fama and French (1992) variables described earlier.

*Systematic risk.* To adjust for systematic risk, we use the announcement period stock beta, estimated from the market model, as follows:

$$R_{it} = a_0 + a_1 R_{mt} + a_2 I_{[-5,0]} R_{mt} + e_t \tag{12}$$

For day $t$, $R_{it}$ is the buy-and-hold return of stock $i$, $R_{mt}$ is the Russell 2000 index return and $I_{[-5,0]}$ is a dummy variable equal to 1 in the interval [-5,0] and zero otherwise. Then:

- BETA = $\hat{a}_1 + \hat{a}_2$, the sum of the OLS estimates of $a_1$ and $a_2$ in (12).

For Nasdaq and OTCBB stocks, respectively, the mean $\hat{a}_1$ is 2.98 and 2.61 while the mean BETA is 3.16 and 2.76, showing an increase in systematic risk during the announcement period.

*Past returns and volume.* Since prices were increasing in the 5 days leading up to the pick day (Table 4), the event-day excess returns could be due to *positive momentum* as firms with high prior returns continue to perform well. Alternatively, large price and volume run-ups may attract buying interest by investors with large search costs (Barber and Odean, 2002). We use:

- ER[-5,-1]: the average excess return from 5 days before to the day before the pick date.
- EVOL[-5,-1]: the ratio of the average volume in the [-5,-1] interval to the average volume in the [-100,-6] interval.

We do not report results for *EVOL*, since its coefficient is not significant in the regression.

*Liquidity.* Amihud and Mendelson (1986) find a positive relation between quoted bid-ask spreads and the risk-adjusted return. Liquidity increases on the pick-day, so if expected returns decrease current prices should increase. Also, Table 5 shows that stocks with a higher *initial* level of liquidity show larger improvements in liquidity around the pick date. Thus, our liquidity proxies are PQBAS[100,-6] and PQBAS[0,0], the average PQBAS on the pick date. We expect excess returns to be *negatively* related to PQBAS[0,0] and *positively* related to PQBAS[100,-6].

*Visibility*. The visibility proxy is log(NEWS). If the IRH holds, then stocks with higher initial visibility should have a lower "awareness" return premium, and hence lower event-day returns.

*Initial market impact*. E-mails sent by the web sites to their subscribers emphasize the low float and high price impact of the stock picks. Such stocks also facilitate a "pump and dump" strategy by web site owners that involves buying the stock, organizing a buying cascade through the web sites and then selling out shortly after the pick is made public. We include:

- log TURNOVER[-100, -6]: log of the average turnover from 100 days to 6 days before the pick day.

We have also used SOUT, average *price level* (PRICE) and the average *price impact* (PRIMP) in the [-100, -6] interval, but the coefficients on these variables are not significant in the regression.

*New economy*. The valuation effects may be an outcome of investor fascination with Internet stocks, a so-called "new economy" effect. For example, Ofek and Richardson (2001) argue that investors in Internet stocks were relatively over-optimistic. We use the Internet dummy variable:

- INTERNET: equal to one for firms in an Internet-related business and zero otherwise.

The results are in Table 6 with *t*-statistics adjusted for heteroskedasticity in the manner described before. A * indicates that the estimate is significant at the 5 percent level or lower.

**Please insert Table 6 here**

With only the fundamental factors, the adjusted R-square is 3.48%. BMV+ is positive and significant, as it is in all later specifications, consistent with Fama and French (1992). However, MV is positive, and it is significant in four out of five specifications, whereas it is negatively related to future returns in Fama and French (1992). BETA boosts the adjusted R-square to about 23% and its coefficient is positive and significant, indicating that stocks with higher announcement period risk have higher pick-day excess returns. With past returns and liquidity, the adjusted R-square jumps to about 46%. The coefficient of ER[-5,-1] is negative and significant, indicating that stocks with lower excess returns in the 5 days prior to the pick date enjoy higher excess returns on the pick day. This is consistent with Lehman (1990), who finds stock price reversals at weekly intervals. As hypothesized, the coefficient of PQBAS[0,0] is negative and significant while the coefficient of PQBAS[-100, -6] is positive and significant. Thus, stocks with low initial liquidity and high pick-day liquidity have the larger pick-day excess returns. NEWS, TURNOVER and the INTERNET dummy do not have significant coefficients.

For the OTCBB stock picks (results not reported), only log(NEWS) is consistently significant. Its coefficient is negative, indicating that OTCBB stock picks with higher initial media exposure have lower pick-day excess returns.

We tested for *cascades* by including PBUY, the percent of buys in the 3 minutes just prior to the pick time, as another explanatory variable.[18] Although PBUY has the right sign (i.e. positive), it is not statistically significant.

Summarizing, both initial liquidity and event-day liquidity are significant determinants of event-day excess returns for the Nasdaq stock picks. Hence, stocks with low initial liquidity have larger liquidity gains (Table 5) and larger excess returns on the event day.

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[18] The models of Bannerjee (1992) and Welch (1992) imply that cascade investors ignore their own information to buy a stock just because others before them bought it.

## 7. Long-horizon Performance of Stock Picks

In this section, we examine the long-horizon performance of the stock picks relative to a matched sample. Since the recommended stocks generally have lower liquidity (higher PQBAS, lower SOUT and TURNOVER) compared to stocks with similar MV and BMV in the pre-event year (see Table 2), we compare their performance to a sample of stocks matched on MV, BMV *and* liquidity in the pre-event year. The matching procedure is as described in section 1C.

In Table 7, we report fiscal year-end performance indicators for the event-year (Year 0) and the year following (Year 1) for Nasdaq stock picks and the matched samples.

**Please insert Table 7 here**

Only firms with data for all matched variables in Year -1 (the pre-event year), Year 0 and Year 1 are included. The table reports year-to-year changes as well as *cumulated changes* in SOUT, MV, PQBAS and TURNOVER relative to the pre-event year. To illustrate, the change in PQBAS is 100*($PQBAS_i$-$PQBAS_{i-1}$)/$PQBAS_{i-1}$ while its cumulated change is 100*($PQBAS_i$-$PQBAS_{-1}$)/$PQBAS_{-1}$, where the subscript *i* refers to Year *i* (*i*=-1,0,1). The annual return is the change in the fiscal year-end closing price, relative to the previous year. The cumulated return is the price change relative to the pre-event year. Finally, BMV, revenue and earnings data are presented. The data is from Bloomberg, Compustat and 10K filings. A * in the *Mean* (*Median*) column indicates that the mean (median) difference between the sample firms and the matched firms is significantly different from zero at the 10 percent level or less, according to a T-test (Z-test). The *p*-values for the Z-test are Monte Carlo estimates of exact *p*-values.

Panel A contains results for the Nasdaq picks and a sample matched on MV, BMV and PQBAS. Only 34 firms have data on the matched variables in all years. Liquidity improves more, or decreases less, for the stock picks than for the matched sample in both years. The mean

PQBAS increases in both years, but less than for the matched sample. The mean TURNOVER of the stock picks increases more in Year 0 and decreases less in Year 1, compared to the matched sample. The mean annual return is greater for the stock picks in both years. Finally, the cumulated increase in the mean SOUT and MV is more than 3 times that of the matched sample. The mean differences in TURNOVER and SOUT are statistically significant in both years. The median differences are generally not significant, except for TURNOVER and MV in 1999. We also calculate (not shown) that the mean (median) number of NEWS in the six months *after* the event month increases 12.86% (20%) for the Nasdaq stock picks, relative to the prior six months.

Web site owners explicitly chose low-float stocks. Panel B contains results for the Nasdaq picks and a sample matched on MV, BMV and SOUT. 50 firms have data on the matched variables in all years. The Nasdaq picks have greater cumulated increase in the mean TURNOVER and lower cumulated increase in the mean PQBAS, compared to the matched sample. Annual returns are lower for the picks in Year 0 and higher in Year 1. However, the Year 0 returns for the stock picks appear more impressive after allowing for the fact that they had *negative* excess returns of about 30% in the 100 days leading up to the event date (Table 4). Finally, the cumulated change in the mean SOUT and MV exceeds that of the matched sample by about 10%, indicating an increase in the investor base. Mean differences in TURNOVER and SOUT are statistically significant. However, the median MV decreases and more so for the stock picks, and the difference is statistically significant.

Overall, the *average* Nasdaq pick has greater gains in liquidity, the investor base, valuation and visibility in the event and post-event years compared to the matched sample. The evidence is less compelling for the *median* Nasdaq pick, showing that most of the gains are from a few firms. For the average OTCBB stock picks (results not shown), the evidence is mixed. Liquidity, returns and the investor base are higher for the stock picks in some instances, but not in others. For example, compared to the matched sample, while TURNOVER is higher for the stock picks, so is the PQBAS. However, as with the Nasdaq picks, visibility improves since the mean (median) value of NEWS in the 6 months after the event-month is 54.65% (50%) higher compared to the prior 6 months.

While the mean returns are generally positive for the stock picks, and greater than the mean returns of the matched samples, median returns are often negative and *lower* than the median returns of matched stocks. Does the median stock pick also have an inferior operating performance? To examine this issue, consider the revenue and earnings data presented in Table 7. Median revenues are higher but the median EPS is lower compared to the matched stocks in both years. The difference in median revenues is statistically significant in Panel B. The median BMV is similar in Panel A and higher for the stock picks in Panel B for both years. A similar conclusion holds for the OTCBB picks (not shown): while revenues are higher than the matched stocks, earnings are generally worse and the median BMV is lower and sometimes negative. Hence, the evidence is mixed: the operating performance of the stock picks is better in some respects and worse in others compared to similar companies.

## 8. Conclusion

In this paper, we examine the short and long run effects of 60 Nasdaq and 60 OTCBB picks by Internet web sites between April 1999 and June 2001. The intraday price and volume impact of the picks is impressive. The cumulative returns from market open to three minutes after the pick time is 40%. Trading activity *per minute* around the pick time is equal in magnitude to the *daily* activity in normal times. Liquidity and trading activity are higher 60 days after the pick day, while volatility is lower, relative to initial levels. Liquidity remains higher one year after the event, compared to a sample matched on size, book-to-market and liquidity in the pre-event year.

Initial liquidity and visibility are the key determinants of changes in liquidity and excess returns on the pick day. We find that, after controlling for firm characteristics, changes in volume and volatility, stocks with lower initial liquidity have greater improvements in liquidity on the pick-day. Further, stocks with lower initial liquidity and higher pick-day liquidity have higher pick-day excess returns. These results support the idea of network effects in liquidity, and that the stock picks act as a coordination device to push initially illiquid stocks to a higher liquidity equilibrium. We also find that stocks with higher media exposure initially enjoy higher liquidity gains and lower excess returns on the pick-day, and that media exposure increases following the stock picks, consistent with Merton's (1987) investor recognition hypothesis.

It has been argued that the Internet facilitates *market manipulation* by allowing fast, cheap and anonymous access to many investors simultaneously (Leinweber and Madhavan, 2001). We find that the initial float, price level or price impact of the stocks (features that make manipulation easier) are unrelated to the event-day returns. Returns and trading activity increase prior to the event, which may indicate "pumping" by the web site owners, but could also be caused by other factors (such as information leakage). The median annual returns of the stock picks is negative in the event-year and the year after, and lower compared to a size-and-liquidity-matched sample. However, the operating performance of the median stock pick is not markedly inferior to that of similar companies: while earnings are lower, revenues are higher. Overall, there is no compelling evidence for or against market manipulation. Independent of the web site owners' intentions, however, the benefit to investors in terms of increased liquidity, valuation and visibility appears to be real, and for the Nasdaq stock picks in particular.

The "momentum" sites in our study typically do not engage in fundamental research. However, relative to more traditional channels such as investment newsletters and phone calls, the Internet can increase transparency by cheaply and *simultaneously* disseminating information to large numbers of people, facilitating fair disclosure in the spirit of the Securities Exchange Commission's Regulation FD.[19] Our study shows that such synchronous information disclosure has liquidity externalities above and beyond its specific news-content, especially for small stocks. On the positive side, good news may create long-lasting liquidity benefits and facilitate the creation of new pools of liquidity (Madhavan, 2000). On the negative side, bad news can push small stocks into a persistent low-trade equilibrium. Also, prices may "overshoot" and volatility increase due to *cascades*, although the publication of a "target price" may alleviate this problem.

[19] Moreover, the quality of the advise can be better gauged by the investors as it is not affected by confounding news released during the time delays associated with the newsletters and other traditional channels.

## Reference

Admati, A.R. and P. Pfleiderer, 1988, "A Theory of Intraday Patterns: Volume and Price Variability," *Review of Financial Studies* 1, 3-40.

Amihud, Y. and H. Mendelson, 1986, "Asset Pricing and the Bid-Ask Spread," *Journal of Financial Economics*, 17, 223-249.

Baker, K.H., Nofsinger, J.R. and D.G.Weaver, 2002, "International Cross-Listing and Visibility," *Journal of Financial and Quantitative Analysis*, 37, 495-521.

Banerjee, A., 1992, "A Simple Model of Herd Behavior," *Quarterly Journal of Economics*, 107, 797-818.

Barber, B.M. and T. Odean, 2002, "All that Glitters: The Effect of Attention and News on the Buying Behavior of Individual and Institutional Investors," Working Paper, University of California, Davis.

Busse, J. A. and T.C. Green, 2002, "Market Efficiency in Real Time," forthcoming *Journal of Financial Economics*.

Camerer, C. and K. Weigelt, 1991, "Information mirages in experimental asset markets," *Journal of Business*, 64, 463-493.

Chan, W.S., 2002, "Stock Price Reaction to News and No-News: Drift and Reversal After Headlines," forthcoming, *Journal of Financial Economics*.

Chen, H., Noronha, G. and V. Singal, 2002, "Investor Awareness and Market Segmentation: Evidence from S&P 500 Index Changes," Working Paper, University of Baltimore.

Cooper, M.J., Dimitrov, O. and P.R. Rau, 2001, "A Rose.com by Any Other Name," *Journal of Finance*, 56, 2371-2388.

Cutler, D.M., Poterba, J.M. and L.H.Summers, 1989, "What Moves Stock Prices?" *Journal of Portfolio Management*, 15, 4-12.

Daniel, K.D., Hirshleifer, D. and A. Subrahmanyam, 1998, "Investor Psychology and Security Market Under-and-Over Reactions," *Journal of Finance*, 53, 1839-1885.

Dow, J., 2002, "Self-sustaining Liquidity in an Asset Market with Asymmetric Information," Working Paper, London Business School.

Dunnett, C. W., 1955, "A Multiple Comparisons Procedure for Comparing Several Treatments with a Control," *Journal of the American Statistical Association*, 50, 1096-1121.

Ellis, K., Michaely, R., and M. O'Hara, 2000, "The Accuracy of Trade Classification Rules: Evidence from Nasdaq," *Journal of Financial and Quantitative Analysis*, 35, 529-551.

Falkenstein, E.G., 1996, "Preferences for Stock Characteristics as Revealed by Mutual Fund Portfolio Holdings," *Journal of Finance*, 51, 111-135.

Fama, E. F. and K.R. French, 1992, "The Cross-Section of Expected Stock Returns," *Journal of Finance*, 47, 427-464.

Fleming, M., 2001, "Measuring Treasury Market Liquidity," *Staff Reports* No. 133, the Federal Reserve Bank of New York.

Gadarowksi, C., 2002, "Financial Press Coverage and Expected Stock Returns," Working Paper, Cornell University.

Glosten, L., 1987, "Components of the Bid-Ask Spread and the Statistical Properties of Transactions Prices," *Journal of Finance*, 42, 1293-1307.

Hansen, L.R, 1982, "Large Sample Properties of Generalized Method of Moments Estimators," *Econometrica*, 50, 1029-054.

Huang, R. and H. Stoll, 1996, "Dealer versus Auction Markets: A Paired Comparison of Execution Costs on Nasdaq and NYSE," *Journal of Financial Economics*, 41, 313-358.

Huberman, G. and T. Regev, 2001, "Contagious Speculation and a Cure for Cancer: A Nonevent that Made Stock Prices Soar," *Journal of Finance*, 56, 387-396.

Kadlec, G.B. and J.J.McConnell, 1994, "The Effect of Market Segmentation and Illiquidity on Asset Prices: Evidence from Exchange Listings," *Journal of Finance*, 49, 611-636.

Klibanoff, P., Lamont, O. and T.A.Wizman, 1998, "Investor Reaction to Salient News in Closed-End Country Funds," *Journal of Finance*, 53, 673-699.

Lehman, B., 1990, "Fads, Martingales and Market Efficiency," *Quarterly Journal of Economics*, 60, 1-28.

Leinwebber, D.J. and A. Madhavan, 2001, "Three Hundred Years of Stock Market Manipulation," *The Journal of Investing*, 1-10.

Madhavan, A., 2000, "In Search of Liquidity in the Internet Era," Working paper, ITG Inc.

Madhavan, A., Richardson, M. and M. Roomans, 1997, "Why do Security Prices Change? A Transaction-Level Analysis of NYSE Stocks," *Review of Financial Studies*, 10, 1035-1064.

Merton, R., 1987, "Presidential address: A Simple Model of Capital Market Equilibrium With Incomplete Information," *Journal of Finance* 42, 483-510.

Newey, W.K. and K.D. West, 1987, "A Simple, Positive Semi-Definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix," *Econometrica*, 55, 703-08.

Ofek, E. and M. Richardson, "Dotcom Mania: The Rise and Fall of Internet Stock Prices," Working Paper 8630, National Bureau of Economic Research.

Pagano, M., 1989a, "Trading Volume and Asset Liquidity," *Quarterly Journal of Economics*;

104(2), May 1989, pages 255-74.

Pagano, M., 1989b, " Endogenous Market Thinness and Stock Price Volatility," *Review of Economic-Studies;* 56(2), April 1989, pages 269-87.

Rashes, S.R., "Massively Confused Investors Making Conspicuously Ignorant Choices (MCI-MCIC)," *Journal of Finance* 56, 1911-1927.

Roll, R., 1984, "A Simple Implicit Measure of the Effective Bid-Ask Spread in an Efficient Market," *Journal of Finance*, 39, 1127-1139.

Romer, D., 1993, "Rational Asset-Price Movements Without News," *The American Economic Review*, 83, 1112-130.

Schultz, P. 2000, "Regulatory and Legal Pressures and the Costs of Nasdaq Trading," *The Review of Financial Studies*, 13, 917-957.

Shapiro, A., 2002, "The Investor Recognition Hypothesis in a Dynamic General Equilibrium: Theory and Evidence," *The Review of Financial Studies*, 15, 97-141.

Stoll, H. R. 2000, "Frictions," *The Journal of Finance* 55: 1479-1514.

Welch, I., 1992, "Sequential Sales, Learning and Cascades," *Journal of Finance*, 47, 695-732.

Wysocki, P.D., "Cheap Talk on the Web: The Determinants of Postings on Stock Message Boards," Working Paper, University of Michigan Business School.

## Table 1. List of Internet Web Sites Recommending Stocks and Distribution of Picks by Exchange and Year

Panel A lists the Internet web sites, and the number of stocks recommended by each between April 1999 and June 2001. Panel B shows the distribution of stock picks by exchange and year.

### Panel A: List of web sites

| Name of web site | Number of stocks recommended | Number of stocks with confounding information | Number of stocks used for analysis |
|---|---|---|---|
| eCompanyProfile.com | 10 | 0 | 10 |
| Explosivepick.com | 14 | 1 | 13 |
| Great-picks.com | 29 | 2 | 27 |
| Stocklauncher.com | 33 | 2 | 31 |
| Stockmarketpicks.com | 11 | 0 | 11 |
| Stockrocket.net | 2 | 0 | 2 |
| TnTStock.com | 28 | 2 | 26 |
| Total | 127 | 7 | 120 |

### Panel B: Distribution of 120 stock picks by exchange and year

| Exchange | Number of picks in 1999 | Number of picks in 2000 | Number of picks in 2001 |
|---|---|---|---|
| Nasdaq | 31 | 29 | 0 |
| OTCBB | 18 | 40 | 2 |
| TOTAL | 49 | 69 | 2 |

## Table 2. Characteristics of Recommended Nasdaq Firms

We report performance indicators for 60 Nasdaq stock picks recommended on Internet web sites between April 1999 and June 2001. The table shows the cross-sectional distribution of each statistic. The accounting data, obtained from Compustat, Bloomberg, and 10K filings, are for the fiscal year-end before the event-year. Accounting measures are reported for 59 Nasdaq firms, since one firm was recommended twice in the same fiscal year. SOUT = shares outstanding, TURNOVER = the trading volume divided by SOUT, MV = the market value, BMV = the book value of common equity divided by MV, RMV = the ratio of annual revenue to MV, NMV = the ratio of annual net income to MV and EPS = the fully diluted earnings-per-share. The proportional bid-ask half-spread PQBAS is one-half the difference between the bid and ask quotes, divided by the quote mid-point. NEWS is the number of news items about a stock in the Bloomberg news archive in the six months prior to the pick month. The MV-BMV-MATCHED Nasdaq sample consists of 59 Nasdaq firms chosen to minimize the Euclidean distance, calculated using the pre-event fiscal year-end values of MV and BMV, from a recommended Nasdaq firm. Other details of the matching procedure are in the text.

| | Number of observations | Mean | Median | Standard deviation | Maximum | Minimum |
|---|---|---|---|---|---|---|
| **Recommended Nasdaq firms** | | | | | | |
| SOUT | 59 | 5.38 | 3.59 | 4.85 | 25.61 | 1.00 |
| TURNOVER | 59 | 0.95 | 0.75 | 1.04 | 7.73 | 0.11 |
| PQBAS | 49 | 6.36 | 4.00 | 8.47 | 52.15 | 0.94 |
| MV | 59 | 7.75 | 5.93 | 6.98 | 48.80 | 0.97 |
| Price | 59 | 1.73 | 1.38 | 1.06 | 5.81 | 0.53 |
| BMV | 59 | 1.31 | 0.97 | 1.66 | 9.64 | -2.84 |
| RMV | 59 | 7.25 | 2.71 | 14.07 | 88.03 | 0.00 |
| NMV | 59 | -0.43 | -0.06 | 0.95 | 0.98 | -3.92 |
| EPS | 59 | -0.51 | -0.07 | 0.98 | 0.40 | -3.49 |
| NEWS | 60 | 7.00 | 5.00 | 6.84 | 36.00 | 0.00 |
| **MV-BMV-MATCHED Nasdaq firms** | | | | | | |
| SOUT | 59 | 6.22 | 4.80 | 5.44 | 24.86 | 0.59 |
| TURNOVER | 59 | 1.27 | 0.72 | 1.54 | 7.74 | 0.06 |
| PQBAS | 56 | 4.53 | 2.94 | 3.97 | 20.00 | 0.67 |
| MV | 59 | 8.50 | 6.00 | 7.00 | 48.80 | 1.17 |
| Price | 59 | 1.91 | 1.38 | 1.55 | 8.38 | 0.38 |
| BMV | 59 | 1.27 | 0.93 | 1.49 | 8.01 | -3.40 |
| RMV | 59 | 3.75 | 2.54 | 4.15 | 21.39 | 0.00 |
| NMV | 59 | -0.23 | -0.17 | 0.48 | 0.79 | -2.01 |
| EPS | 59 | -0.30 | -0.27 | 0.81 | 2.41 | -3.62 |

## Table 3. Intra-day Activity and Liquidity on the Pick Day: Nasdaq Stocks

We report statistics for trading activity and liquidity measures for 60 Nasdaq stock picks recommended on Internet web sites between April 1999 and June 2001. The time intervals are in minutes around the pick time (time 0). Statistics are calculated for each stock and then averaged over all stocks traded in the interval. BHR, the buy-and-hold return, is the log of the last quote mid-point in that interval minus the log of the last quote mid-point in the previous interval. VOLUME and NTRADE, the number of trades, per minute is the total volume and number of trades in an interval divided by the number of minutes in the interval. STDR per minute is the standard deviation of returns divided by the square root of the interval length. The trade indicator Q=-1 (buy) if the price is closer to the ask A and Q=1 (sell) if the price is closer to the bid B. Q=0 if the price is equal to the quote midpoint. PBUY is the ratio of the number of buy trades to the total number of trades in the interval.
The proportional bid-ask spread is calculated for each trade $t$ in an interval and then averaged across all trades in an interval. The proportional quoted half-spread is:

$$PQBAS = (A_t - B_t)/2M_t \qquad (1)$$

where $A_t$ is the inside ask price, $B_t$ is the inside bid price and $M_t$ is the quote mid-point for trade $t$. The proportional effective half-spread is:

$$PEBAS = |P_t - M_t|/M_t \qquad (2)$$

where $P_t$ is the trade price for trade $t$.

The proportional Roll price covariance for interval $i$ is:

$$PRBAS = \sqrt{COV}(1-K)/M_i \qquad (3)$$

where $COV$ is the first-order autocovariance of price changes, the small sample adjustment $K = (\kappa\text{-}4)/(8n\text{-}8)$, $\kappa$ is the kurtosis of the price change distribution, $n$ is the number of price changes and $M_i$ is the last quote mid-point in interval $i$. PROLLAS is the proportional adverse selection bias in RBAS, estimated using Schultz's (2000) formula, is defined for interval $i$, as follows:

$$\text{PROLLAS} = \frac{\sqrt{EBAS^2 - \delta EBAS} - EBAS}{M_i} \qquad (4)$$

where EBAS is the mean effective bid-ask spread in the interval, $\delta = \Sigma_t\,[(M_t - M_{t-1})(Q_{t-1} - Q_{t-2})/T]$, $Q_t$ is the trade indicator, and the summation is over $t$=1 to T, the number of trades in the interval.
The percent volume imbalance, PVIMB, is the sell volume minus the buy volume, divided by the total volume in an interval. Then price impact, PRIMP, for interval $i$ is:

$$PRIMP = (M_i - M_{i-1})/PVIMB \qquad (5)$$

TDEPTH is the total quoted depth (bid depth plus ask depth) and PBDEPTH is the ratio of bid depth to total depth in an interval. MMAKERS per minute is the number of market makers active in an interval divided by the number of minutes in the interval. For returns, * indicates the mean is significantly different from zero at the 5 percent level or less. For other variables, * indicates that the mean is significantly different at the 5 percent level or less from the mean in the [open, -3) interval, according to Dunnett's (1955) many-to-one $t$ statistic.

### Table 3 (continued). Intra-day Activity and Liquidity on the Pick Day: Nasdaq Stocks

### Panel A: Activity, Returns and Risk on the Pick Day

| | [open,-3) | [-3,0) | [0,3) | [3,9) | [9,15) | [15,30) | [30,60) | [60,close] |
|---|---|---|---|---|---|---|---|---|
| BHR (%) | 7.32* | 9.48* | 22.35* | 1.33 | -0.39 | -2.70 | -0.99 | -5.03* |
| STDR per minute | 0.31 | 1.37* | 2.13* | 1.39* | 1.19* | 0.72 | 0.50 | 0.15 |
| VOLUME per minute | 353 | 5,444* | 16,762* | 12,463* | 7,970* | 4,780* | 2,404 | 594 |
| NTRADE per minute | 0.29 | 6* | 22* | 14* | 9* | 5* | 3 | 0.66 |
| Trade size | 957.49 | 946.30 | 763.11* | 848.15 | 886.47 | 914.16 | 912.74 | 885.65 |
| PBUY | 0.67 | 0.89* | 0.74 | 0.61 | 0.57 | 0.54* | 0.52* | 0.50* |
| PVIMB | -0.35 | -0.74* | -0.45 | -0.22 | -0.08* | -0.07* | -0.01* | 0.06* |

### Panel B: Liquidity and Adverse Selection on the Pick day

| | [open,-3) | [-3,0) | [0,3) | [3,9) | [9,15) | [15,30) | [30,60) | [60,close] |
|---|---|---|---|---|---|---|---|---|
| PQBAS (%) | 5.40 | 4.08 | 4.09 | 3.41* | 3.41* | 3.34* | 3.03* | 3.01* |
| PEBAS (%) | 4.27 | 3.43 | 3.25 | 2.85* | 2.79* | 2.71* | 2.43* | 2.44* |
| PRBAS (%) | 2.82 | 1.27* | 1.56* | 2.07 | 2.26 | 2.04 | 1.85 | 1.38* |
| PROLLAS (%) | 1.03 | 0.82 | 0.76* | 0.71* | 0.70* | 0.69* | 0.61* | 0.61* |
| PRIMP (%) | 0.0031 | 0.0024 | 0.0170 | 0.0043 | 0.0007 | 0.0000 | 0.0074 | -0.0021 |
| MMAKERS per minute | 0.15 | 1.28* | 2.60* | 1.28* | 1.06* | 0.43* | 0.21 | 0.03 |
| TDEPTH | 3,590 | 4,022 | 3,805 | 4,480 | 4,594 | 4,193 | 4,033 | 3,720 |
| PBDEPTH | 0.55 | 0.55 | 0.52 | 0.37* | 0.37* | 0.42* | 0.43* | 0.51 |

## Table 4. Activity and Liquidity Before and After the Pick Day: Nasdaq Stocks

Daily statistics are reported for Nasdaq stock picks recommended on Internet web sites between April 1999 and June 2001 for 100 days before to 60 days after the pick date. There are 5 samples. Sample 1 is the whole sample, consisting of 60 stock picks. Sample 2 is 19 stock picks with positive pick-day excess returns that were not dissipated within 10 days after the pick date. Sample 3 is 35 stock picks with positive pick-day excess returns that *were dissipated* within 10 days after the pick date. Sample 4 consists of 29 stocks that were picked in 2000 and 2001. Sample 5 comprises of 44 stocks that had no positive news in the post-pick period. The excess return in an interval [*a*, *b*] is:

$$Excess\ return = \log\left(M_b / M_{a-1}\right) - \log\left(Rus_b / Rus_{a-1}\right) \qquad (1)$$

where $M_t$ is the closing mid-quote and $Rus_t$ is the closing Russell 2000 index for day $t$={($a$-1),$b$}. All other statistics are calculated for each stock on a daily basis and then averaged over the number of days in the interval. *STDR* is the standard deviation of intraday returns. The trade indicator Q=-1 (buy) if the price is closer to the ask A and Q=1 (sell) if the price is closer to the bid B. Q=0 if the price is equal to the quote midpoint. The percent volume imbalance, *PVIMB*, is the sell volume minus the buy volume, divided by the total volume in the day. The price impact for day *t* is:

$$PRIMP = \left[M_t - M_{t-1}\left(1 + \log(Rus_b / Rus_{a-1}\right)\right] / PVIMB \qquad (2)$$

The proportional Roll price covariance for day *t* is:

$$PRBAS = \sqrt{COV}\,(1-K)/M_t \qquad (3)$$

where *COV* is the first-order autocovariance of price changes, the small sample adjustment $K$ = (κ-4)/(8$n$-8), κ is the kurtosis of the price change distribution and $n$ is the number of price changes in the day. The percent adverse selection bias in the Roll covariance for day *t* is estimated using Schultz's (2000) formula as follows:

$$PROLLAS = \frac{\left(\sqrt{EBAS^2 - \delta EBAS} - EBAS\right)}{M_t} \qquad (4)$$

where $\delta = \Sigma_n\,[(M_n - M_{n-1})(Q_{n-1} - Q_{n-2})/T]$, and the summation is over $n$=1 to T, the number of trades in a day.
We calculate the proportional bid-ask spreads for each trade and then averaged over all trades in the day. The proportional quoted half-spread is:

$$PQBAS = (A_t - B_t)/2M_t \qquad (5)$$

where $A_t$ is the inside ask price, $B_t$ is the inside bid price and $M_t$ the quote mid-point for trade *t*. The proportional effective half-spread is:

$$PEBAS = \left|P_t - M_t\right| / M_t \qquad (6)$$

where $P_t$ is the trade price.
TDEPTH is the total quoted depth (bid depth plus ask depth) in a day; PBDEPTH is the ratio of bid depth to total depth. MMAKERS is the number of market makers changing quotes in a day. For returns, * indicates the mean is significantly different from zero at the 5 percent level. For other variables, * indicates that the mean is significantly different at the 5 percent level from the mean in the [100, -6] interval, according to Dunnett's (1955) many-to-one *t* statistic.

**Table 4 Panel A: Activity, Returns and Risk Before and After Pick Day for Nasdaq Stocks**

| | No. of picks | [-100, -6] | [-5,-1] | [0,0] | [1,10] | [11,20] | [21,60] |
|---|---|---|---|---|---|---|---|
| Excess Return (1) | 60 | $-29.56^*$ | $12.69^*$ | $23.86^*$ | $-23.91^*$ | -0.90 | 0.93 |
| (2) | 19 | $-36.77^*$ | $6.14^*$ | $36.29^*$ | $-16.37^*$ | --- | --- |
| (3) | 35 | $-28.55^*$ | $12.63^*$ | $23.38^*$ | $-31.34^*$ | --- | --- |
| (4) | 29 | $-33.63^*$ | $14.77^*$ | $20.39^*$ | $-23.39^*$ | -1.24 | $-14.63^*$ |
| (5) | 44 | $-29.44^*$ | $12.93^*$ | $23.89^*$ | $-25.78^*$ | -1.78 | $-5.76^*$ |
| VOLUME (1) | 60 | 23,921 | 41,302 | 517,324$^*$ | 57,769$^*$ | 41,086 | 39,146$^*$ |
| (2) | 19 | 23,805 | 34,489 | 582,232$^*$ | 62,037$^*$ | --- | --- |
| (3) | 35 | 25,251 | 43,408 | 499,724$^*$ | 58,374$^*$ | --- | --- |
| (4) | 29 | 14,227 | 26,128$^*$ | 386,996$^*$ | 27,292$^*$ | 15,850 | 16,380 |
| (5) | 44 | 14,410 | 28,333$^*$ | 397,881$^*$ | 35,670$^*$ | 18,928 | 24,706$^*$ |
| NTRADE (1) | 60 | 22 | 37 | $586^*$ | $63^*$ | 41 | $41^*$ |
| (2) | 19 | 19 | 21 | $587^*$ | $56^*$ | --- | --- |
| (3) | 35 | 24 | 43 | $611^*$ | $70^*$ | --- | --- |
| (4) | 29 | 13 | $24^*$ | $446^*$ | $31^*$ | 16 | $17^*$ |
| (5) | 44 | 11 | 21 | $426^*$ | $34^*$ | 17 | $25^*$ |
| Trade size (1) | 60 | 1,055 | 1,104 | 866 | $872^*$ | $877^*$ | $891^*$ |
| (2) | 19 | 1,080 | 1,165 | 905 | $862^*$ | --- | --- |
| (3) | 35 | 1,058 | 1,046 | 837 | $880^*$ | --- | --- |
| (4) | 29 | 970 | 1056 | 831 | $854^*$ | $831^*$ | $870^*$ |
| (5) | 44 | 1,093 | 1,153 | 864 | $887^*$ | $864^*$ | $912^*$ |
| STDR (1) | 60 | 3.88 | 4.05 | 3.59 | 3.47 | $3.12^*$ | $3.09^*$ |
| (2) | 19 | 3.58 | 3.40 | 3.03 | $2.84^*$ | --- | --- |
| (3) | 35 | 4.06 | 4.31 | 3.81 | 3.91 | --- | --- |
| (4) | 29 | 3.49 | 4.05 | 3.10 | 3.34 | 3.08 | $3.03^*$ |
| (5) | 44 | 4.01 | 4.36 | 3.88 | 3.70 | $3.28^*$ | $3.29^*$ |
| PVIMB (1) | 60 | 0.25 | $0.03^*$ | $-0.14^*$ | 0.24 | 0.22 | $0.20^*$ |
| (2) | 19 | 0.25 | $0.00^*$ | $-0.15^*$ | 0.15 | --- | --- |
| (3) | 35 | 0.25 | $0.05^*$ | $-0.14^*$ | 0.28 | --- | --- |
| (4) | 29 | 0.26 | $-0.05^*$ | $-0.12^*$ | 0.22 | 0.22 | 0.22 |
| (5) | 44 | 0.25 | $0.07^*$ | $-0.14^*$ | 0.22 | 0.23 | 0.17 |

**Table 4 Panel B: Liquidity and Adverse Selection Before and After Pick day for Nasdaq Stocks**

| | No. of picks | [-100, -6] | [-5,-1] | [0,0] | [1,10] | [11,20] | [21,60] |
|---|---|---|---|---|---|---|---|
| PQBAS (1) | 60 | 5.46 | 5.27 | 3.33* | 4.59* | 4.98* | 4.67* |
| (2) | 19 | 4.94 | 4.17 | 2.88* | 3.54* | --- | --- |
| (3) | 35 | 5.70 | 5.78 | 3.39* | 5.18 | --- | --- |
| (4) | 29 | 4.95 | 4.84 | 3.04* | 4.17* | 4.81 | 4.75 |
| (5) | 44 | 5.62 | 5.61 | 3.57* | 4.89* | 5.40 | 5.08* |
| PEBAS (1) | 60 | 4.47 | 3.96 | 2.70* | 3.71* | 3.88* | 3.75* |
| (2) | 19 | 4.05 | 3.19 | 2.33* | 2.80* | --- | --- |
| (3) | 35 | 4.68 | 4.35 | 2.77* | 4.25 | --- | --- |
| (4) | 29 | 3.97 | 3.68 | 2.49* | 3.32* | 3.74 | 3.82 |
| (5) | 44 | 4.61 | 4.17 | 2.91* | 4.00* | 4.21 | 4.11* |
| PRBAS (1) | 60 | 2.47 | 2.15 | 2.01 | 1.77* | 1.84* | 1.82* |
| (2) | 19 | 2.34 | 1.85 | 1.67 | 1.53* | --- | --- |
| (3) | 35 | 2.56 | 2.39 | 2.13 | 2.04 | --- | --- |
| (4) | 29 | 2.25 | 2.00 | 1.68 | 1.77* | 1.74* | 1.91* |
| (5) | 44 | 2.74 | 2.38 | 2.18 | 1.93* | 1.99* | 2.03* |
| PRIMP (1) | 60 | 0.0006 | 0.0039 | 0.0221 | 0.0013 | 0.0002 | 0.0037 |
| (2) | 19 | 0.0011 | 0.0006 | 0.0212 | 0.0029 | --- | --- |
| (3) | 35 | 0.0002 | 0.0057 | 0.0218 | 0.0001 | --- | --- |
| (4) | 29 | 0.0010 | 0.0015 | 0.0272* | -0.0001 | 0.0008 | 0.0031 |
| (5) | 44 | 0.0013 | 0.0043 | 0.0242* | -0.0001 | -0.0006 | 0.0018 |
| PROLLAS (1) | 60 | 1.06 | 0.97 | 0.70* | 0.90* | 0.89* | 0.83* |
| (2) | 19 | 0.96 | 0.81 | 0.57* | 0.68* | --- | --- |
| (3) | 35 | 1.11 | 1.06 | 0.71* | 1.03 | --- | --- |
| (4) | 29 | 0.95 | 0.91 | 0.64* | 0.82* | 0.91 | 0.90 |
| (5) | 44 | 1.10 | 1.03 | 0.77* | 0.97* | 0.95* | 0.90* |
| MMAKERS (1) | 60 | 8.11 | 8.57 | 11.08* | 9.27 | 8.67* | 8.68* |
| (2) | 19 | 9.06 | 9.56 | 12.79* | 10.06* | --- | --- |
| (3) | 35 | 7.92 | 8.30 | 10.63* | 8.29 | --- | --- |
| (4) | 29 | 7.80 | 8.46* | 11.48* | 8.51* | 8.13 | 8.11* |
| (5) | 44 | 7.60 | 8.05 | 10.55* | 8.26* | 7.99 | 7.99* |
| TDEPTH (1) | 60 | 3,253 | 3,634 | 4,028 | 3,701 | 3,684* | 3,283 |
| (2) | 19 | 3,219 | 3,538 | 4,262 | 3,416 | --- | --- |
| (3) | 35 | 3,290 | 3,696 | 3,800 | 3,570 | --- | --- |
| (4) | 29 | 3,210 | 3,706 | 4,174 | 3,589 | 3,509 | 3,225 |
| (5) | 44 | 3,377 | 3,606 | 3,806 | 3,754 | 3,699 | 3,227 |
| PBDEPTH (1) | 60 | 0.53 | 0.57* | 0.44* | 0.50 | 0.55 | 0.50* |
| (2) | 19 | 0.54 | 0.63* | 0.46 | 0.52 | --- | --- |
| (3) | 35 | 0.51 | 0.55 | 0.43 | 0.56* | --- | --- |
| (4) | 29 | 0.55 | 0.58 | 0.45 | 0.54 | 0.52 | 0.48* |
| (5) | 44 | 0.54 | 0.57 | 0.44 | 0.54 | 0.55 | 0.50* |

**Table 5. Determinants of Increase in Liquidity around the Pick Date**

Results from a cross-sectional regression analysis are reported for 60 Nasdaq stock picks and 60 OTCBB stock picks recommended on Internet web sites between April 1999 and June 2001. In Panel A (Nasdaq stocks only), the dependent variable is $\text{CPQBAS} = 100 * \frac{PQBAS[0,0] - PQBAS[-5,-1]}{PQBAS[-5,-1]}$ where PQBAS[0,0] is the proportional quoted bid-ask spread (PQBAS) on the pick date (day 0) and PQBAS[-5,-1] is the average PQBAS in the 5 days prior to the pick date. In Panel B, the dependent variables are CPROLLAS, CVOLATILITY, CNTRADE and CDEPTH, the percent change in adverse selection costs, volatility, number of trades and quoted depth, respectively, from the [-5, -1] interval to the event day. Volatility is the standard deviation of intraday returns for Nasdaq stocks and the absolute daily price change for OTCBB stocks. The independent variables are: CVOLUME, the percent change in volume from the [-5, -1] interval to the event day; log(MV), the log of market value; BMV_DUM, a dummy variable equal to one when the book-to-market value BMV is zero or negative; BMV+ = max(BMV,0); EPS_DUM, a dummy variable equal to one when the earnings-per-share EPS is zero or negative; EPS+ = max(EPS, 0) and log(NEWS), the log of the number of news items about the firm published in the Bloomberg news archive during the six months prior to the pick month. PQBAS[-100, -6] is the average PQBAS in the period 100 days to 6 days before the pick date. The *t*-statistics are adjusted for heteroskedasticity using the Newey and West (1987) procedure with the Hansen (1982) generalized method of moments (GMM) technique. A * indicates that the estimated coefficient is significantly different from zero at the 5 percent level or less.

**Panel A: Nasdaq stocks, dependent variable is CPQBAS**

| Variable | Estimated coefficient | t-statistic | Estimated coefficient | t-statistic | Estimated coefficient | t-statistic | Estimated coefficient | t-statistic |
|---|---|---|---|---|---|---|---|---|
| Intercept | **-60.16*** | -6.01 | **-52.16*** | -4.57 | **-28.75*** | -2.12 | -26.24 | -1.77 |
| log(MV) | **12.31*** | 2.81 | 8.03 | 1.66 | 4.72 | 0.97 | 8.02 | 1.76 |
| BMV+ | -1.35 | -0.78 | -1.73 | -1.23 | -2.54 | -1.70 | -2.05 | -1.34 |
| BMV_DUM | **-19.04*** | -2.62 | -12.93 | -1.92 | **-17.84*** | -2.59 | -12.27 | -1.84 |
| EPS+ | 37.53 | 0.87 | **63.25*** | 2.06 | **58.45*** | 2.07 | 31.72 | 1.01 |
| EPS_DUM | **15.92*** | 2.03 | **17.02*** | 2.31 | **17.99*** | 2.73 | **14.36*** | 2.28 |
| CVOLATILITY | --- | --- | **0.17*** | 3.56 | **0.19*** | 4.02 | **0.18*** | 4.98 |
| CVOLUME | --- | --- | **-0.002*** | 3.45 | **-0.002*** | -3.79 | **0.00*** | -4.54 |
| PQBAS [-100, -6] | --- | --- | --- | --- | **-2.98*** | -2.67 | **-3.16*** | -2.45 |
| log(NEWS) | --- | --- | --- | --- | --- | --- | **-4.15*** | -3.16 |
| **Model statistics** | | | | | | | | |
| Number of observations | 60 | | 59 | | 59 | | 59 | |
| Adjusted $R^2$ | 0.0982 | | 0.3099 | | 0.3636 | | 0.5137 | |

**Table 5 (continued). Determinants of Increase in Liquidity around the Pick Date**

**Panel B: Nasdaq and OTCBB stocks, with alternative liquidity definitions**

| | Nasdaq stock picks | | | | | | | | OTCBB stock picks | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Dependent variable: CPROLLAS | | Dependent variable: Log(CNTRADE) | | Dependent variable: CVOLATILITY | | Dependent variable: CDEPTH | | Dependent variable: CVOLATILITY | |
| Variable | Estimated coefficient | t-statistic | Estimated coefficient | t-statistic | Estimated coefficient | t-statistic | Estimated coefficient | t-statistic | Estimated coefficient | t-statistic |
| Intercept | -24.57 | -1.59 | **7.29*** | 16.68 | **-29.11*** | -2.19 | **67.40*** | 2.26 | -3.20 | -0.60 |
| log(MV) | 7.28 | 1.55 | 0.17 | 1.05 | 11.49 | 1.72 | 12.13 | 0.70 | 1.38 | 1.30 |
| BMV+ | -3.34 | -1.72 | 0.03 | 0.49 | 2.71 | 1.00 | 5.26 | 0.96 | **0.85*** | 2.44 |
| BMV_DUM | **-19.36*** | -2.47 | 0.68 | 1.57 | -2.41 | -0.21 | -25.85 | -1.12 | 6.21 | 1.47 |
| EPS+ | 59.37 | 1.29 | 0.93 | 0.67 | -78.12 | -1.09 | -96.54 | -1.00 | 12.46 | 0.75 |
| EPS_DUM | **23.85*** | 2.99 | -0.02 | -0.09 | -5.20 | -0.48 | -0.46 | -0.02 | 4.07 | 0.90 |
| CVOLATILITY | **0.17*** | 4.31 | 0.00 | -0.47 | --- | --- | -0.07 | -0.59 | --- | --- |
| CVOLUME | **-0.002*** | -3.67 | **0.00*** | 2.89 | 0.00 | 0.07 | **0.005*** | 3.80 | 0.01 | 1.48 |
| PROLLAS[-100,-6] | **-12.54*** | -2.39 | --- | --- | --- | --- | --- | --- | --- | --- |
| Log(NTRADE*(1/PQBAS)) [-100,-6] | --- | --- | **-0.17*** | -3.30 | --- | --- | --- | --- | --- | --- |
| VOLATILITY*PQBAS [-100,-6] | --- | --- | --- | --- | **-0.70*** | -2.72 | --- | --- | **-2.51*** | -2.22 |
| DEPTH[-100,-6] | --- | --- | --- | --- | --- | --- | -0.01 | -1.11 | --- | --- |
| Log(NEWS) | **-5.92*** | -3.15 | 0.01 | 0.19 | -2.48 | -1.93 | **-5.77*** | -2.53 | -0.95 | -1.64 |
| **Model statistics** | | | | | | | | | | |
| Number of observations | 59 | | 58 | | 34 | | 42 | | 54 | |
| Adjusted $R^2$ | 0.4417 | | 0.2836 | | 0.1220 | | 0.0711 | | 0.0460 | |

## Table 6. Determinants of Returns on the Pick Date for Nasdaq Stocks

Results from a cross-sectional regression analysis are reported for 60 Nasdaq stock picks recommended on Internet web sites between April 1999 and June 2001. The dependent variable is the excess return for a stock on the pick day. The independent variables are: log(MV), the log of market value; BMV_DUM, a dummy variable equal to one when the book-to-market value BMV is zero or negative; BMV+ = max(BMV,0); EPS_DUM, a dummy variable equal to one when the earnings per share EPS is zero or negative; EPS+ = max(EPS,0); BETA, the stock's beta in the [-5,0] interval, estimated from the market model as described in the text; ER[-5,-1], excess returns in the five days before the pick date; PQBAS[0,0], the average PQBAS on the pick date; log(NEWS), log of the number of news items about the firm in the Bloomberg news archive during the six months prior to the pick month; and INTERNET, a dummy variable equal to one for Internet-related stocks. PQBAS[-100, -6] and log TURNOVER[-100, -6] are the average PQBAS and the log of the average turnover (the ratio of volume to shares outstanding), respectively, in the period 100 days to 6 days before the pick date. The *t*-statistics are adjusted for heteroskedasticity using the Newey and West (1987) procedure with the Hansen (1982) generalized method of moments (GMM) technique. A * indicates that the estimated coefficient is significantly different from zero at the 5 percent level or less.

| Variable | Estimated coefficient | t-statistic | Estimated coefficient | t-statistic | Estimated coefficient | t-statistic | Estimated coefficient | t-statistic | Estimated coefficient | t-statistic |
|---|---|---|---|---|---|---|---|---|---|---|
| Intercept | **20.79*** | 2.16 | 6.68 | 0.82 | -1.04 | -0.07 | -1.28 | -0.08 | -1.40 | -0.09 |
| log(MV) | 5.76 | 1.62 | **7.41*** | 2.53 | **7.94*** | 2.55 | **7.82*** | 2.52 | **8.24*** | 2.40 |
| BMV+ | **3.72*** | 2.80 | **3.10*** | 2.29 | **3.50*** | 2.74 | **3.49*** | 2.68 | **3.39*** | 2.56 |
| BMV_DUM | **20.44*** | 2.95 | 11.38 | 1.65 | 10.42 | 1.51 | 10.25 | 1.49 | 9.73 | 1.27 |
| EPS+ | **-99.47*** | -2.09 | -63.93 | -1.67 | -59.74 | -1.94 | -58.70 | -1.84 | -59.46 | -1.89 |
| EPS_DUM | -13.70 | -1.52 | -4.19 | -0.56 | -1.83 | -0.28 | -1.69 | -0.25 | -2.05 | -0.31 |
| BETA | --- | --- | **1.64*** | 3.75 | **1.67*** | 5.97 | **1.67*** | 5.84 | **1.75*** | 4.62 |
| ER[-5,-1] | --- | --- | --- | --- | **-0.32*** | -2.33 | **-0.32*** | -2.31 | **-0.31*** | -2.03 |
| PQBAS[-100,-6] | --- | --- | --- | --- | **4.96*** | 2.60 | **4.92*** | 2.58 | **4.98*** | 2.62 |
| PQBAS[0,0] | --- | --- | --- | --- | **-5.71*** | -2.92 | **-5.58*** | -2.78 | **-5.46*** | -2.57 |
| log(NEWS) | --- | --- | --- | --- | --- | --- | 0.17 | 0.28 | 0.13 | 0.22 |
| log TURNOVER[-100, -6] | --- | --- | --- | --- | --- | --- | --- | --- | 2.00 | 0.60 |
| INTERNET | --- | --- | --- | --- | --- | --- | --- | --- | -2.55 | -0.39 |
| **Model statistics** | | | | | | | | | | |
| Number of observations | | 60 | | 60 | | 60 | | 60 | | 60 |
| Adjusted R-square | | 0.0348 | | 0.2329 | | 0.4619 | | 0.4513 | | 0.4330 |

## Table 7. Long-horizon Performance of Nasdaq Stock Picks and Matched Samples

We report fiscal year-end performance indicators for Nasdaq stock picks and matched samples for the event-year (Year 0) and the year following (Year 1). The stock picks are matched on market value MV, the book-to-market value BMV and *either* the proportional quoted half-spread PQBAS (Panel A) *or* shares outstanding SOUT (Panel B). The matched sample consists of Nasdaq firms chosen to minimize the Euclidean distance, calculated using the pre-event fiscal year-end values of the matched variables, from a recommended Nasdaq firm. Other details of the matching procedure are in the text. Only firms with data for the matched variables in Year -1 (the pre-event year), Year 0 and Year 1 are included. The table reports year-to-year changes and *cumulated changes* in PQBAS, SOUT, MV and TURNOVER relative to the pre-event year. For example, the cumulated change in PQBAS is $100*(PQBAS_i-PQBAS_{-1})/PQBAS_{-1}$, where the subscript *i* refers to Year *i* (*i*=0,1). Annual return is the change in the fiscal year-end closing price, relative to the previous year. The c*umulated return* is the price change relative to the pre-event year. TURNOVER is the annual trading volume divided by SOUT. RMV is the ratio of annual revenue to market value, and EPS is the fully diluted earnings-per-share. The data is from Bloomberg, Compustat and 10K filings. A * in the *Mean* (*Median*) column indicates that the mean (median) difference between the sample firms and the matched firms is significantly different from zero at the 10 percent level or less, according to a T-test (Z-test). The *p*-values for the Z-test are Monte Carlo estimates of exact *p*-values.

### Panel A: Nasdaq firms, matched on MV, BMV and PQBAS

| | Year 0 | | | Year 1 | | |
|---|---|---|---|---|---|---|
| | No. of Firms | Mean | Median | Firms | Mean | Median |
| **Recommended firms** | | | | | | |
| TURNOVER: Change (%) | 34 | **102.32*** | **58.17*** | 33 | -1.77 | -46.45 |
| : Cumulated change (%) | 34 | **102.32*** | **58.17*** | 33 | **63.81*** | -9.75 |
| PQBAS: Change (%) | 34 | 0.49 | -0.13 | 34 | 1.63 | 0.44 |
| : Cumulated change (%) | 34 | 0.49 | -0.13 | 34 | 1.00 | 0.08 |
| Annual return (%) | 34 | 45.89 | -17.42 | 34 | 79.24 | 0.00 |
| Cumulated annual return (%) | 34 | 45.89 | -17.42 | 34 | 62.43 | -2.36 |
| Cumulated change in SOUT (%) | 34 | **22.67*** | 1.17 | 34 | **50.82*** | 12.45 |
| Cumulated change in MV (%) | 34 | 112.28 | **-20.30*** | 34 | 194.31 | -25.13 |
| BMV | 34 | **1.93*** | 1.29 | 34 | **1.84*** | 1.05 |
| RMV | 34 | 10.35 | 3.24 | 34 | 6.93 | 3.72 |
| EPS | 34 | **-0.40*** | -0.14 | 34 | **-0.29*** | -0.08 |
| **Matched firms** | | | | | | |
| TURNOVER: Change (%) | 34 | 26.60 | -2.02 | 34 | -5.82 | -26.62 |
| : Cumulated change (%) | 34 | 26.60 | -2.02 | 34 | 3.45 | -14.92 |
| PQBAS: Change (%) | 34 | 2.43 | -0.21 | 34 | 2.72 | -0.09 |
| : Cumulated change (%) | 34 | 2.43 | -0.21 | 34 | 1.58 | -0.06 |
| Annual return (%) | 34 | 41.12 | -3.55 | 34 | 16.69 | -2.00 |
| Cumulated annual return (%) | 34 | 41.12 | -3.55 | 34 | 40.31 | -8.88 |
| Cumulated change in SOUT (%) | 34 | 2.89 | 0.25 | 34 | 15.64 | 2.60 |
| Cumulated change in MV (%) | 34 | 44.50 | 3.23 | 34 | 62.96 | -2.79 |
| BMV | 34 | 4.54 | 1.30 | 34 | 1.94 | 1.10 |
| RMV | 34 | 17.34 | 2.30 | 34 | 14.81 | 2.92 |
| EPS | 34 | -0.19 | -0.03 | 34 | -0.50 | -0.02 |

**Panel B of Table 7: Nasdaq firms, matched on MV, BMV and SOUT**

| | Year 0 | | | Year 1 | | |
|---|---|---|---|---|---|---|
| | No. of Firms | Mean | Median | Firms | Mean | Median |
| **Recommended firms** | | | | | | |
| TURNOVER: Cum. Change (%) | 50 | **84.77*** | **39.40*** | 49 | **57.73*** | -10.81 |
| Cum change in PQBAS (%) | 41 | 0.58 | -0.10 | 36 | 1.09 | 0.18 |
| Annual return (%) | 50 | 13.38 | **-29.52*** | 50 | 40.18 | -14.81 |
| Cumulated annual return (%) | 50 | 13.38 | **-29.52*** | 50 | 18.83 | -49.20 |
| SOUT : Change (%) | 50 | **14.92*** | 0.22 | 50 | 14.34 | 0.45 |
| : Cumulated change (%) | 50 | **14.92*** | 0.22 | 50 | **37.70*** | 2.35 |
| MV : Change (%) | 50 | 57.60 | **-33.15*** | 50 | 81.05 | -18.51 |
| : Cumulated change (%) | 50 | 57.60 | **-33.15*** | 50 | 108.57 | **-49.04*** |
| BMV | 50 | **2.42*** | **1.29*** | 50 | **13.79*** | **1.23*** |
| RMV | 50 | 11.71 | **5.03*** | 50 | 38.98 | **6.16*** |
| EPS | 49 | **-0.46*** | -0.33 | 49 | **-0.36*** | -0.15 |
| **Matched firms** | | | | | | |
| TURNOVER: Cum. Change (%) | 50 | 19.50 | -4.15 | 49 | 49.28 | -29.89 |
| Cum change in PQBAS (%) | 39 | 3.01 | -0.10 | 43 | 2.77 | 0.33 |
| Annual return (%) | 50 | 93.58 | -1.23 | 50 | 1.27 | -16.67 |
| Cumulated annual return (%) | 50 | 93.58 | -1.23 | 50 | 55.66 | -11.64 |
| SOUT : Change (%) | 50 | 10.34 | 0.97 | 50 | 15.40 | 1.19 |
| : Cumulated change (%) | 50 | 10.34 | 0.97 | 50 | 26.69 | 12.60 |
| MV : Change (%) | 50 | 107.89 | 8.72 | 50 | 15.00 | -15.24 |
| : Cumulated change (%) | 50 | 107.89 | 8.72 | 50 | 106.63 | -1.49 |
| BMV | 50 | 3.55 | 0.80 | 50 | 0.50 | 0.89 |
| RMV | 50 | 15.48 | 1.40 | 50 | 21.97 | 2.24 |
| EPS | 50 | -0.43 | -0.11 | 50 | -0.60 | -0.13 |

**Figure 1: Intra-day**
**Market Impact of Nasdaq Stocks on Pick Day**
**From Market Open to Market Close**

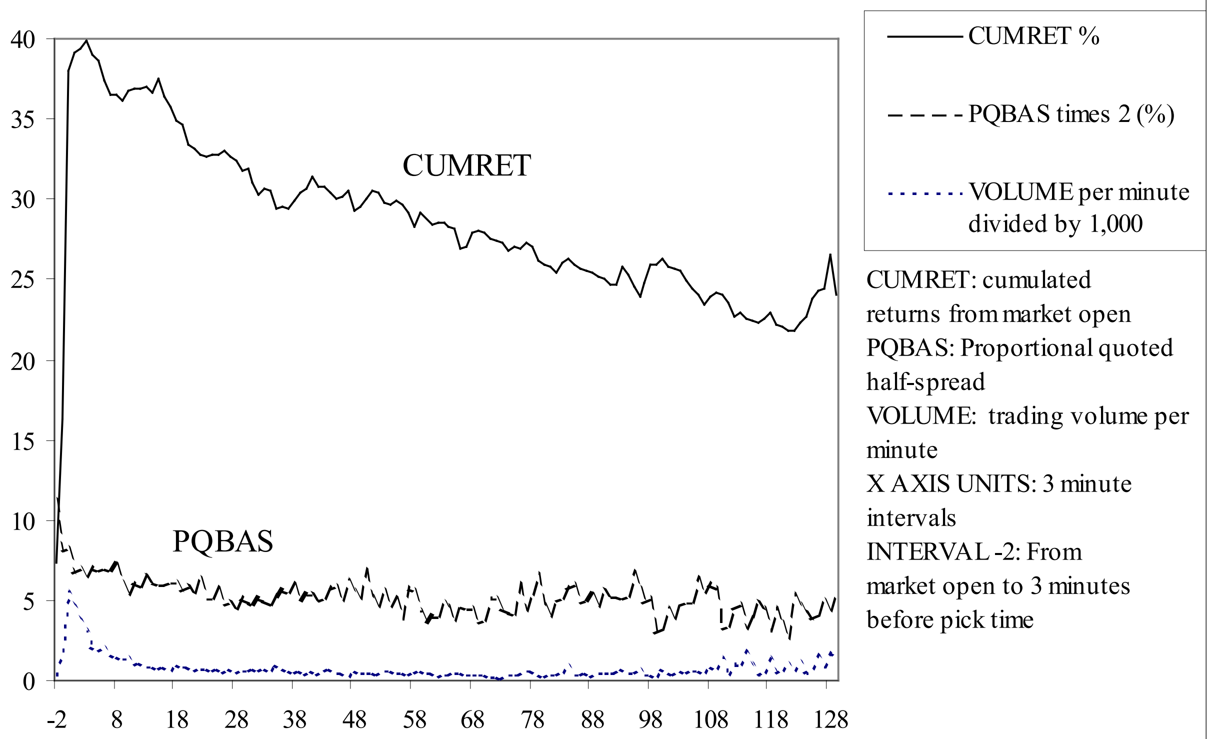

**Figure 2:
Market Impact of Nasdaq Stocks
From 100 Days Before to 60 Days After Pick Day**

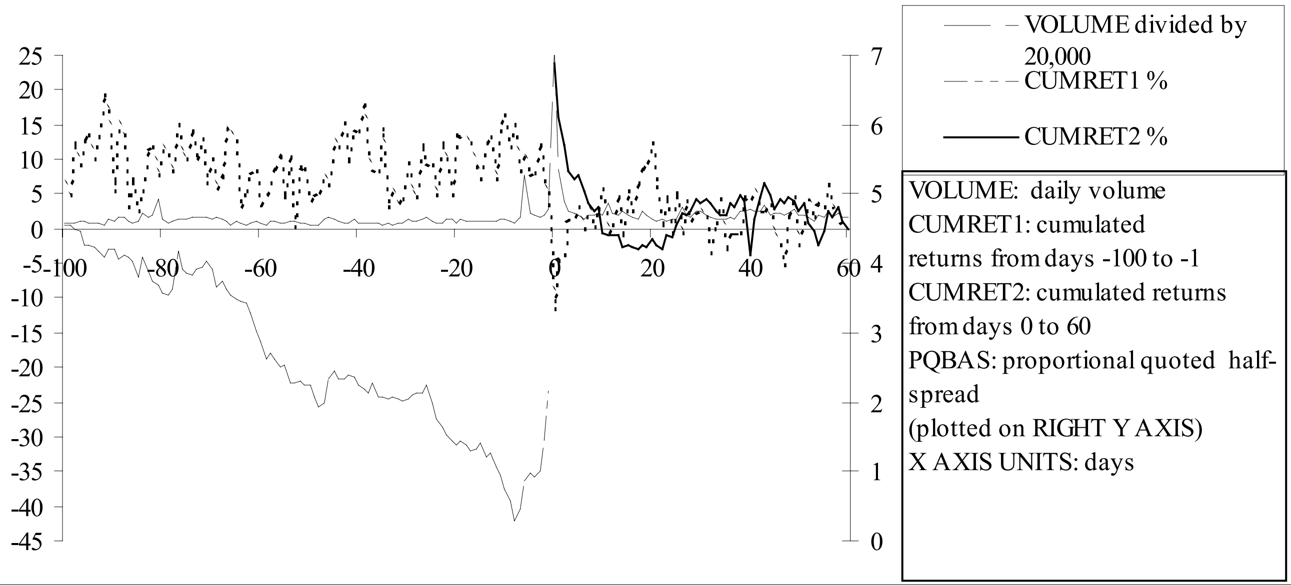

**Figure 3:**
**Market Impact of OTC Stocks**
**From 100 Days Before to 60 Days After Pick Day**