Dispersion of Opinions, Short Sale Constraints, and Overnight Returns

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Abstract

Using nine years of intraday data for the largest 3,000 U.S. stocks, we find a strong tendency for positive returns during the overnight period followed by reversals during the subsequent trading day. This behavior is driven by an opening price that is high relative to intraday prices. Consistent with the theory of Miller (1977) and other disagreement models, we find this behavior is concentrated among stocks with high dispersion of opinions near the daily open, as well as over the entire trading day. Furthermore, the magnitude of these overnight returns and trading day reversals is progressively greater among finer subsamples of stocks with more binding short sale constraints and high transaction costs.

JEL Classification: D82, G14, G19.
Key Words: market efficiency, limits to arbitrage, short sale restrictions, institutional ownership, transaction costs, dispersion of opinions, disagreement, overpricing, opening price, overnight return.

1. Introduction

Recent theoretical work attempts to explain the joint empirical behavior of stock prices, trading volume, and return volatility. Hong and Stein (2007) argue that the class of disagreement models – in which dispersion of beliefs plays a major role – holds the greatest promise for success in this area. A central prediction of these models is that high disagreement results in high trading volume and stock return volatility and, when combined with binding short sale constraints, this leads to overpricing and low future returns.[1]

This class of theoretical disagreement models assumes heterogeneous beliefs and short sale constraints, and derives empirical predictions that extend to several aspects of the price formation process. Most empirical work in this area focuses on either the perspective of disagreement or of short sale constraints, and examines whether overpriced stocks (i.e., stocks subject to high disagreement and/or binding short sale constraints) have low future returns measured over long time frames. For example, Jones and Lamont (2002), and Chen et al. (2002) find that stocks with severe short sale constraints have temporarily high prices and low future returns over the following months and quarters. Diether et al. (2002) focus on disagreement, showing that stocks with high dispersion across analysts' earnings forecasts have low returns over the following months. Similarly, Ang et al. (2006) find that stocks with high volatility have low future returns, while Brennan et al. (1998) show that stocks with high trading volume have low future returns over the following months.

Combining both perspectives, Boehme et al. (2006) find that stocks with binding short sale constraints and high dispersion of opinions underperform over the following months.

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1 The disagreement models of Chen et al. (2002), Harrison and Kreps (1978), Hong et al. (2006), Miller (1977), Morris (1996), and Scheinkman and Xiong (2003) arrive at similar predictions with regard to future returns. In contrast, Diamond and Verrecchia (1987) and Hong and Stein (2003) hold that rational traders take into account short sale constraints so that, on average, prices are not biased.

Similarly, Nagel (2005) shows that stocks with both low institutional ownership (his proxy for binding short sale constraints) and high values of three proxies for disagreement (share turnover, volatility, and analyst forecast dispersion) have significant price declines over the following year.

Some recent work documents evidence of overpricing that is corrected over a shorter time frame around earnings announcements, which are important events that reduce differences of opinion. Berkman et al. (2008) find that price corrections for stocks with high disagreement and low institutional ownership are concentrated in the days around earnings announcements.[2] Berkman and Koch (2008) show that such corrections for overpriced stocks are preceded by abnormal buying activity just before the earnings announcement, which leads to a pre-announcement price run-up that is dominated by a larger post-announcement reversal.

In this study we analyze whether the economic forces behind overpricing operate over yet a shorter time frame in a manner that leads to high daily opening prices, positive overnight returns, and trading day reversals. During the overnight hours, evolving information does not flow freely into prices in the same fashion as during trading hours. There is a decline in liquidity and an accumulation of new information that might result in relatively high disagreement at the start of the trading day.[3] For stocks characterized by high disagreement at the start of the trading day, combined with binding short sale constraints, disagreement models predict that prices will be high at the open relative to the close and the rest of the day, as optimistic investors buy at the open while pessimists are kept out of the market. Such a high opening price would result in a tendency for positive overnight returns followed by reversals the next day, especially for stocks that are already prone to overpricing.

2 LaPorta et al. (1997), find similar evidence around the earnings announcements of glamour stocks.
3 Consistent with this view, Amihud and Mendelson (1987) and Stoll and Whaley (1990) find that open-to-open returns are more volatile than close-to-close returns. Stoll and Whaley conclude that the greater volatility in open-to-open returns is "attributable to private information revealed in trading and to temporary price deviations induced by specialist and other traders. The implied cost of immediacy at the open is significantly higher than at the close."

This paper examines how these factors associated with disagreement models affect prices at the open relative to the close and the rest of the trading day. We analyze abnormal (market-adjusted) overnight and trading day returns, based on quote midpoints at the open and close, for the 3,000 largest U.S. stocks over the period, 1996-2004.[4] We find significant positive overnight returns and negative trading day reversals, when averaged across all stocks and trading days. We then explore whether these tendencies are due to a high opening price, or a low closing price, or both. Consistent with the implications of disagreement models, we show that the opening price is significantly greater than the mean intraday price, when averaged over the entire sample, and the open is further above the intraday mean for subsamples with more binding short sale constraints. In contrast, there is no tendency for the closing price to decline below the mean intraday price.[5]

We then further examine how these overnight return patterns are related to short sale constraints and dispersion of opinions at the open relative to the rest of the day. Based on prior research, we focus on low institutional ownership as a proxy for binding short sale constraints. In addition, we examine intraday movements in share turnover and stock return volatility to construct two daily proxies for "relative" dispersion of opinions at the open versus the rest of the trading day: (i) the difference between share turnover during the first hour of trading and turnover during the rest of the trading day, and (ii) the difference between stock return volatility during the first hour of trading and volatility during the rest of the trading day.[6]

Our first test applies a portfolio approach in which we independently double-sort the sample stocks each day into terciles, according to their recent institutional ownership (at the end

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4 Reliance on midquotes assures that our results are not due to bid-ask bounce. In Table 7 we show that these results are robust when we use trade prices at the open and close to measure overnight and trading day returns.
5 These results are also consistent with the evidence in Branch and Ma (2008) and Cliff et al. (2007).
6 Prior work that uses low institutional ownership to proxy for binding short sale constraints includes Almazan (2004), Asquith et al. (2005), D'Avolio (2002), Geczy et al. (2002), Jones and Lamont (2002), Nagel, (2005), and Ofek et al. (2004). Studies that use daily data on share turnover or stock return volatility to proxy for dispersion of opinions include Berkman et al. (2008), Boehme et al. (2006), and Nagel (2005).

of the previous quarter) and relative dispersion of opinions at the open (averaged over the previous twenty trading days). We then compute the mean overnight and trading day returns for the resulting 3 x 3 scheme of portfolios sorted along these two dimensions. We find that positive overnight returns and negative trading day reversals are concentrated among stocks with high relative dispersion at the open. Furthermore, these patterns are magnified for stocks that also have low institutional ownership. The resulting subsample of overpriced stocks (i.e., with both low institutional ownership and high relative dispersion at the open) has significant positive overnight returns that average close to +10 basis points (bp) per day, followed by significant trading day reversals that average around -20 bp per day.

Prior research uses daily data on share turnover and stock return volatility to measure dispersion of opinions. These studies find that stocks subject to high values of dispersion of opinions measured at a daily frequency tend to underperform over longer periods, especially if they are also subject to binding short sale constraints.[7] An interesting empirical question is whether such overpriced stocks are more prone to display the short term overpricing behavior at the open, documented in this study. Thus, we also use two proxies for a stock's absolute dispersion of opinions: (i) daily turnover as a percent of shares outstanding, and (ii) daily volatility, both averaged over the previous twenty trading days. Note that we refer to absolute dispersion of opinions when turnover and volatility are measured at a daily frequency. We refer to relative dispersion at the open when we compare turnover and volatility in the first hour of trading with turnover and volatility during the rest of the trading day.

In our second set of tests we independently triple-sort the sample stocks each day along three dimensions, according to their recent: (1) absolute dispersion of opinions , (2) relative dispersion at the open, and (3) institutional ownership. The result is a set of three 3 x 3 portfolio

7 For example, see Berkman et al. (2008), Boehme et al. (2006), and Nagel (2005). See also Diether et al. (2002).

schemes for stocks with low, medium, or high absolute dispersion of opinions, respectively. This extended analysis reveals that the tendency for positive overnight returns and trading day reversals is largely limited to the tercile with high absolute dispersion of opinions. Furthermore, within this tercile's 3 x 3 scheme of portfolios, the overnight return patterns are progressively larger in magnitude for finer subsamples that are more prone to overpricing at the open – i.e., with higher relative dispersion at the open and lower institutional ownership. Now the finer subsample of overpriced stocks has significant positive overnight returns that average around +20 bp per day, and significant trading day reversals that average over -30 bp per day.

While these mean overnight returns and trading day reversals are large in economic terms, they are swamped by transaction costs at all stages of our analysis. For example, a mean abnormal overnight return of +20 bp per day accumulates to 1% per week and 52% per annum. However, the mean daily spread at the open is 98 bp, which overwhelms these overnight returns.

Therefore, in our third test we examine the role of transaction costs as an additional limit to arbitrage that may exacerbate the overpricing hypothesized in disagreement models (Lesmond, 2007; Sadka and Scherbina, 2007). Here we begin by selecting the 50% of stocks each day with the highest effective half spread. We then examine the behavior of finer subsamples with high absolute and relative dispersion of opinions, combined with low institutional ownership. These finer subsamples have average abnormal overnight returns (and trading day reversals) that are larger in magnitude, at around +30 (and -40) bp per day. This evidence suggests high transaction costs act as an additional limit to arbitrage that exacerbates the overpricing at the open.

As a fourth test, we combine both limits to arbitrage embodied in transaction costs and more binding short sale constraints, by investigating: (a) the 50% of stocks each day with the highest effective half spread, and (b) the 20% of these stocks with the highest relative short interest.[8] We then consider finer subsamples based on institutional ownership and dispersion of opinions. For the finer subsample of overpriced stocks, we find larger mean overnight returns around +40 bp per day, and larger trading day reversals that range from -56 to -78 bp per day.

Our results are robust across different methodologies, including a portfolio approach and a regression approach which both control for firm size. Additional robustness tests indicate that these return patterns remain when we use median overnight and daytime returns rather than mean returns. The return patterns also remain when we use trade prices to measure returns, and when we exclude low-price stocks. This behavior is also ubiquitous across subsamples of small stocks, large stocks, NASD stocks, and NYSE stocks, although there is a larger mean overnight return and trading day reversal for small stocks and NASD stocks. In addition, we find this behavior is similar on Mondays and other days of the week, and is apparent regardless of a firm's degree of information asymmetry or overnight liquidity risk. Finally, we document this behavior is robust across subsamples before and after the crash of March, 2000, and is stable across years.

This article proceeds as follows. Section 2 describes our sample selection and variable construction. Section 3 reports descriptive statistics. Section 4 presents the empirical analysis. Section 5 provides extensions and robustness tests, and section 6 summarizes and concludes.

2. Sample Selection and Variable Construction

2.1 Sample Selection and Daily Return Measures

Our sample period covers the nine years from 1996 through 2004. We select the 3,000 largest firms each year according to their market capitalization on July 1. This criterion includes stocks comprising more than 98 percent of the total U.S. market capitalization for every year. Trade

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8 Asquith et al. (2005) show that stocks with, both, low institutional ownership and high relative short interest are subject to more binding short sale constraints that lead to a greater upward bias in prices and larger subsequent negative returns, consistent with the implications of disagreement models.

prices and quotes are taken from TAQ. We calculate daily returns using dealer quotations.[9] The opening price on day t ($open_t$) is selected as the midpoint of the first valid bid and ask quotes taken after 9:30 a.m.[10] The closing price on day t ($close_t$) is selected as the midpoint of the last valid bid and ask quotes observed before 4:00 p.m.[11] We adjust these daily opening and closing prices for stock splits and cash dividends, before computing daily returns. Actual raw returns are measured as the log of the price relative over each time frame considered:

Daily Open-to-Open Return = raw_oto = $\log(open_t / open_{t-1})$;
Daily Close-to-Close Return = raw_ctc = $\log(close_t / close_{t-1})$;
Overnight, Close-to-Open Return = raw_cto = $\log(open_t / close_{t-1})$;
Trading Day, Open-to-Close Return = raw_otc = $\log(close_t / open_t)$.

Note that raw_ctc = raw_cto + raw_otc. We then construct market-adjusted abnormal returns by subtracting the market return over the same time frame, where the market return over each time frame is constructed as the value-weighted average daily return across all stocks in the sample:

Daily Open-to-Open Abnormal Return = oto = raw_oto - market_oto;
Daily Close-to-Close Abnormal Return = ctc = raw_ctc - market_ctc;
Overnight, Close-to-Open Abnormal Return = cto = raw_cto - market_cto;
Trading Day, Open-to-Close Abnormal Return = otc = raw_otc - market_otc.

Finally, consistent with prior work, we screen the data for errors and extreme observations.[12]

9 TAQ's consolidated quotation file is an aggregation of dealer quotes within each market venue. It represents a set of "top of book" records for each venue. In order to identify market-wide best prices, we calculate an inside market across all venues. For the NYSE, this almost never improves upon the NYSE specialist's price. However, in NASD issues, ECNs often improve on the NASD's reported best price.

10 By "the first valid quotes" we mean the first quotes after 9:30 a.m. for which there is non-zero trade size on both the bid and the ask. For NYSE issues, selection of the open is straightforward since the opening cross is easily identified and begins the trading day. For NASD issues, selection of the open is not so straightforward. Although technically the NASD opens at 9:30 a.m., it is often several minutes before valid market-maker quotes appear. If the midquote precisely at 9:30 a.m. is used as the open, these quotes will often be flagged as "closed" by the market participant, or may have zero size associated with the prices. In either case the price does not represent a firm commitment to trade. This behavior of the NASD open motivates our choice of the first valid quotes after 9:30 a.m. as the opening quotes. Our results are robust when we take the midquote precisely at 9:30 a.m. as the open.

11 Occasionally, the final quotes before 4:00 p.m. have zero shares available to trade on one or both sides, or the quote is flagged as closed. For this reason, we select the last valid quote before 4:00 p.m. As shown in section 5.1, we find robust results when we use the first and last trade prices each day to measure overnight returns.

12 Quotes are dropped from our analysis if their "mode" designation indicates that they are not normal quotes, or if the reported ask price is greater than 1.5 times the reported bid price. Similarly, trade prices are deleted if they are more than $1.00 outside of the inside market. In addition, we omit the daily return if the bid-ask spread is negative, or if the opening or closing spread is greater than $5.00 or 30% of the midpoint quote, or if the effective half spread

2.2 Variable Construction

For each stock, we estimate two proxies for absolute dispersion of opinions throughout the entire trading day. Our first measure, Abs_TURN_t, is daily share turnover (i.e., the daily number of shares traded as a percentage of shares outstanding). Our second measure, Abs_VOL_t, is the standard deviation across all 30-minute returns throughout the trading day.[13]

Next, we use intraday data on share turnover and stock returns to construct two daily proxies for relative dispersion of opinions near the open versus the rest of the trading day. Our first measure is relative turnover (Rel_TURN_t), which is the difference between turnover during the first hour of trading and turnover during the rest of the trading day, as a percent of turnover during the entire trading day. Our second measure is relative volatility (Rel_VOL_t), which is the difference between the standard deviation across 30-minute returns during the first hour of trading and the standard deviation across 30-minute returns during the rest of the trading day.[14] Note that our tests focus on the recent behavior of these daily measures of relative and absolute dispersion, averaged over the previous twenty trading days.

Following Asquith et al. (2005), the two proxies for short sale constraints used in this study are institutional ownership and relative short interest. Data on institutional holdings are taken from CDA Spectrum 13F filings. For each quarter, we calculate the percentage of institutional ownership ($INST_t$) for every firm as aggregate shares held by institutions scaled by total shares outstanding. If a stock is available in CRSP but has no information on institutional holdings from the 13F filings data, we assume this stock has zero institutional ownership (see

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is greater than \$2.50 or 15% of the midpoint quote, or if the daily open is more than 25% greater (or less) than both the previous close and the subsequent close.

13 We have also measured Abs_VOL_t using the standard deviation across all midquotes throughout the trading day, or the standard deviation across recent close-to-close returns or open-to-open returns, with robust results.

14 We have also measured relative dispersion of opinions using share turnover or return volatility (i.e., the squared 30-minute return) during the first thirty minutes of the trading day, with robust results.

Asquith et al., 2005, Gompers and Metrick, 2001, and Nagel, 2005). A more detailed description of this variable appears in Appendix A. Our second proxy for short sale constraints is relative short interest (RSI_t), measured by the number of shares sold short as a percent of total shares outstanding, using monthly data on short interest from the NYSE and the Nasdaq.

Finally, we use three measures of transaction costs: the percentage spread at the open ($SPR(open)_t$), at the close ($SPR(close)_t$), and the percentage effective half spread ($Spread_t$).[15]

3. Sample Statistics and Intraday Price Patterns

3.1 Descriptive Statistics for Overnight and Trading Day Returns

In Panel A of Table 1 we report the mean and median values for overnight returns, trading day returns, and 24-hour returns across all firms and days in the sample. Note that the average number of firms each day varies from 2,491 to 2,585 across the different measures of daily returns considered. This is less than the 3,000 largest U.S. stocks used as the initial sample, because daily quotes are frequently unavailable for 400-500 of the smaller stocks in this sample.

Standard t-tests applied to these mean returns could be biased upward due to cross-correlation of daily returns across firms on the same date (Bernard, 1987). In all of our analyses, we conduct tests that are not affected by this bias. Specifically, for each of the 2,267 trading days in our nine-year sample period, we first compute the mean (or median) overnight and trading day returns across all stocks in the sample. We then average these cross-sectional mean (or median) returns across all trading days in the sample period. The corresponding t-statistics are based on the standard errors of the time-series average across daily means, and thus do not suffer from any

15 For every trade, the percentage effective half spread is defined as the absolute difference between the trade price and the quote midpoint, as a percent of the quote midpoint. Trades are matched to quotes with a lag of one second, and then averaged to get the day's percentage effective half spread. Our choice of a one-second lag is taken from the NASD Economic Research Office, which argues this lag is optimal to match trades and quotes in its automated electronic system. Our results are not affected by this choice (see Lee and Ready, 1991, and Bessembinder, 2003).

potential bias associated with cross-sectional clustering on the same day (see Bernard, 1987, and Fama and McBeth, 1973).

Results on the left side of Panel A in Table 1 indicate a significant positive raw overnight return (raw_cto) of 8.0 basis points (bp) per day, and a significant negative raw trading day reversal (raw_otc) of -4.9 bp per day, when averaged across all firms and days in the sample. As a result, the average daily return on a strategy that is long the sample stocks during the overnight period and short the same stocks during the subsequent trading day (raw_DIFF) equals 13.0 bp, before deducting transaction costs. However, note that the return on this strategy is swamped by transaction costs. When we subtract the average bid-ask spread at the daily open and close, we obtain a significant negative mean difference after transaction costs (raw_DIFF-TC) of -76.6 bp.

The right side of Panel A reveals similar but diminished results when we deduct the value-weighted market return over each time frame, to obtain abnormal overnight and trading day returns, reflecting the fact that the overnight return pattern is attenuated for larger stocks. Still, after subtracting the value-weighted market return for each time frame, we find a significant positive mean abnormal overnight return of 2.0 bp per day, and a significant negative mean abnormal trading day reversal of -6.8 bp per day. These results lead to a significant mean difference between abnormal overnight and trading day returns of 8.8 bp, that is again swamped by transaction costs. In order to reduce the impact of market-wide price changes on our return measures during the overnight or trading day periods, we focus on abnormal returns throughout our analysis. Our conclusions are unaffected when we use raw overnight and trading day returns.

Note that the median values of raw and abnormal overnight returns in Panel A of Table 1 (raw_cto and cto) are smaller than their respective means, suggesting some skewness in the distribution of overnight returns due to positive outliers. On the other hand, the median trading day returns in Panel A (raw_otc and otc) are nearly identical to their respective means, indicating no substantive skewness in the distribution of trading day returns.

3.2 Descriptive Statistics for the Main Variables

Panel B of Table 1 provides descriptive statistics for the main variables in the study. First consider our two proxies for absolute dispersion of opinions: (i) average daily turnover (Abs_TURN) is 0.72 percent of total shares outstanding, while (ii) the average standard deviation across all 30-minute returns during the trading day (Abs_VOL) is 0.61 percent. Second consider our two proxies for relative dispersion of opinions near the open versus the rest of the trading day: (iii) average share turnover (Rel_TURN) is 39 percent greater during the first hour of trading than during the rest of the day, while (iv) the average standard deviation across 30-minute returns (Rel_VOL) is .014 percent greater during the first hour of trading than during the rest of the day.

Third consider the proxies for short sale constraints. The mean value of institutional ownership (INST) is 45.6 percent of shares outstanding. This number is higher than the 34 percent reported in Nagel (2005), presumably because our sample is limited to larger firms. Relative short interest averages 3.0% of shares outstanding across all stocks and days in the sample, similar to the result in Asquith et al. (2005).

Fourth consider our proxies for transaction costs. The average spread at the open is 0.98% of the quote midpoint, which exceeds the average spread at the close, at 0.78%. The effective half spread averages 0.21% across all stocks and days in the sample. Finally, the average firm has a market capitalization of $4.45 Billion.

Note that the medians for most variables in Panel B of Table 1 are smaller than their corresponding means. This result indicates some degree of skewness for these firm attributes.

3.3 Correlations across the Main Variables

In Panel C of Table 1 we report the average Spearman correlation across each pair of variables.[16] Once again, we first calculate the cross-sectional correlation across stocks for each day. Then we report the mean correlation across days in our sample period. While these bivariate correlations should be interpreted with caution, several interesting patterns emerge.

First consider the mean correlations across the four dispersion measures. Abs_TURN and Abs_VOL have a significant positive correlation of 45 percent, consistent with prior work (see Nagel, 2005). The remaining correlations across these four measures of absolute and relative dispersion of opinions are also significantly positive, although lower in magnitude. These positive correlations suggest that our proxies capture similar, though not identical, information about dispersion of opinions near the open and throughout the trading day.

Second consider the correlations between each dispersion measure and our proxies for short sale constraints. Note that both proxies for absolute dispersion of opinions have significant positive correlations with institutional ownership. This evidence indicates a tendency for institutions to hold stocks with greater overall dispersion of opinions. In contrast, the two measures of relative dispersion of opinions have correlations of opposite signs with institutional ownership. While relative volatility at the open (Rel_VOL) is positively correlated with institutional holdings, relative turnover at the open (Rel_TURN) has a negative correlation. All four dispersion proxies are positively correlated with relative short interest, indicating that stocks subject to greater dispersion of opinions also experience greater short selling.

Third, three of these four dispersion measures (Abs_TURN, Rel_TURN, and Rel_VOL) are negatively correlated with the bid-ask spread, while the fourth (Abs_VOL) is positively correlated with the spread.

16 Spearman correlations are applied to reduce the influence of outliers. Pearson correlations yield similar results.

Fourth, all four dispersion measures are positively correlated with the overnight return (cto), and three of the four measures (Abs_VOL, Rel_TURN, and Rel_VOL) are negatively correlated with the trading day return (otc). This evidence is consistent with an upwardly biased opening price for stocks with higher absolute and relative dispersion of opinions, in accord with the implications of disagreement models. In contrast, the fourth measure (Abs_TURN) is positively correlated with otc, which is not consistent with disagreement models.

Fifth, consider the association between our proxies for short sale constraints and stock returns during the overnight versus the trading day period. The percent of institutional ownership (INST) is significantly negatively correlated with the overnight return (cto) and positively correlated with the trading day return (otc), while the opposite tendencies are apparent for relative short interest (RSI). Thus, stocks subject to more binding short sale constraints (with lower institutional ownership or higher short interest) tend to have larger overnight returns and trading day reversals. This is also consistent with the predictions of disagreement models.

Sixth, examine the correlations involving transaction costs. The spread measures tend to be positively correlated with cto and negatively correlated with otc, indicating a tendency for larger overnight returns and trading day reversals for stocks with higher transaction costs. This evidence suggests that transaction costs may operate as a further limit to arbitrage that could allow overpricing at the open to persist. In addition, the spread measures are negatively correlated with both firm size and institutional holdings, as expected.

Finally, firm size is positively correlated with institutional ownership, reinforcing the need to control for size when we analyze the influence of institutional ownership in our analysis (see Nagel, 2005). In addition, firm size is negatively related to overnight returns (otc), but positively related to trading day returns (cto). This outcome suggests that smaller firms have a greater tendency for positive overnight returns and negative trading day reversals.

3.4 The Intraday Price Pattern across All Stocks and Days

The descriptive statistics in Table 1 raise several questions. For example, is this average positive overnight return and negative trading day reversal due to a high opening price or a low closing price, or both? Furthermore, do these patterns hold for the entire sample of stocks, or are they more dramatic for subsamples with high disagreement and more binding short sale constraints?

To address these issues, we examine the intraday pattern in prices. For each stock, we collect data on intraday midquotes at 30-minute intervals for every trading day. In addition, we gather the midquotes at 5-minute intervals for the first and last 30 minutes of the trading day. Next we compute the intraday average across all midquotes during the day, omitting the quotes in the first and last 30 minutes. Then, at each 5-minute or 30-minute interval (T), we construct the ratio of the midquote at that time to the day's average intraday midquote. We then average these price ratios across all stocks each day. Finally we compute the time series mean of these cross-sectional average price ratios for all days in the sample.

Figure 1 plots the intraday pattern in this ratio of the midquote at time T to the average intraday midquote, across all stocks and days in the sample, along with the 95% confidence interval about a ratio of one. Results indicate that the opening price is significantly higher than the average intraday price (i.e., the opening ratio > 1.0). The price tends to decline during the first 60 minutes of trading toward the average intraday price. Intraday prices then continue to decline below the intraday average in the middle of the day, before rising again during the last few minutes of trading. The closing price ends above the average intraday price, although not significantly so. This intraday pattern is consistent with the implications of disagreement models, indicating that the opening price tends to be high relative to the average intraday price.[17]

3.5 The Intraday Price Pattern and Short Sale Constraints

Figure 2 further explores the implications of disagreement models, by examining how this intraday price pattern varies across subsamples stratified by the degree of short sale constraints. We partition the sample stocks each day into quintiles according to the percent of institutional ownership, and plot the intraday pattern in price ratios for each subsample, along with the 95% confidence interval about 1.0 that applies to the first quintile with low institutional ownership.[18]

All quintiles reveal a similar intraday pattern, in which the opening price is significantly higher than the intraday average, then the price declines significantly below the intraday average in the middle of the day, and the closing price rises back near the intraday average. However, the bottom two quintiles with lower institutional ownership reveal an opening price that is higher, and a closing price that is lower, than the three quintiles with higher institutional ownership. Furthermore, as we move to the three quintiles with higher institutional ownership (and less binding short sale constraints), the intraday price pattern twists in a counter-clockwise fashion, so that the opening price ratio decreases toward 1.0, while the closing price ratio increases above 1.0. This evidence suggests a greater upward price bias at the open, larger overnight returns, and larger trading day reversals, when there are more binding short sale constraints. These results provide further support for the implications of disagreement models.[19]

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17 In contrast, these results do not support the implications of liquidity risk theory applied to the overnight period. Based on this theory, the daily *closing* price should be lower than the average intraday price to compensate for overnight liquidity risk. We provide further evidence on this issue in our robustness tests in Table 7.

18 The quintile with low institutional ownership has the largest standard errors of the mean price ratio throughout the day, and thus reveals the widest 95 percent confidence interval about 1.0. Thus, comparisons of the intraday patterns for the remaining four quintiles with this 95 percent confidence interval are conservative.

19 Analogous results, not presented here for brevity, similarly indicate greater upward price bias at the open for subsamples of stocks with higher relative short interest, or for stocks subject to IPO lockup, or for stocks with higher values of absolute or relative dispersion of opinions.

4. Empirical Tests

4.1 Double-Sorted Portfolio Approach: Relative Dispersion of Opinions near the Open and Institutional Ownership

In our first set of tests, we apply a double-sorting scheme in which we compare average overnight and trading day returns across portfolios of firms that are independently partitioned along two dimensions, relative dispersion of opinions near the open and institutional ownership, while controlling for firm size. In this approach we consider each trading day as a separate event. For each trading day, we control for firm size by initially sorting all firms into size terciles based on the firm's mean market capitalization over the previous twenty trading days.[20] Then, within each size tercile, we form three finer portfolios by independently sorting based on: (i) the mean values of our proxies for relative dispersion of opinions near the open (Rel_TURN or Rel_VOL) over the previous twenty trading days, and (2) the percentage of institutional ownership (INST) at the end of the previous quarter. The result is two 3 x 3 schemes of portfolios sorted by size-adjusted relative dispersion of opinions and institutional ownership.

Finally, we test the implications of disagreement models by comparing mean overnight and trading day abnormal returns across portfolios in each 3 x 3 scheme, with different levels of relative dispersion of opinions and institutional ownership. If the tendency for positive overnight returns and trading day reversals is not due to the optimism bias hypothesized in disagreement models, then we would expect no differences in mean overnight or trading day returns across portfolios with different levels of relative dispersion or short sale constraints. On the other hand, if this overnight return behavior is attributable to such optimism bias, then we would expect

20 It is important to control for firm size in this partitioning scheme, given the well-documented association of size with both institutional ownership and dispersion of opinions (Ang et al., 2006, Boehme et al., 2006, Brennan et al., 1998, Diether et al., 2002, and Nagel, 2005). Results are robust when we do not control for size in this partitioning scheme. We also find similar results when we apply this partitioning scheme based on firm size, institutional ownership, and dispersion of opinions measured over the previous ten or thirty trading days.

greater positive (negative) overnight (trading day) abnormal returns for portfolios with high relative dispersion of opinions near the day's open, combined with low institutional ownership.

Once again, we conduct statistical tests that are not affected by potential cross-sectional correlation in abnormal returns on the same day. Specifically, for each trading day, we first allocate stocks to one of the double-sorted portfolios in the 3 x 3 scheme. We then compute the cross-sectional mean overnight and trading day abnormal returns for portfolios of stocks with the same characteristics (i.e., within each of the double-sorted portfolios). Finally, we average the cross-sectional mean returns for each of these double-sorted portfolios across all trading days in the sample period. The corresponding t-statistics are based on the standard errors of these time series means.

Panel A of Table 2 presents the mean overnight returns for two different 3 x 3 schemes of double-sorted portfolios using share turnover and stock return volatility, respectively, to proxy for relative dispersion of opinions near the open. On average, there are 280 stocks in each of the nine portfolios within every double-sorted partitioning scheme in Table 2. The significant positive overnight returns in each 3 x 3 scheme are largely confined to the tercile with high relative dispersion near the open, in the bottom row. Mean difference t-tests provided at the bottom of every column indicate that stocks with high relative dispersion significantly outperform stocks with low relative dispersion during the overnight period. In addition, the left column of each scheme contains the largest element in every row, suggesting that stocks with more binding short sale constraints tend to have larger overnight returns. Finally, the bottom left cell contains the largest mean in each scheme, indicating that stocks with both high relative dispersion and low institutional ownership have the greatest abnormal overnight returns, which average close to +10 basis points (bp) per day.

Panel B provides the analogous results for trading day returns, and similarly reveals that the significant negative mean trading day returns are concentrated among stocks with medium or high relative dispersion near the open. Now the mean difference t-test at the bottom of every column shows that stocks with high relative dispersion significantly underperform stocks with low relative dispersion during the trading day. In addition, the bottom left cell of every 3 x 3 scheme now contains the largest negative mean trading day reversal, which is around -20 bp.

4.2 Triple-Sorted Portfolio Approach

4.2.1 Absolute Dispersion, Relative Dispersion, and Institutional Ownership

In our second test we independently sort the sample stocks each day along three dimensions, according to their absolute dispersion of opinions (based on daily data), relative dispersion near the open, and institutional ownership. The result is a set of three 3 x 3 schemes of portfolios for subsamples with low, medium, or high absolute dispersion of opinions.

Panel A of Table 3 presents the results for overnight returns (cto), while Panel B gives trading day returns (otc). The three 3 x 3 schemes on the left side of each Panel present the mean abnormal returns for each subsample using share turnover to proxy for absolute and relative dispersion of opinions. The three schemes on the right side provide the analogous mean returns using return volatility. As we proceed down across 3 x 3 schemes on each side of Panel A or B, we move to subsamples with higher absolute dispersion of opinions. On average, there are now 95 stocks in each of the 27 portfolios within every triple-sorted partitioning scheme in Table 3.

We now discuss systematic differences in the results of Panel A in Table 3, across portfolio stratifications based on each leg of our triple-sorting scheme, in turn. First consider differences in average overnight returns across the different 3 x 3 schemes stratified by absolute dispersion of opinions throughout the day. It is striking that there are virtually no positive overnight returns in the top two 3 x 3 schemes on the left or right side of Panel A. In contrast, the bottom 3 x 3 scheme on each side of Panel A is dominated by significant positive abnormal returns. This outcome indicates that our evidence of positive overnight returns is largely confined to the subsample of firms that are subject to high absolute dispersion of opinions. Furthermore, as we move down across the schemes on the left or right side of Panel A, the corresponding elements in every scheme increase uniformly.[21] This result indicates that stocks with high absolute dispersion consistently outperform stocks with low absolute dispersion during the overnight period, after controlling for institutional ownership (the column in each scheme) and relative dispersion of opinions (the row in each scheme).

Second, compare mean overnight returns as we move down each column in every 3 x 3 scheme of Panel A, toward portfolios with high relative dispersion of opinions near the open. Focus on the bottom two 3 x 3 schemes in Panel A of Table 3, for stocks with high absolute dispersion throughout the day. Within these two schemes, the mean overnight returns tend to increase as we move down each column to portfolios with high relative dispersion near the open. The mean difference t-test at the bottom of each column shows that stocks with high relative dispersion outperform stocks with low relative dispersion during the overnight period.

Third, compare mean overnight returns across portfolios with different levels of institutional ownership, as we move across columns of every 3 x 3 scheme in Panel A of Table 3. The left column of every scheme in Panel A nearly always contains the largest positive (or smallest negative) mean overnight return in any given row. This result indicates that stocks with more binding short sale constraints tend to have greater overnight returns.

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21 In mean difference t-tests not reported here for brevity, we compare the nine corresponding elements in the bottom versus the top 3 x 3 schemes on the left or right side of Panel A. For each dispersion proxy (i.e., turnover or volatility), all nine of these pairwise comparisons reveal significantly larger mean overnight returns in the bottom 3x3 scheme, composed of stocks with high absolute dispersion of opinions throughout the day.

Finally, it is noteworthy that the bottom left cell contains the largest mean overnight return in all but one 3 x 3 scheme of Panel A in Table 3. For example, in the bottom two 3 x 3 schemes of Panel A, based on high absolute dispersion of opinions throughout the day, this bottom left cell indicates a mean overnight return of approximately +20 basis points per day. This average overnight return is large in economic terms, accumulating to 1% per week or 52% per year. This cell applies to the subsample of stocks that are most prone to overpricing according to disagreement models (i.e., stocks with high absolute and relative dispersion of opinions, combined with low institutional ownership).

Next consider the mean trading day (otc) returns provided in Panel B of Table 3. These results tend to mirror those in Panel A, with the tendency for increasingly positive overnight returns being replaced by a tendency for increasingly negative trading day reversals, for stocks that are more prone to overpricing (with higher absolute or relative dispersion and lower institutional ownership). First, now the mean trading day returns become smaller (i.e., larger negative), as we move down across 3 x 3 schemes in Panel B, to portfolios with greater absolute dispersion throughout the day.[22] Second, within the bottom two 3 x 3 schemes in Panel B, based on stocks with high absolute dispersion, the mean trading day return becomes smaller (i.e., larger negative) as we move down each column to stocks with higher relative dispersion of opinions near the open. Now the bottom row of these two schemes contains the largest negative trading day reversal in each column, and the mean difference t-test indicates that stocks with high values of relative dispersion significantly underperform stocks with low values during the trading day.

22 Once again, in mean difference t-tests not reported here for brevity, we compare corresponding elements in the bottom versus the top 3 x 3 schemes on the left or right side of Panel B. For each dispersion measure (turnover or volatility), eight or nine of these nine pairwise comparisons have significantly smaller (i.e., larger negative) mean trading day reversals in the bottom scheme, composed of stocks with high absolute dispersion of opinions. This result indicates that, during the trading day, stocks with high absolute dispersion consistently underperform stocks with low absolute dispersion, after controlling for institutional ownership and relative dispersion of opinions.

Also, this trading day reversal is largest in magnitude for the bottom left cell of most 3 x 3 schemes in Panel B, for the portfolio with both high relative dispersion of opinions and low institutional ownership. Once again, these trading day reversals are economically significant for the subsample of overpriced stocks. For example, the bottom left cell of the bottom two 3 x 3 schemes in Panel B indicates a mean trading day reversal of more than -30 basis points per day, which accumulates to approximately -1% every three days, and -75% per annum, for this subsample of overpriced stocks.

Finally, it is no coincidence that the magnitude of the negative trading day reversal in Panel B exceeds that of the positive overnight return in Panel A, for the subsample of overpriced stocks (i.e., with high absolute and relative dispersion of opinions, and low institutional ownership). Combining these effects implies an average 24-hour return that is negative for these stocks. This result is expected, since these stocks have been shown to be overpriced over longer periods of time, (see Asquith et al., 2005, Berkman et al., 2008, and Nagel, 2005).

Together, the results in Table 3 are consistent with the implications of disagreement models. We find stocks with high absolute dispersion of opinions throughout the trading day have significant positive overnight returns that are dominated by larger subsequent trading day reversals. Furthermore, within the tercile with high absolute dispersion of opinions, these overnight return patterns are progressively larger in magnitude for finer subsamples with greater relative dispersion of opinions near the open. Finally, these patterns are largest for the still finer subsample subject to binding short sale constraints in the form of low institutional ownership.

4.2.2 Triple-Sorted Portfolio Approach: Stocks with High Transaction Costs

While Table 3 indicates that average abnormal overnight returns and trading day reversals for overpriced stocks are large in economic terms, they are uniformly swamped by transaction costs at all stages of our analysis.[23] Hence, in our next application of the portfolio approach, we examine the role of transaction costs as a further limit to arbitrage that may exacerbate the overpricing behavior at the open documented above. Here we reproduce the analysis in Table 3, but we limit the sample to the 50% of firms each day with the highest effective half spread.

Results are provided in Table 4. On average, there are now 47 stocks in each of the 27 portfolios within every triple-sorted partitioning scheme in Panels A and B. As expected, the abnormal overnight and trading day returns display similar relations with absolute and relative dispersion of opinions, as well as with institutional ownership. However, they now tend to be larger in absolute value than the analogous results from Table 3, especially for the subsample of overpriced stocks. In particular, the bottom left cell in every 3 x 3 scheme in Table 4 is larger in magnitude than the analogous cell in Table 3. For the bottom two schemes in Panel A of Table 4, the average abnormal overnight return is now close to +30 basis points, while the analogous average abnormal trading day reversal in Panel B now ranges from -40 to -49 basis points.[24]

These results indicate that overpriced firms – with high dispersion of opinions and low institutional ownership – tend to have positive overnight returns and trading day reversals that are larger in magnitude when transaction costs are high. This evidence reinforces a growing body of evidence that documents the importance of both short sale constraints and transaction costs as limits to arbitrage that affect overpricing (see Lesmond, 2007, and Sadka and Scherbina, 2007).

4.2.3 Triple-Sorted Portfolio Approach: Stocks with High Transaction Costs and High Relative Short Interest

23 Panel A of Table 1 shows that the mean daily spread at the open dwarfs the overnight returns and trading day reversals, when averaged across all stocks and days in the sample. This result also applies to subsamples of overpriced stocks with high absolute and relative dispersion of opinions, and low institutional ownership.

24 Results in Table 4 are robust when we use the 50% of firms with the highest average spread at the day's open and close (rather than the effective half spread), or when we use other cutoff's besides 50%.

Our final application of the portfolio approach appears in Table 5. Here we examine the extent to which high transaction costs and high short interest operate together, to reflect greater limits to arbitrage that exacerbate the overpricing behavior documented above. This Table reproduces the analysis in Table 3, but limits the sample to: (i) the 50% of firms each day with the highest effective half spread, and (ii) the 20% of these stocks each day with the highest relative short interest. On average, there are now 9 stocks in each of the 27 portfolios within every triple-sorted partitioning scheme in Table 5.

As expected, the abnormal returns in Table 5 now tend to be still larger in magnitude than the analogous results from Tables 3 and 4, especially for the overpriced portfolio with low institutional ownership and high absolute and relative dispersion of opinions. For example, the bottom left cell in each scheme of Table 5 is larger in magnitude than the analogous cell in each scheme of Table 4. For the bottom two 3 x 3 schemes in Panel A of Table 5, these overnight returns now average around +40 basis points, while the analogous schemes in Panel B contain mean trading day reversals that range from -56 to -78 basis points. These results reinforce the view that overpriced firms tend to have positive overnight returns and trading day reversals that are larger in magnitude when transaction costs are high and short sale constraints are more binding, and they further corroborate the above support for disagreement models.

4.3 Cross-Sectional Regression Approach

In our next set of tests we use cross-sectional regression analysis to investigate how overnight and trading day returns are associated with absolute and relative dispersion of opinions, for different levels of institutional ownership, while also including firm size as an explanatory variable. Controlling for firm size in this regression framework offers a robustness check on the methodology of our earlier portfolio approach that utilizes the size-adjusted partitioning scheme.

In this cross-sectional regression analysis, we estimate the association between overnight (cto) or trading day (otc) returns and the combined influence of relative and absolute dispersion of opinions, while controlling for the level of institutional ownership and firm size, as follows:

$$\begin{aligned} \text{Return(cto, otc)}_i = b_0 &+ b_1(\text{Rel\_Disp}_i * \text{Abs\_Disp}_i * \text{HighINST}_i) \\ &+ b_2(\text{Rel\_Disp}_i * \text{Abs\_Disp}_i * \text{MedINST}_i) \\ &+ b_3(\text{Rel\_Disp}_i * \text{Abs\_Disp}_i * \text{LowINST}_i) + b_4\,\text{SIZE}_i + \varepsilon_i . \quad (1) \end{aligned}$$

The variable labelled, Rel_Disp, refers to our proxy for relative dispersion of opinions at the open (Rel_TURN or Rel_VOL); the variable labelled, Abs_Disp, refers to absolute dispersion of opinions throughout the day (Abs_TURN or Abs_VOL). Finally, the variable labelled, HighINST, is an indicator variable that takes a value of one for the tercile of firms each day with high institutional ownership (INST) and zero otherwise, while MedINST and LowINST similarly identify the terciles of firms with medium and low institutional ownership, respectively.

The coefficients of the first three terms in the regression model (b_1 - b_3) reflect the nature and strength of the association between overnight or trading day returns and the interactive effect of our relative and absolute dispersion measures, for each tercile based on institutional ownership. Since the four dispersion measures and firm size have substantial outliers, we first transform these explanatory variables into decile ranks each quarter. We then scale the decile-ranks to range from 0.1 to 1, to facilitate interpretation of the results. The interaction of our scaled measures of relative and absolute dispersion of opinions ($\text{Rel\_DISP}_i * \text{Abs\_DISP}_i$) thus creates a new variable that ranges from 0.01 to 1, and reflects the combined attributes of relative and absolute dispersion of opinions for the i^{th} firm.[25]

25 For example, a firm that has both relative and absolute dispersion in the lowest deciles on a given day will have a value for (Rel_DISP * Abs_DISP) of .01, while another firm with both measures in the highest deciles will have a value for (Rel_DISP * Abs_DISP) of 1.0. Other firms with values of relative and absolute dispersion in the interim deciles will have values for (Rel_DISP * Abs_DISP) that range between .01 and 1. A similar regression framework using decile-ranks is applied in Nagel (2005). We obtain comparable results when we use the (natural log of) raw

Table 6 provides the mean Fama-MacBeth regression coefficients and t-statistics obtained from estimating 2,267 different daily cross-sectional regressions over the 9-year period from 1996 through 2004. Once again, the time series standard error of each mean regression coefficient is used to construct the t-ratio, to guard against any potential bias from cross-sectional correlation across stock returns on the same day (Bernard, 1987).

The left two columns of Table 6 present the mean coefficients for the regression model that analyzes overnight returns (cto) using turnover and volatility, respectively, to proxy for relative and absolute dispersion of opinions. The right two columns provide the analogous mean coefficients for the model that analyzes trading day returns (otc). First note that firm size (b_4) is negatively related to the overnight return, regardless of the proxy used to measure relative and absolute dispersion of opinions. In contrast, firm size is positively related to trading day returns when turnover is used to proxy for dispersion of opinions. This evidence is consistent with the correlations in Table 1, and indicates that smaller firms tend to have a larger overnight return and trading day reversal, after controlling for variation due to institutional ownership and the combined effect of relative and absolute dispersion of opinions.

Next observe that the remaining coefficients, b_1 - b_3, are significantly greater than zero in the regressions involving overnight returns, and significantly less than zero in the regressions involving trading day returns. Furthermore, the magnitude of this association is greater for subsamples with lower institutional ownership (i.e., $|b_1| < |b_2| < |b_3|$). At the bottom of Table 6 we provide a formal test of the null hypothesis that $b_3 = b_1$, for each model. This hypothesis is rejected for both regressions involving overnight and trading day returns, and for both proxies based on turnover and volatility. Together, this evidence indicates that stocks with higher

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measures of absolute and relative dispersion and firm size in (1), rather than decile-ranks. Our conclusions are also unaffected when we examine the influences of Rel_DISP and Abs_DISP separately, rather than their interaction.

combined levels of relative dispersion at the open and absolute dispersion throughout the day tend to have larger overnight returns and trading day reversals, and this association is strongest for stocks with binding short sale constraints (i.e., low institutional ownership).

The economic significance of these regression results can be illustrated by considering the first two columns of Table 6, for the regression models involving overnight returns (cto). The coefficient, b_3 = .337 (t = 12.5) for the regression using turnover, and b_3 = .279 (t = 12.5) for the regression using volatility. This result implies that moving from the lowest to the highest deciles of both relative and absolute dispersion of opinions, within the subsample of firms with low institutional ownership, is associated with an increase in the overnight return of +28 to +34 basis points, depending on the proxy for dispersion used. Analogous implications hold for the last two columns of Table 6, for the regressions involving trading day returns (otc). Here the coefficient, b_3 = .-.428 (t = -9.9) when turnover is used, and b_3 = -.470 (t = -11.4) when volatility is used. Now, when we move from the lowest to the highest deciles of both relative and absolute dispersion, the average trading day reversal increases in magnitude by -43 to -47 basis points.

This regression evidence corroborates the results of our portfolio approach in Tables 2-5. It indicates a stronger association between overnight or trading day returns and the combined effect of relative and absolute dispersion of opinions, for subsamples of stocks with more binding short sale constraints, consistent with the implications of disagreement models.

5. Extensions and Robustness Tests

In Panels A and B of Table 7 we provide extensions and robustness tests in which we apply the main analysis from our portfolio approach of Table 3, but we base this analysis on alternative return measures or subsamples of stocks. For each test, Panel A of Table 7 reports results for average overnight returns (cto), while the analogous results for trading day returns (otc) are provided in Panel B.

In all of these robustness tests, we focus on the difference between the cells in the bottom versus the top rows of each 3 x 3 scheme. Specifically, we analyze the abnormal overnight and trading day return behavior of zero-cost hedge portfolios that are long the tercile with high values of relative dispersion of opinions and short the tercile with low values, conditional on institutional ownership (the column) and absolute dispersion (the 3 x 3 scheme).

For brevity, within each 3 x 3 scheme we only report these hedge portfolio results for the terciles based on low and high institutional ownership. Similarly, we only present results for the first and third 3 x 3 schemes in each case, applied to the terciles with low and high absolute dispersion of opinions throughout the day. The four columns on the left side of each Panel in Table 7 provide results for the 3 x 3 scheme based on low absolute dispersion, while the four columns on the right side report the analogous results for the scheme based on high absolute dispersion. Our previous results in Tables 3-5 show that this latter 3 x 3 scheme contains the largest mean overnight returns and trading day reversals, consistent with the implications of disagreement models. Hence, we focus the following discussion on the four columns on the right side of Panels A and B in Table 7.

The base-case provided at the top of each Panel in Table 7 reproduces the analogous mean difference t-tests from Table 3. In every subsequent robustness test (row) in each Panel, we change only one aspect of the analysis to facilitate comparison with the base case.

5.1 Using Median Returns, Trade Prices, and Excluding Low-Price Stocks

The results of our first robustness test in Panels A and B of Table 7 appear in row 1, just below the base case. Here we use the median return across stocks in each subsample every day, rather than the mean, and we then compute the time series mean of these medians across all days in the sample period. Results are similar to the base case. One implication is that half of the sample stocks experience overnight and trading day returns that exceed the medians provided in row 1 of Panels A and B. Another implication is that our results are not attributable to outliers.

Our next robustness test is provided in the second row of Panels A and B, and uses the first and last trade prices of the day to compute overnight and trading day returns. Results are virtually identical to the base case using midquote returns. Together, the evidence in the base case and this robustness test indicate that our results reflect the behavior of both trade prices and midquotes, and are not attributable to bid-ask bounce.

Our third robustness test excludes stocks each day whose average daily closing price is below $5 during the previous three months. This exclusion yields hedge portfolio returns that are similar to the base case. This evidence indicates that our results are not due to low-priced stocks.

5.2 NASD versus NYSE Stocks

The fourth and fifth tests provided in Table 7 reproduce the analysis in Table 3 for the subsamples of NASD and NYSE stocks, respectively. There are reasons to expect potentially divergent behavior across NASD and NYSE stocks at the day's open and close. The NYSE specialist system is substantively different from the NASD trading regime based on market makers. Furthermore, these different systems implement divergent rules and mechanisms for determining daily opening prices. In addition, the bulk of NASD stocks are smaller firms with higher transaction costs and greater information asymmetries. These divergent features of NASD versus NYSE stocks lead us to expect greater mispricing at the open, and thus larger overnight returns and trading day reversals, for NASD stocks.[26]

These expectations are born out in our fourth and fifth tests in Table 7. While we find both NYSE and NASD stocks have significant positive overnight hedge portfolio returns and negative trading day reversals that depend on dispersion of opinions and short sale constraints, these hedge returns are substantially larger in magnitude for NASD stocks. On the other hand, this evidence reveals that this overnight return behavior is not limited to NASD stocks, but also characterizes NYSE stocks, albeit in smaller magnitudes.

5.3 Small versus Large Stocks

The sixth and seventh tests in Table 7 pursue a similar line of inquiry by examining subsamples of stocks in the smallest and largest quintiles by market capitalization each day. Panel A of Table 7 reveals that the mean overnight hedge returns are somewhat larger for small firms than for large firms, especially for the four columns on the right side of Panel A (i.e., based on the tercile with high absolute dispersion of opinions). The analogous results in Panel B similarly reveal mean trading day reversals that are larger for hedge portfolios based on small stocks, in comparison with large stocks.

It is noteworthy that, while this evidence documents a strong size effect in overnight returns and trading day reversals, firm size is not the sole cause of our results in Tables 2 - 7. In all these analyses we examine how overnight returns and trading day reversals are related to absolute and relative dispersion of opinions, short sale constraints, and transaction costs, while *controlling for firm size*. Thus, while small stocks tend to experience larger overnight returns and trading day reversals, this behavior is not limited to small stocks.

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26 These issues also emphasize the importance of proper identification of opening and closing prices (see Gerety and Mulherin, 1994, Harris, 1989, Rogalski, 1984, Smirlock and Starks, 1986, and our footnotes 9-12 above).

5.4 Day-of-the-Week Effect

Cliff et al. (2007) find that the recent behavior of overnight and trading day returns between Friday's close and Monday's close has reversed from that prevailing before the mid-1990's, so that now the opening price on Mondays tends to be greater than the closing price on Fridays.[27] In line with our other predictions based on disagreement models, we conjecture that the magnitude of this weekend overnight return should exceed that on other days of the week, as a result of greater optimism bias at the open on Mondays following the longer weekend period.

The eighth and ninth tests in Table 7 examine the behavior of overnight hedge returns and trading day reversals on Mondays versus other days of the week. Results reveal significant positive overnight returns and trading day reversals for both Mondays and other weekdays, indicating that this phenomenon does not just occur on Mondays. Furthermore, the evidence in Panel A shows modestly greater overnight hedge returns on Mondays versus other weekdays, consistent with our conjecture based on disagreement models. On the other hand, Panel B reveals modestly smaller trading day reversals on Mondays, which is inconsistent with our conjecture based on disagreement models.

5.5 Information Asymmetry and the Probability of Information Trading

Previous work indicates that a risk premium is demanded for stocks with greater information asymmetry (e.g., see Easley et al., 2002). Extending this work to our setting, the behavior of overnight returns and trading day reversals may be related to the degree of a stock's information asymmetry. According to the model of Hong and Wang (2000), the lack of trading overnight may give rise to increased information asymmetry during the overnight period, which is reversed when trading resumes after the open (see also Odders-White and Ready, 2008). Then, as

27 For recent work on the weekend effect, see Cliff et al. (2007), Harris (1986), Jain and Joh (1988), Kamara (1997), Rogalski (1984), Schwert (2003), Smirlock and Starks (1986), and Wang et al. (1997).

information is processed through trading, the result may be declining information asymmetry and stock prices during the trading day, as a smaller premium is demanded on the stock.

We investigate the implications of these theories in conjunction with disagreement models, by examining whether a stock that is subject to greater information asymmetry tends to have larger overnight returns and trading day reversals. In this analysis, we construct a quarterly proxy for a stock's degree of information asymmetry, by estimating the probability of information trading (PIN) using transaction data from all trading days over the previous quarter (Easley et al., 2002). Then we apply the portfolio approach of Table 3 to the quintiles of stocks each day with the lowest and highest PIN, respectively.

Results are provided in our tenth and eleventh tests in Table 7. When we focus on the four columns on the right side of Panels A and B, we find somewhat larger overnight hedge returns and trading day reversals for stocks with high PIN. This evidence is consistent with the view that stocks subject to greater information asymmetry have greater mispricing at the open.

5.6 Liquidity Risk Theory, Overnight Liquidity Risk, and the Closing Price

In this section we explore the implications of liquidity risk theory applied to the overnight period.[28] According to this theory, if the overnight session is a reduced liquidity regime, investors will require a premium to bear this overnight liquidity risk and the daily closing price should tend to be depressed. We also expect stocks with greater overnight liquidity risk (i.e., greater sensitivity to overnight changes in market-wide liquidity) to have lower closing prices relative to the intraday average, along with greater overnight returns and trading day reversals.

Recall that Figures 1 and 2 reveal intraday price patterns in which the stock price tends to rise near the daily close. This behavior is contrary to the implications of liquidity risk theory

28 For related work in the literature on liquidity premiums, see Chordia et al. (2000 and 2001), Hasbrouck and Seppi (2001), Huberman and Halka (2001), Pastor and Stambaugh (2003), and Watanabe and Watanabe (2008).

applied to the overnight period. To further explore the implications of liquidity risk theory, we examine how this intraday price pattern varies across subsamples sorted according to a firm's degree of overnight liquidity risk.

We measure a firm's degree of overnight liquidity risk by hypothesizing that 24-hour changes in its liquidity (proxied by close-to-close changes in the bid-ask spread) depend on changes in market liquidity during the overnight period and the subsequent trading day period:

$$(SPR(close)_{it} - SPR(close)_{it-1}) = \alpha_i + \beta_{cto}(SPR_{o\,mt} - SPR_{c\,mt-1}) + \beta_{otc}(SPR_{c\,mt} - SPR_{o\,mt}) + \varepsilon_i, \quad (2)$$

where $SPR(close)_{it}$ = closing bid-ask spread of firm i on day t, as a percent of the midquote,
$SPR_{o\,mt}$ = value-weighted average opening percent market spread, across firms on day t,
$SPR_{c\,mt}$ = value-weighted average closing percent market spread, across firms on day t,
$(SPR_{o\,mt} - SPR_{c\,mt-1})$ = overnight (close-to-open) change in percent market spread on day t,
$(SPR_{c\,mt} - SPR_{o\,mt})$ = trading day (open-to-close) change in percent market spread on day t.

In this specification the coefficient, β_{cto}, measures the sensitivity of daily (ctc) changes in a firm's liquidity to overnight (cto) changes in market liquidity. We propose this sensitivity as one measure of the degree of a firm's overnight liquidity risk.

We estimate model (2) for each stock across all days during every quarter. We restrict the analysis to stock quarters with data for at least 44 trading days during the quarter. For each stock, the result is a quarterly time series of regression coefficients, β_{cto}, that reflect quarterly measures of the sensitivity of the firm's daily liquidity changes to overnight changes in market liquidity. This series provides our measures of overnight liquidity risk for each stock.[29]

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29 This measure is proposed in the spirit of Acharya and Pederson (2007), Hasbrouck and Seppi (2001), Pastor and Stambaugh (2003), and Watanabe and Watanabe (2008). We have also examined the difference in sensitivities, $(\beta_{cto} - \beta_{otc})$, as an alternative measure of a firm's overnight liquidity risk. In addition, we have estimated alternative specifications of (2) that include: (i) putting *open-to-open* or *close-to-open* changes in the firm's percent spread on the left-hand-side, and/or (ii) adding close-to-open and open-to-close market *returns* on the right-hand-side. We have also estimated (2) over monthly and yearly time frames. Partitioning stocks by any of these alternative measures of a firm's sensitivity to overnight changes in market liquidity yield similar overnight return patterns.

In Figure 3 we plot how the average intraday price pattern varies across quintiles stratified each day by the degree of overnight liquidity risk. This Figure shows that the two quintiles with the lowest and highest degrees of overnight liquidity risk reveal the highest average opening prices. However, after the open, all quintiles reveal a similar intraday pattern in which the high opening price declines until it is significantly below the intraday average during the middle of the day, before rising back near the intraday average at the close. The key result in Figure 3 is that the closing price reveals no tendency to decline near the end of the trading day below the intraday average price, for any quintile, let alone for quintiles with greater overnight liquidity risk. We conclude that this evidence is inconsistent with the implications of liquidity risk theory applied to the overnight period.

We further investigate the potential relation between a firm's overnight liquidity risk and the magnitude of its overnight returns and trading day reversals, with our twelfth and thirteenth robustness tests in Table 7. Here we reproduce the analysis in Table 3 for the two quintiles of stocks with the lowest and highest degrees of overnight liquidity risk. Results for both quintiles are generally similar to each other and to the base case. Importantly, there is little evidence in the last two rows of Table 7 to suggest systematically greater overnight returns for stocks with greater overnight liquidity risk. Thus we find no evidence to support the implications of liquidity risk theory applied to the overnight period. Instead, throughout all our analyses we find consistent, corroborating support for the implications of disagreement models.

5.7 The Stability of Overnight and Trading Day Returns over Different Subperiods

In Table 8 we investigate the stability of this behavior over time. The first two rows below the base case in each Panel of Table 8 present the hedge portfolio returns for the two subperiods before and after the crash of March, 2000. Results in Panel A indicate that significant positive overnight hedge returns are apparent for each subperiod, although they are somewhat larger for the pre-crash boom of the late 1990s. The analogous results in Panel B similarly reveal significant trading day hedge reversals across both subperiods, but now these reversals are larger in magnitude for the post-crash subsample.

As a final robustness check, we estimate the hedge portfolio returns for each year of the sample period, separately. Results are provided in the last nine rows of Panels A and B in Table 8. Results in the right four columns of Panels A and B reveal evidence of significant positive overnight hedge portfolio returns for eight of the nine years, and significant negative trading day reversals for all nine years. Most importantly, for every year the nature of any statistically significant results in the four columns on the right side of each Panel is in line with the predictions of disagreement models. That is, significant overnight hedge returns are always positive, while significant trading day hedge returns are always negative. In addition, these significant hedge portfolio returns are consistently larger in magnitude for the subsample with low institutional ownership.

Together these results indicate that the overnight return behavior documented in this study is robust before and after the crash of March, 2000, and is stable across years.

6. Summary and Conclusions

We document a strong tendency for the daily opening midquote to be high relative to the closing midquote, as well as the mean intraday midquote, when averaged across the 3000 largest U.S. stocks over the period, 1996-2004. This high opening price results in a propensity for positive overnight returns and negative trading day reversals. We argue that this pattern in intraday returns is consistent with Miller (1977) and other disagreement models, and we show that positive overnight returns and trading day reversals are larger in magnitude, for stocks subject to greater relative dispersion of opinions near the open, and more binding short sale constraints. We also show that these overnight return patterns are more dramatic for stocks with high absolute dispersion of opinions based on daily turnover and daily volatility. Additional tests reveal that these overnight return patterns are further exacerbated when we explore finer subsamples subject to the greater limits to arbitrage embodied in high transaction costs and high short interest.

These overnight return patterns remain when we use median returns rather than mean returns, when we use trade prices to measure overnight and trading day returns, and when we examine subsamples that exclude low-price stocks. These patterns also apply to subsamples of stocks traded on the NASD or the NYSE, and to small or large stocks, although we find greater overnight returns and trading day reversals for NASD stocks and small stocks. We also find these return patterns appear on both Mondays and other weekdays.

In additional tests, we find a tendency for larger overnight return patterns for stocks with greater information asymmetry (measured by PIN). In contrast, we find no tendency for closing prices to decline below the intraday average for stocks with greater overnight liquidity risk. Finally, we demonstrate that this overnight return behavior is stable across subperiods before and after March of 2000, and across all years of the sample period.

Throughout all of our analyses we find uniform and corroborating evidence that supports the implications of disagreement models. We consistently document a higher opening price, along with larger overnight returns and trading day reversals, for stocks subject to greater dispersion of opinions at the open and throughout the day, combined with more binding short sale constraints and high transaction costs. In our most stringent tests based on subsamples with high effective spreads and high relative short interest, these returns are extremely large before deducting transaction costs. For the subsample most prone to overpricing at the open, mean overnight returns are 40 basis points per day (100% per annum), and mean trading day reversals are -78 basis points per day (-195% per annum). On the other hand, while these overnight returns and trading day reversals are large in economic terms, they are uniformly swamped by the average daily spread at the open. Thus, the forces behind disagreement models apparently result in these tendencies within the confines allowed by limits to arbitrage embodied in short sale constraints and transaction costs.

This study contributes to the literature on cross-sectional return predictability. We show that overnight return predictability based on absolute and relative dispersion of opinions is concentrated among stocks with binding short sale constraints and high transaction costs. In addition, this evidence indicates that the economic forces behind disagreement models contribute to opposing price movements during the overnight period versus the trading day session. Thus, in contrast to most previous work, we show how this optimism bias can affect stock price movements both away from and back toward fundamental values, and we document how this can occur over short time frames.

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Appendix A: Data Collection for Institutional Holdings

We use low institutional ownership to proxy for short sale constraints, because it embodies both direct and indirect costs of short selling (Nagel, 2005). First, direct costs include fees to borrow stock, which can be high when the supply of loanable shares is scarce. Since institutions are the main suppliers of stock loans, low institutional ownership often reflects low supply and high direct costs of short selling. On the other hand, over the short time frames analyzed in this study, these direct costs are likely to be small compared to other direct trading costs (i.e., the spread, commission, and price impact).[30] Thus a second, more plausible reason why low institutional ownership is important in our study rests with the indirect costs of short selling. Indirect costs involve institutional and cultural constraints that effectively prevent short selling by institutional investors. Due to these constraints, most professional investors simply never sell short, and thus cannot trade against overpriced stocks they do not own (Almazan et al., 2004). Given these indirect short sale constraints, efficient pricing depends on individual investors who own the stock. However, individual stock owners may not recognize or act on any overpricing, especially over such short time frames. Consequently, stocks with low institutional ownership could experience the recurring and persistent overpricing behavior we hypothesize overnight.[31]

Quarterly data on institutional holdings for our sample stocks are taken from CDA Spectrum 13F filings. All institutional investors that manage portfolios of $100 Million or more must file quarterly 13F reports with the SEC. These institutions include banks, insurance companies, brokerage firms, pension funds, and other investment houses. Institutions are required to report all their equity holdings greater than 10,000 shares or $200,000 in market value, at the end of each quarter. Consistent with prior research, we refer to institutional ownership as the equity holdings of managers that submit quarterly 13F Filings.

Following other researchers, we address problems and inconsistencies in the quarterly 13F filings data from Thomson Financial Institutional Holdings (see Asquith et al., 2005, Gompers and Metrick, 2001, Han and Wang, 2004, and Nagel, 2005). For example, one problem arises due to occasional missing or inaccurate data in the 13F filings on the number of shares outstanding at the end of the filing quarter. We resolve this problem by replacing the end-of-

30 See Asquith et al. (2005), D'Avolio (2002), Geczy et al. (2002), Jones and Lamont (2002), and Ofek et al (2004).
31 Since institutions can always buy underpriced stocks, there are no such impediments to arbitrage on the buy side.

quarter shares outstanding from the Thomson Financial Institutional Holdings database with the analogous variable from CRSP.

Another potential problem has to do with stock splits, which can cause inaccuracies in the institutional holdings data in at least two ways. First, institutions may simply report split-adjusted holdings and trading records incorrectly during a quarter when there is a split. Second, an institution may submit a late 13F filing after the 45-day deadline imposed by the SEC following the end of a quarter, when a stock split occurred during this 45-day grace period. In this situation, CDA Spectrum adjusted the institutional holdings record even though it should not have been adjusted for the record date. In such cases there are inaccuracies due to the failure of CDA Spectrum to properly synchronize the institutional holdings data with the split-adjustment.

We find the magnitude of these potential problems is small for our sample. We use CRSP data to document all firm-quarters from 1996 through 2004 when a stock split occurred in the dataset on 13F filings (this includes all quarters that experience changes in shares outstanding due to stock splits or stock dividends). We find that 2.5 percent of all firm-quarters in our dataset occurred during quarters with stock splits.

This evidence suggests that the potential problem associated with stock splits and late 13F filings is likely to have a minimal impact on our results. Still, we have followed several procedures to investigate the impact of this potential problem. First, we have omitted from our analysis all observations during firm-quarters when a stock split or stock dividend occurs. Second, we have replaced all daily observations on institutional ownership during a quarter with a stock split with the previous quarter's value of the percent of institutional ownership for that firm. All these procedures lead to robust results consistent with those presented in this study.

Figure 1. Intraday Price Pattern
Ratio of Midquote at Time T to Average Intraday Midquote
across All Stocks and Days

These intraday price patterns trace out the ratio of the midquote at time (T) to the average intraday midquote, where this intraday average is computed across all 30-minute intraday intervals excluding quotes in the first and last 30 minutes of the trading day. These price ratios are provided at 5-minute intervals over the first and last 30-minutes of the trading day, and at 30-minute intervals over the rest of the trading day. First, for each day we average this price ratio at every time (T) across all stocks in the sample. Next, we compute the time series average of these daily cross-sectional means across all days in the sample period. The 95 percent confidence interval about a ratio of 1.0 is constructed using the standard error of the time series mean at each time (T).

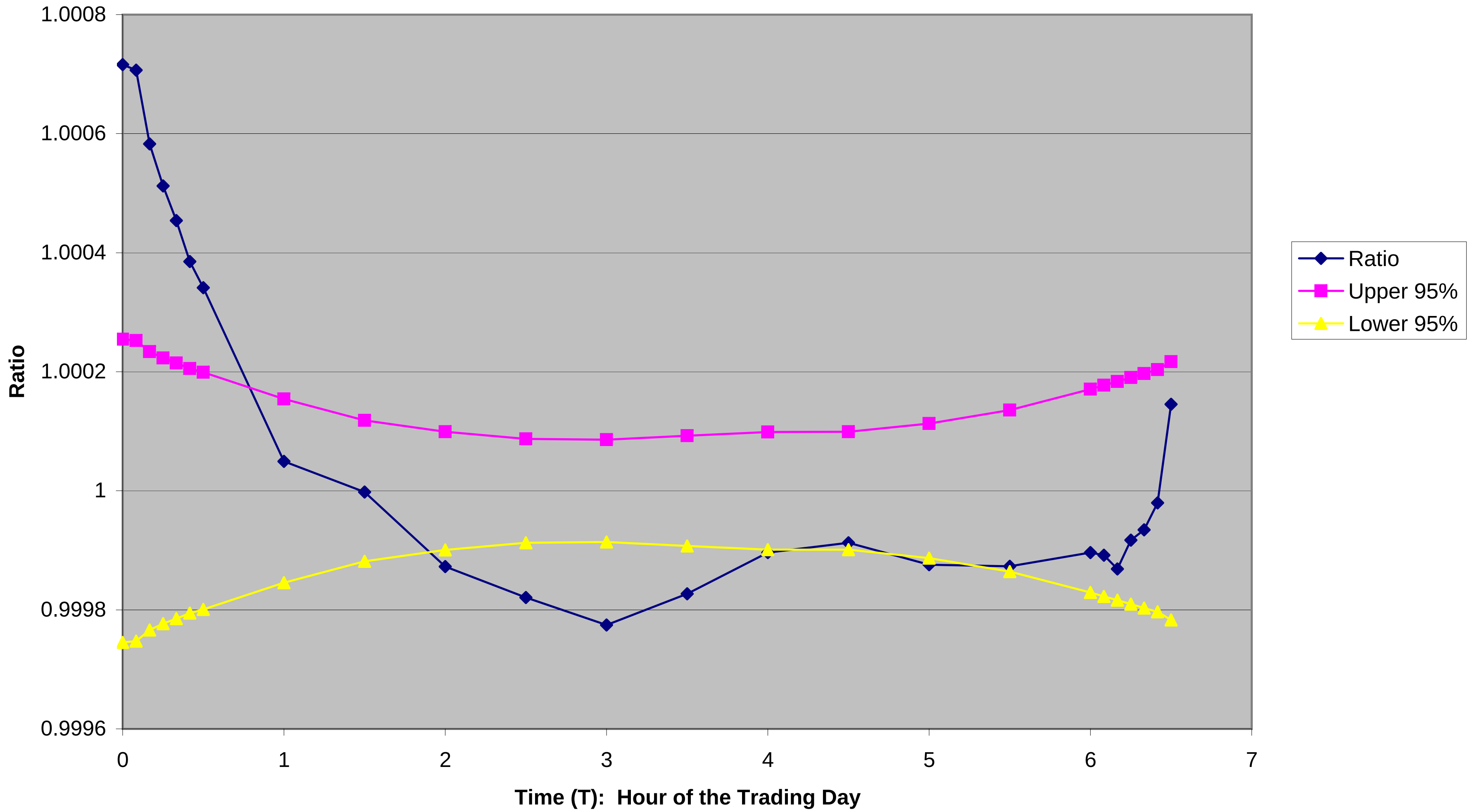

Figure 2. Intraday Price Pattern
Ratio of Midquote at Time T to Average Intraday Midquote
for Quintiles of Firms Sorted by Institutional Ownership

These intraday price patterns trace out the ratio of the midquote at time (T) to the average intraday midquote, where this intraday average is computed across all 30-minute intraday intervals excluding quotes in the first and last 30 minutes of the trading day. These price ratios are provided at 5-minute intervals over the first and last 30-minutes of the trading day, and at 30-minute intervals over the rest of the trading day. First, for each day we average this price ratio at every time (T) across all stocks in each quintile based on institutional ownership. Next, for each quintile we compute the time series average of these daily cross-sectional means across all days in the sample period.

The 95 percent confidence interval about a ratio of 1.0 is constructed using the standard error of the time series mean at each time (T), using only the bottom quintile of stocks each day with low institutional ownership. This quintile has the largest standard errors for different times (T) throughout the day, and thus has the widest confidence interval. Therefore, comparison of the intraday pattern for other quintiles with this confidence interval represents a conservative approach to determine the statistical significance of these intraday price patterns throughout the trading day.

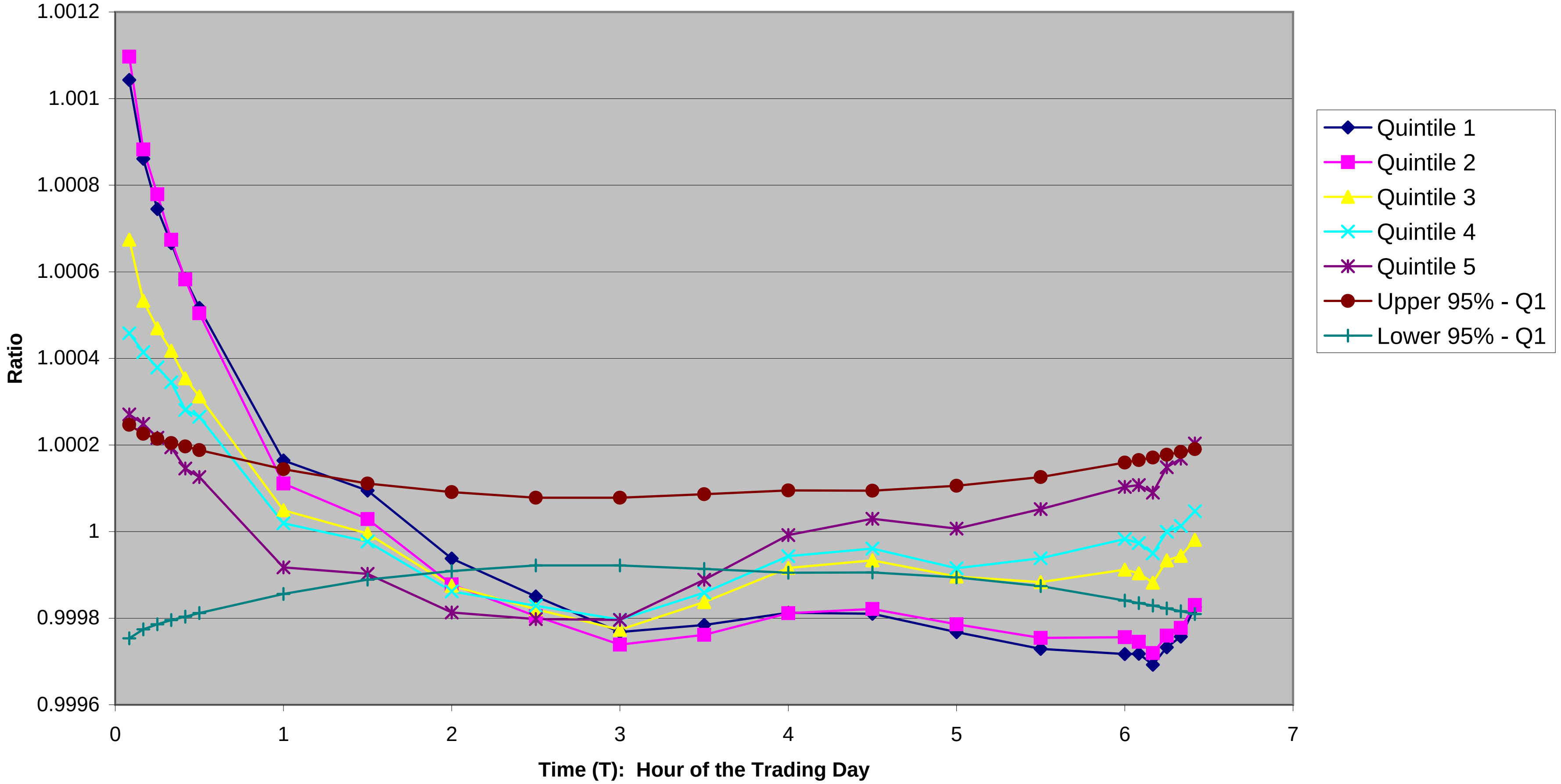

Figure 3. Intraday Price Pattern
Ratio of Midquote at Time T to Average Intraday Midquote
for Quintiles of Firms Sorted by Overnight Liquidity Risk

These intraday price patterns trace out the ratio of the midquote at time (T) to the average intraday midquote, where this intraday average is computed across all 30-minute intraday intervals excluding quotes in the first and last 30 minutes of the trading day. These price ratios are provided at 5-minute intervals over the first and last 30-minutes of the trading day, and at 30-minute intervals over the rest of the trading day. First, for each day we average this price ratio at every time (T) across all stocks in each quintile based on the firm's degree of overnight liquidity risk, where overnight liquidity risk is measured as the sensitivity of daily changes in a firm's percent spread to overnight changes in the market spread. Next, for each quintile we compute the time series average of these daily cross-sectional mean price ratios across all days in the sample period.

The 95 percent confidence interval about a ratio of 1.0 is constructed using the standard error of the time series mean at each time (T), using only the bottom quintile of stocks with low overnight liquidity risk. All five quintiles based on overnight liquidity risk have similar standard errors for different times (T) throughout the day, and thus have similar confidence intervals. Therefore, the choice of a quintile to use as a basis for comparison with confidence intervals is immaterial.

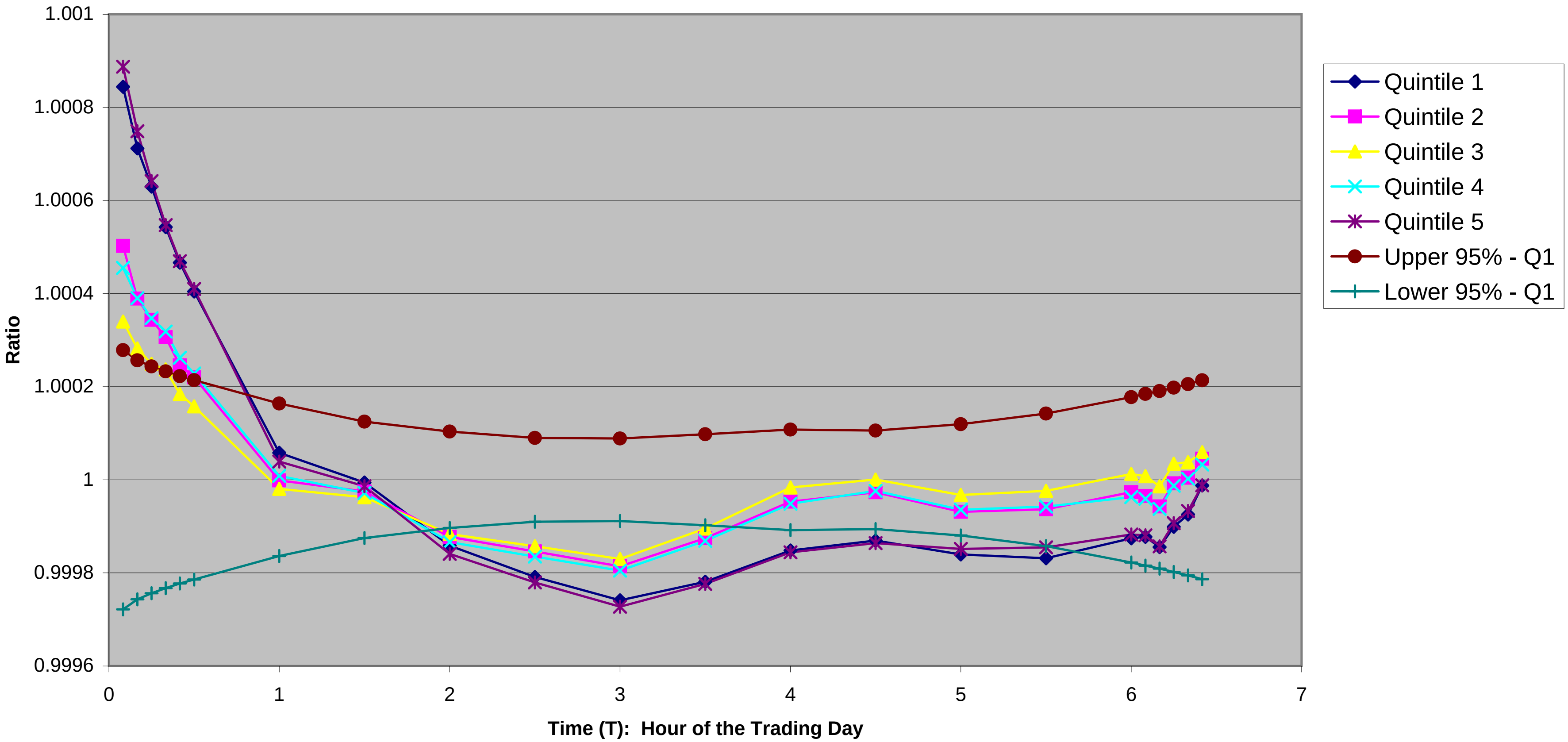

Table 1. Summary Statistics and Correlations across Variables

The initial sample includes the 3,000 largest U.S. stocks selected each year over the period, 1996-2004. This analysis is applied to the subsample of these stocks each day with nonmissing TAQ data on quotes. The focus of this study is on overnight and trading day returns, measured as the log of the price relative using quote midpoints at the open and the close: raw_cto = actual close-to-open (overnight) return, and raw_otc = actual open-to-close (trading day) return. We also analyze the difference between overnight and trading day returns (raw_DIFF = raw_cto - raw_otc), as well as this same difference after deducting transaction costs measured as the average spread at the day's open and close: raw_DIFF-TC = raw_DIFF - [SPR(open)+SPR(close)]/2. In addition, we examine daily abnormal returns by adjusting for market movements over the same time frame. These abnormal returns are labelled: cto, otc, DIFF, and DIFF-TC, and are calculated as the actual raw return over each time frame minus the return on the value-weighted portfolio of all stocks in the sample, measured over the same time frame. Finally, we also examine daily abnormal returns measured over the 24-hour periods from close-to-close and from open-to-open: ctc, and oto.

We consider four proxies for dispersion of opinions, including two measures of absolute dispersion throughout the entire trading day, and two measures of relative dispersion near the open versus the rest of the trading day. The two measures of absolute dispersion are: (i) Abs_TURN = daily share turnover as a percent of shares outstanding (multiplied by 1,000), and (ii) Abs_VOL = the standard deviation across 30-minute returns throughout the trading day. The two measures of relative dispersion are: (i) Rel_TURN = the difference between share turnover during the first hour of the trading day and turnover during the rest of the trading day, as a percent of turnover during the entire trading day, and (ii) Rel_VOL = the difference between the standard deviation across 30-minute returns during the first hour of trading and the standard deviation across 30-minute returns during the rest of the trading day.

Next, we consider limits to arbitrage for each firm, in the form of two proxies for short sale constraints and three measures of transaction costs. Our two short sale constraints are measured as: (i) the percent of institutional ownership (INST) computed from quarterly 13F Filings using aggregate shares held by institutions as a percent of total shares outstanding, and (ii) relative short interest (RSI) measured as the number of shares sold short each month divided by total shares outstanding. Our three measures of daily transaction costs include: (i) the bid-ask spread as a percent of the quote midpoint at the open (SPR(open)), (ii) the percent spread at the close (SPR(close)), and (iii) the daily effective half spread (Spread). Finally, firm size (SIZE) is proxied by daily market capitalization.

The descriptive statistics in Panels A and B are calculated by first computing the cross-sectional mean (or median) each day, and then averaging these means (or medians) across all days in the sample period. The standard deviation of the time series average across daily means is then used to construct the t-test for each statistic in Panels A and B. Similarly, the Spearman correlations in Panel C are calculated by first computing the cross-sectional correlation each day, and then averaging these correlations across all days in the sample. Once again, the standard deviation of the time series average correlation is used to construct the t-test for each average correlation in Panel C.

Panel A: Descriptive Statistics for Close-to-Open (Overnight) Returns, Open-to-Close (Trading Day) Returns, and 24-Hour Returns

	Unadjusted Overnight & Trading Day Returns				Market-Adjusted Overnight & Trading Day Returns				24-Hour Returns	
	raw_cto	raw_otc	raw_DIFF	raw_DIFF-TC	cto	otc	DIFF	DIFF-TC	ctc	oto
Mean (%)	.080	-.049	.130	-.766	.020	-.068	.088	-.807	-.048	.021
Median (%)	.031	-.048	.079	-.681	-.029	-.066	.038	-.722	-.094	-.032
T (H_0: mean=0)	7.4 **	-2.4 *	5.8 **	-34.8 **	4.0 **	-7.0 **	7.6 **	-61.7 **	-4.7 **	1.9
Avg # Firms/Day	2584	2585	2584	2491	2584	2584	2584	2491	2584	2584

* indicates significance at the .05 level; and ** indicates significance at the .01 level.

Table 1, continued

Panel B: Descriptive Statistics for Measures of Dispersion of Opinions, Short Sale Constraints, Transaction Costs, and Firm Size

	Dispersion of Opinions				Short Sale Constraints		Transaction Costs			
	Abs_TURN	Abs_VOL	Rel_TURN	Rel_VOL	INST	RSI	SPR(open)	SPR(close)	Spread	SIZE ($000)
Mean (%)	.72	.61	39.0	.014	45.6	3.0	.98	.78	.21	4,450,533
Median (%)	.34	.48	37.5	.009	48.7	1.4	.72	.53	.16	917,918
T (H_0: mean=0)	79.4 **	142.3 **	396.9 **	9.5 **	259.8 **	110.8 **	199.5 **	102.3 **	98.6 **	187.6 **
Avg # Firms/Day	2585	2574	2557	2504	2614	2553	2530	2543	2555	2585

Panel C: Spearman Correlations

Abs_TURN	1.00									
Abs_VOL	.450 **	1.00								
Rel_TURN	.206 **	.069 **	1.00							
Rel_VOL	.161 **	.216 **	.072 **	1.00						
INST	.254 **	.060 **	-.015 **	.042 **	1.00					
RSI	.538 **	.292 **	.138 **	.120 **	.288 **	1.00				
SPR(open)	-.206 **	.158 **	-.193 **	-.030 **	-.163 **	-.168 **	1.00			
SPR(close)	-.191 **	.136 **	-.148 **	-.058 **	-.178 **	-.192 **	.489 **	1.00		
Spread	-.104 **	.258 **	-.172 **	-.028 **	-.314 **	-.179 **	.616 **	.578 **	1.00	
SIZE	.099 **	-.106 **	.206 **	.064 **	.183 **	.152 **	-.539 **	-.525 **	-.759 **	1.00
cto	.060 **	.045 **	.025 **	.017 **	-.008 **	.023 **	.021 **	.001	.021 **	-.012 **
otc	.008 **	-.012 *	-.019 **	-.012 **	.005 **	-.027 **	-.003 *	-.017 **	-.018 **	.025 **
DIFF	.012 **	.022 **	.025 **	.017 **	-.006 **	.032 **	.008 **	.014 **	.021 **	-.024 **
DIFF-TC	.068 **	-.029 **	.068 **	.027 **	.047 **	.084 **	-.206 **	-.193 **	-.157 **	.127 **

* indicates significance at the .05 level; and ** indicates significance at the .01 level.

Table 2. Overnight and Trading Day Returns across Portfolios Double-Sorted by:
(1) Relative Dispersion of Opinions Near the Open, and
(2) Institutional Ownership

This table reports mean overnight (close-to-open, or cto) and trading day (open-to-close, or otc) abnormal returns, for four different 3 x 3 double-sorted partitioning schemes of portfolios. In each 3 x 3 scheme, we independenty double-sort the sample every day into terciles, based on the firm's size-adjusted: (1) relative dispersion of opinions at the open, and (2) institutional ownership. The rows in each scheme represent low, medium, or high relative dispersion of opinions, and the columns reflect low, medium, or high institutional ownership.

Mean overnight returns are provided in Panel A, and mean trading day returns appear in Panel B. The sample includes the largest 3,000 U.S. firms each year, for which TAQ data are available.The scheme on the left (right) side of each Panel uses share turnover (return volatility) to proxy for relative dispersion of opinions.

For every portfolio in each 3 x 3 scheme, we first compute the mean return across all firms each day, and then average these cross-sectional means across all days in the sample period. The time series standard error is then used to obtain the T-statistic for each portfolio's average daily returns. At the bottom of each column in every 3 x 3 scheme, we provide the mean-difference T-test across portfolios with high versus low relative dispersion of opinions, conditional on institutional ownership.

Panel A. Abnormal Overnight (close-to-open, or cto) Returns

Size-Adjusted Dispersion of Opinions:	Share Turnover			Stock Return Volatility		
Near the Open Relative To the Entire Trading Day	Size-Adjusted Institutional Ownership: Low	Medium	High	Size-Adjusted Institutional Ownership: Low	Medium	High
Low	-.022 **	-.029 **	-.030 **	.025 **	.009	-.002
Med	.024 **	.003	-.004	-.012	-.021 **	-.014
High	.076 **	.041 **	.020 **	.096 **	.042 **	.011
High-Low	.098	.069	.050	.071	.033	.013
T-stat	12.8 **	9.7 **	8.6 **	8.7 **	5.0 **	2.4 *

Panel B. Abnormal Trading Day (open-to-close, or otc) Returns

Size-Adjusted Dispersion of Opinions:	Share Turnover			Stock Return Volatility		
Near the Open Relative To the Entire Trading Day	Size-Adjusted Institutional Ownership: Low	Medium	High	Size-Adjusted Institutional Ownership: Low	Medium	High
Low	-.029 *	-.009	-.018	-.035 *	-.019	-.022
Med	-.082 **	-.055 **	-.048 **	-.057 **	-.058 **	-.068 **
High	-.165 **	-.114 **	-.089 **	-.201 **	-.105 **	-.059 **
High-Low	-.136	-.105	-.072	-.166	-.085	-.037
T-stat	-12.7 **	-9.9 **	-7.5 **	-8.3 **	-4.7 **	-2.1 *

* indicates statistical significance at the .05 level; ** at the .01 level.

Table 3. Overnight and Trading Day Returns across Portfolios Triple-Sorted by:
(1) Absolute Dispersion of Opinions Throughout the Day,
(2) Relative Dispersion of Opinions Near the Open, and
(3) Institutional Ownership

This table reports mean overnight (close-to-open, or cto) and trading day (open-to-close, or otc) abnormal returns, for four sets of three different 3 x 3 double-sorted partitioning schemes of portfolios. In each set of three 3 x 3 schemes, we independenty triple-sort the sample each day into terciles, based on the firm's size-adjusted: (1) absolute dispersion of opinions throughout the trading day, (2) relative dispersion of opinions near the open, and (3) institutional ownership. In every set we provide three different 3 x 3 schemes stratified by the firm's (1) absolute dispersion of opinions, where the rows in each scheme are based on (2) relative dispersion of opinions, and the columns reflect (3) institutional ownership.

Overnight returns are provided in Panel A, and trading day returns appear in Panel B. The three 3 x 3 schemes on the left (right) side of each Panel present the mean abnormal returns, using share turnover (return volatility) to proxy for absolute and relative dispersion of opinions. The sample includes the largest 3,000 U.S. firms each year, for which TAQ data are available.

For every portfolio in each 3 x 3 scheme, we first compute the mean return across all firms every day, and then average these cross-sectional means across all days in the sample period. The time series standard error is then used to obtain the T-statistic for each portfolio's average daily returns. At the bottom of each column in every scheme, we provide the mean difference T-test across portfolios with high versus low relative dispersion of opinions, conditional on institutional ownership (the column) and absolute dispersion of opinions (the 3 x 3 scheme).

Panel A. Abnormal Overnight (close-to-open, or cto) Returns

Size-Adjusted Dispersion of Opinions: Absolute for Entire Trading Day	Near Open Relative To Trading Day	Share Turnover: Size-Adjusted Institutional Ownership Low	Medium	High	Stock Return Volatility: Size-Adjusted Institutional Ownership Low	Medium	High
Low	Low	-.048 **	-.052 **	-.060 **	-.040 **	-.048 **	-.043 **
	Med	-.031 **	-.053 **	-.042 **	-.035 **	-.040 **	-.038 **
	High	-.019 *	-.042 **	-.032 **	-.052 **	-.063 **	-.064 **
	High-Low	.029	.009	.028	-.011	-.015	-.021
	T-stat	8.0 **	1.8	4.3 **	-2.0 *	-2.9 **	-3.5 **
Medium	Low	-.015	-.036 **	-.038 **	-.033 **	-.034 **	-.028 **
	Med	.020 **	-.019 *	-.036 **	-.018 *	-.031 **	-.018 *
	High	.041 **	-.012	-.032 **	-.015	-.033 **	-.030 **
	High-Low	.055	.024	.006	.018	.000	-.003
	T-stat	7.9 **	4.8 **	1.4	3.2 **	.1	-.6
High	Low	.052 **	.044 **	.002	.136 **	.099 **	.059 **
	Med	.129 **	.095 **	.042 **	.088 **	.058 **	.049 **
	High	.193 **	.130 **	.065 **	.205 **	.136 **	.075 **
	High-Low	.142	.087	.062	.070	.037	.016
	T-stat	10.1 **	7.6 **	7.6 **	7.6 **	4.1 **	2.2 *

* indicates statistical significance at the .05 level; ** at the .01 level.

Table 3, continued

Panel B. Abnormal Trading Day (open-to-close, or otc) Returns

Size-Adjusted Dispersion of Opinions: Absolute for Entire Trading Day	Near Open Relative To Trading Day	Share Turnover: Size-Adjusted Institutional Ownership Low	Medium	High	Stock Return Volatility: Size-Adjusted Institutional Ownership Low	Medium	High
Low	Low	-.003	.010	.004	.002	.017	.010
	Med	-.019	-.001	-.018	-.012	-.015	-.028
	High	-.044 **	-.004	-.008	.048 **	.082 **	.064 **
	High-Low	-.041	-.014	-.012	.046	.066	.054
	T-stat	-6.5 **	-1.9	-1.2	3.2 **	4.7 **	3.5 **
Medium	Low	-.047 **	-.012	-.008	.010	.007	.000
	Med	-.091 **	-.023	-.011	-.062 **	-.056 **	-.066 **
	High	-.115 **	-.045 **	-.017	.004	.036 *	.026
	High-Low	-.068	-.033	-.009	-.006	.029	.026
	T-stat	-5.9 **	-3.8 **	-1.1	-.4	1.8	1.7
High	Low	-.084 **	-.057 **	-.051 **	-.086 **	-.073 **	-.070 **
	Med	-.189 **	-.158 **	-.095 **	-.255 **	-.210 **	-.170 **
	High	-.315 **	-.225 **	-.151 **	-.373 **	-.265 **	-.174 **
	High-Low	-.231	-.169	-.100	-.286	-.192	-.104
	T-stat	-10.2 **	-9.3 **	-7.4 **	-11.0 **	-7.9 **	-4.2 **

* indicates statistical significance at the .05 level; ** at the .01 level.

Table 4. Overnight and Trading Day Returns across Portfolios Triple-Sorted by:
(1) Absolute Dispersion of Opinions Throughout the Trading Day,
(2) Relative Dispersion of Opinions Near the Open, and
(3) Institutional Ownership,
for Subsample of Stocks with High Transaction Costs

This table reports mean overnight (close-to-open, or cto) and trading day (open-to-close, or otc) abnormal returns, for four sets of three different 3 x 3 double-sorted partitioning schemes of portfolios. In each set of three 3 x 3 schemes, we independenty triple-sort the sample every day into terciles, based on the firm's size-adjusted: (1) absolute dispersion of opinions throughout the trading day, (2) relative dispersion of opinions near the open, and (3) institutional ownership. In every set we provide three different 3 x 3 schemes stratified by the firm's (1) absolute dispersion of opinions, where the rows in each scheme are based on (2) relative dispersion of opinions, and the columns reflect (3) institutional ownership.

Overnight returns are provided in Panel A, and trading day returns appear in Panel B. The three 3 x 3 schemes on the left (right) side of each Panel present the mean abnormal returns, using share turnover (return volatility) to proxy for absolute and relative dispersion of opinions. This analysis is applied to the top 50% of the sample stocks each day with the highest transaction costs (proxied by the effective half spread).

For every portfolio in each 3 x 3 scheme, we first compute the mean return across all firms every day, and we then average these cross-sectional means across all days in the period. The time series standard error is then used to obtain the T-statistic for each portfolio's average daily returns. At the bottom of each column in every scheme, we provide the mean difference T-test across portfolios with high versus low relative dispersion of opinions, conditional on institutional ownership (the column) and absolute dispersion of opinions (the 3 x 3 scheme).

Panel A. Abnormal Overnight (close-to-open, or cto) Returns

Size-Adjusted Dispersion of Opinions:		Share Turnover			Stock Return Volatility		
		Size-Adjusted Institutional Ownership			Size-Adjusted Institutional Ownership		
Absolute for Entire Trading Day	Near Open Relative To Trading Day	Low	Medium	High	Low	Medium	High
Low	Low	-.043 **	-.047 **	-.054 **	-.040 **	-.042 **	-.048 **
	Med	-.021 *	-.030 **	-.037 **	-.034 **	-.031 **	-.036 **
	High	-.009	-.015	-.010	-.046 **	-.030 *	-.033 **
	High-Low	.033	.032	.044	-.006	.012	.014
	T-stat	6.5 **	3.7 **	4.5 **	-.6	1.4	1.4
Medium	Low	.002	-.006	-.037 **	-.008	-.011	-.021 **
	Med	.054 **	.023 **	-.028 **	.003	-.018 *	-.013
	High	.087 **	.027 **	-.014	.030 **	.015	.000
	High-Low	.085	.033	.023	.039	.026	.020
	T-stat	8.3 **	4.0 **	3.3 **	3.7 **	3.2 **	2.7 *
High	Low	.086 **	.091 **	.028 **	.201 **	.177 **	.110 **
	Med	.190 **	.147 **	.083 **	.147 **	.114 **	.084 **
	High	.273 **	.222 **	.127 **	.308 **	.234 **	.144 **
	High-Low	.187	.131	.099	.107	.057	.034
	T-stat	9.6 **	7.9 **	8.9 **	7.8 **	3.8 **	3.1 **

Table 4, continued

Panel B. Abnormal Trading Day (open-to-close, or otc) Returns

Size-Adjusted Dispersion of Opinions: Absolute for Entire Trading Day	Near Open Relative To Trading Day	Share Turnover: Size-Adjusted Institutional Ownership Low	Medium	High	Stock Return Volatility: Size-Adjusted Institutional Ownership Low	Medium	High
Low	Low	-.010	-.009	-.005	.017	.044 **	.034 *
	Med	-.039 *	-.027	-.028	-.010	-.024	-.031
	High	-.054 **	-.039 *	-.023	.016	.036	.093 **
	High-Low	-.044	-.031	-.018	.000	-.008	.059
	T-stat	-4.7 **	-2.5 *	-1.1	.0	-.4	2.7 *
Medium	Low	-.068 **	-.052 **	-.015	.009	.001	.015
	Med	-.134 **	-.078 **	-.033 *	-.127 **	-.096 **	-.099 **
	High	-.184 **	-.107 **	-.038 *	-.069 **	-.021	.007
	High-Low	-.116	-.055	-.023	-.079	-.022	-.009
	T-stat	-6.5 **	-3.7 **	-1.7	-3.2 **	-1.0	-.4
High	Low	-.082 **	-.095 **	-.041	-.089 *	-.103 **	-.076 *
	Med	-.206 **	-.201 **	-.115 **	-.367 **	-.326 **	-.236 **
	High	-.396 **	-.329 **	-.217 **	-.487 **	-.410 **	-.262 **
	High-Low	-.314	-.234	-.176	-.398	-.307	-.186
	T-stat	-9.2 **	-8.5 **	-9.6 **	-11.9 **	-9.4 **	-6.0 **

* indicates statistical significance at the .05 level; ** at the .01 level.

Table 5. Overnight and Trading Day Returns across Portfolios Triple-Sorted by:
(1) Absolute Dispersion of Opinions Throughout the Trading Day,
(2) Relative Dispersion of Opinions Near the Open, and
(3) Institutional Ownership,
for Subsample with High Transaction Costs and High Relative Short Interest

This table reports mean overnight (close-to-open, or cto) and trading day (open-to-close, or otc) abnormal returns, for four sets of three different 3 x 3 double-sorted partitioning schemes of portfolios. In each set of three 3 x 3 schemes, we independenty triple-sort the sample every day into terciles, based on the firm's size-adjusted: (1) absolute dispersion of opinions throughout the trading day, (2) relative dispersion of opinions near the open, and (3) institutional ownership. In every set we provide three different 3 x 3 schemes stratified by the firm's (1) absolute dispersion of opinions, where the rows in each scheme are based on (2) relative dispersion of opinions, and the columns reflect (3) institutional ownership.

Overnight returns are provided in Panel A, and trading day returns appear in Panel B. The three 3 x 3 schemes on the left (right) side of each Panel present the mean abnormal returns, using share turnover (return volatility) to proxy for absolute and relative dispersion of opinions. This analysis is applied a subsample that first takes the top 50% of sample stocks each day by transaction costs, and then examines the top 20% of these stocks by relative short interest.

For every portfolio in each 3 x 3 scheme, we first compute the mean return across all firms every day, and we then average these cross-sectional means across all days in the period. The time series standard error is then used to obtain the T-statistic for each portfolio's average daily returns. At the bottom of each column in every scheme, we provide the mean difference T-test across portfolios with high versus low relative dispersion of opinions, conditional on institutional ownership (the column) and absolute dispersion of opinions (the 3 x 3 scheme).

Panel A. Abnormal Overnight (close-to-open, or cto) Returns

Size-Adjusted Dispersion of Opinions:		Share Turnover			Stock Return Volatility		
		Size-Adjusted Institutional Ownership			Size-Adjusted Institutional Ownership		
Absolute for Entire Trading Day	Near Open Relative To Trading Day	Low	Medium	High	Low	Medium	High
Low	Low	-.005	-.047 **	-.038 **	-.021	-.031 **	-.026 *
	Med	.043 **	.009	-.031 *	-.007	-.024 *	-.015
	High	.068 **	-.006	-.028	-.034	-.021	-.067 *
	High-Low	.073	.041	.010	-.014	.011	-.042
	T-stat	3.6 **	.9	.7	-0.7	0.6	-2.0 *
Medium	Low	.076 **	.054 **	-.005	.100 **	.077 **	.048 **
	Med	.155 **	.108 **	.038 *	.113 **	.085 **	.065 **
	High	.187 **	.129 **	.047	.146 **	.058 *	.042
	High-Low	.110	.076	.052	.046	-.018	-.006
	T-stat	3.9 **	3.3 **	2.0 *	1.5	-0.6	-0.6
High	Low	.159 **	.083 *	.074 **	.328 **	.277 **	.180 **
	Med	.303 **	.230 **	.153 **	.322 **	.256 **	.164 **
	High	.368 **	.243 **	.185 **	.401 **	.281 **	.202 **
	High-Low	.209	.160	.111	.073	.004	.022
	T-stat	4.2 **	3.9 **	3.9 **	3.3 **	-2.5 *	0.8

Table 5, continued

Panel B. Abnormal Trading Day (open-to-close, or otc) Returns

Size-Adjusted Dispersion of Opinions: Absolute for Entire Trading Day	Near Open Relative To Trading Day	Share Turnover, Size-Adjusted Institutional Ownership: Low	Medium	High	Stock Return Volatility, Size-Adjusted Institutional Ownership: Low	Medium	High
Low	Low	-.159 **	-.058 *	-.084 **	.017	.027	-.041
	Med	-.220 **	-.129 **	-.054	-.125 **	-.118 **	-.107 **
	High	-.217 **	-.109	-.049	-.094	.041	.045
	High-Low	-.058	-.051	.035	-.110	.014	.086
	T-stat	-1.7	-.9	.8	-0.4	0.1	1.8
Medium	Low	-.233 **	-.163 **	-.059 *	-.075	-.037	-.042
	Med	-.239 **	-.225 **	-.123 **	-.341 **	-.280 **	-.215 **
	High	-.352 **	-.230 **	-.187 **	-.279 **	-.186 **	-.070
	High-Low	-.119	-.067	-.128	-.204	-.149	-.027
	T-stat	-2.6 *	-1.6	-2.9 **	-3.7 **	-3.0 **	-0.6
High	Low	-.273 **	-.287 **	-.150 **	-.171 **	-.218 **	-.205 **
	Med	-.425 **	-.387 **	-.233 **	-.670 **	-.496 **	-.379 **
	High	-.568 **	-.403 **	-.336 **	-.781 **	-.578 **	-.410 **
	High-Low	-.294	-.116	-.186	-.610	-.359	-.204
	T-stat	-3.9 **	-1.7 *	-4.0 **	-10.0 **	-5.0 **	-3.0 **

* indicates statistical significance at the .05 level; ** at the .01 level.

Table 6. The Relation Between Overnight or Trading Day Returns and a Combined Measure of Relative and Absolute Dispersion of Opinions, Estimated Across Subsamples Stratified by Institutional Ownership

This table presents mean coefficients and T-statistics across 2,244 daily cross-sectional regressions from 1996 - 2004. On any given day the sample includes the largest 3,000 U.S. stocks for which there are TAQ data on quotes. The regression model uses interactive dummy variables to estimate the association between overnig (**cto**) or trading day (**otc**) abnormal returns and a combined measure of relative and absolute dispersion of opinions, for different subsamples based on the firm's institutional ownership, as follows.

(**cto** or **otc** Return) = a + b1(RelDisp*AbsDisp*HighINST) + b2(RelDisp*AbsDisp*MedINST) + b3(RelDisp*AbsDisp*LowINST) + b4 SIZE +ε .

The variable, AbsDisp, refers to our measure of absolute dispersion of opinions measured throughout the trading day. We use two proxies for AbsDisp: (i) daily share turnover as a percent of shares outstanding, and (ii) the standard deviation across all 30-minute returns throughout the trading day.

The variable, RelDisp, refers to our measure of relative dispersion of opinions near the open versus the rest of the trading day. We use two proxies to capture relative dispersion of opinions: (i) the difference between share turnover during the first hour of trading and turnover during the rest of the trading day, as a percent of turnover during the entire trading day, and (ii) the difference between the standard deviation across 30-minute returns during the first hour of trading and the standard deviation across 30-minute returns during the rest of the trading day.

Our regression variables, RelDisp and AbsDisp, are measured each day as the average daily values over the previous 20 trading days. SIZE is the firm's average daily market capitalization over the previous 20 trading days. Low(Med, High)INST takes a value of one for all firms in the Low(Med, High) tercile according to institutional ownership. Every day we transform the continuous explanatory variables (RelDisp, AbsDisp, and SIZE) into decile ranks and scale them to range from 0.1 to 1. The time series standard error across the mean daily regression coefficients is used to construct all T-statistics.

Dependent Variable:		Overnight Returns (cto)		Trading Day Returns (otc)	
Dispersion Measure:		Turnover	Volatility	Turnover	Volatility
Intercept	a	-.005	-.004	-.003	.043
T-stat		-.4	-.3	-.1	2.2 *
RelDisp * AbsDisp * High INST	b_1	.176	.125	-.217	-.247
T-stat		9.7 **	7.2 **	-6.7 **	-6.5 **
RelDisp * AbsDisp * Med INST	b_2	.228	.168	-.288	-.320
T-stat		9.8 **	8.2 **	-7.5 **	-8.1 **
RelDisp * AbsDisp * Low INST	b_3	.337	.279	-.428	-.470
T-stat		12.5 **	12.5 **	-10.0 **	-11.4 **
Size	b_4	-.113	-.074	.057	-.005
T-stat		-17.2 **	-9.3 **	3.1 **	-.3
[Low versus High INST]	H1: $b_1 = b_3$	.160	.154	-.211	-.223
		13.8 **	16.1 **	-10.2 **	-11.6 **
Average Sample Size (# firms / day)		2565	2457	2565	2457
Average Adjusted R^2		.027	.025	.026	.036

* indicates statistical significance at the .05 level; ** at the .01 level.

Table 7. Portfolio Approach: Extensions and Robustness Tests Based on Alternative Return Measures and Subsamples

This Table focuses on the difference between elements in the bottom versus the top row of every 3 x 3 scheme. We present mean abnormal returns for "hedge portfolios" that are long the tercile with high relative dispersion of opinions near the open (bottom row by Rel_DISP) and short the tercile with low values (top row by Rel_DISP), conditional on institutional ownership (the column) and absolute dispersion (the 3 x 3 scheme).

Panel A presents thirteen different robustness tests for overnight (cto) returns, while Panel B provides the analogous tests for trading day (otc) returns. For brevity, we only provide results for the first and third 3 x 3 schemes in each case, applied to the terciles with low and high values of absolute dispersion of opinions. Similarly, within each 3 x 3 scheme, we only report results for the terciles based on low and high institutional ownership. The base-case in each Panel reproduces the abnormal "hedge portfolio" returns (mean difference t-tests) from the 3 x 3 schemes in Table 3. In each subsequent test (row), we change only one aspect of the analysis to facilitate comparison with the base case.

Panel A. Mean Difference in Abnormal Overnight Returns (cto%) across Portfolios

	Difference across Portfolios (Rows) with High vs Low Rel_DISP							
	from 3 x 3 Scheme with Low Abs_DISP				from 3 x 3 Scheme with High Abs_DISP			
Dispersion Measure:	Low Abs_Turn		Low Abs_Vol		High Abs_Turn		High Abs_Vol	
Institutional Ownership:	Low	High	Low	High	Low	High	Low	High
Base Case (Table 3)	.03	.03	-.01	-.02	.14	.06	.07	.02
t-ratio	8.0 **	4.3 **	-2.0 *	-3.5 **	10.1 **	7.6 **	7.6 **	2.2 *
1. Using the Median Return across stocks each day	.02	.00	.00	.00	.12	.05	.06	.03
	9.6 **	1.2	-.7	-.6	10.2 **	8.8 **	9.4 **	5.8 **
2. Using Trade Prices to Measure Returns	.04	.01	-.01	-.02	.15	.07	.07	.02
	9.8 **	2.1 *	-1.3	-3.0 **	10.7 **	8.9 **	7.2 **	2.2 *
3. No Low-Price Stocks (with Price < $5)	.02	.02	-.01	-.02	.12	.06	.05	.01
	6.9 **	3.7 **	-1.5	-3.2 **	8.7 **	6.9 **	5.9 **	1.6
4. NASD Stocks	.08	.00	.02	-.06	.13	.06	.07	.00
	7.9 **	-.3	1.6	-4.0 **	4.5 **	4.0 **	4.2 **	-.3
5. NYSE Stocks	.01	.04	.00	-.02	.04	.03	.04	.03
	3.7 **	5.2 **	0.0	-2.8 **	3.5 **	5.4 **	5.5 **	5.1 **
6. Small Stock Quintile	.04	.01	.01	.01	.17	.08	.11	.00
	4.2 **	.8	.7	.7	5.8 **	4.9 **	5.2 **	.2
7. Large Stock Quintile	.01	.02	-.02	-.03	.09	.06	.02	-.01
	.8	1.1	-1.8	-3.4 **	3.6 **	4.2 **	1.5	-1.2
8. Mondays	.04	.04	.01	-.02	.17	.08	.07	.04
	4.1 **	2.5 *	.9	-1.2	5.5 **	4.2 **	3.2 **	2.7 *
9. Other Days of Week	.03	.02	-.02	-.02	.13	.06	.07	.01
	6.9 **	3.5 **	-2.7 *	-3.3 **	8.6 **	6.4 **	6.9 **	1.2
10. Low PIN Quintile	.01	.04	-.01	-.06	.13	.06	.01	-.02
	1.3	2.7 *	-1.0	-4.7 **	4.5 **	4.4 **	.8	-1.8
11. High PIN Quintile	.01	.03	.00	.02	.17	.05	.11	.03
	.6	2.1 *	.4	1.4	6.7 **	4.1 **	5.5 **	2.2 *
12. Low Liquidity Risk	.03	.04	.02	-.02	.09	.06	.08	.03
	5.0 **	3.0 **	2.0 *	-1.3	4.3 **	4.7 **	4.9 **	2.4 *
13. High Liquidity Risk	.02	-.02	.00	-.03	.10	.06	.08	.03
	2.0 *	-1.2	-.2	-2.1 *	4.1 **	4.1 **	4.7 **	1.7

Table 7, continued

Panel B. Mean Difference in Abnormal Trading Day Returns (otc%) across Portfolios

	Difference across Portfolios (Rows) with High vs Low Rel_DISP							
	from 3 x 3 Scheme with Low Abs_DISP				from 3 x 3 Scheme with High Abs_DISP			
Dispersion Measure:	Low Abs_Turn		Low Abs_Vol		High Abs_Turn		High Abs_Vol	
Institutional Ownership:	Low	High	Low	High	Low	High	Low	High
Base Case (Table 3)	-.04	-.01	.05	.05	-.23	-.10	-.29	-.10
t-ratio	-6.5 **	-1.2	3.2 **	3.5 **	-10.2 **	-7.4 **	-11.0 **	-4.2 **
1. Using the Median Return	-.03	-.01	.05	.06	-.25	-.08	-.20	-.08
across stocks each day	-6.0 **	-1.3	3.5 **	3.6 **	-12.4 **	-6.5 **	-8.1 **	-3.0 **
2. Using Trade Prices	-.05	.00	.04	.05	-.24	-.11	-.29	-.10
to Measure Returns	-7.9 **	.1	3.1 **	3.4 **	-10.7 **	-8.1 **	-11.0 **	-4.1 **
3. No Low-Price Stocks	-.04	-.01	.04	.05	-.19	-.10	-.23	-.09
(with Price < $5)	-5.8 **	-.5	3.0 **	3.6 **	-8.7 **	-7.2 **	-8.8 **	-3.7 **
4. NASD Stocks	-.13	-.02	.02	.01	-.31	-.14	-.45	-.20
	-9.7 **	-.7	.6	.2	-6.9 **	-5.3 **	-10.8 **	-4.9 **
5. NYSE Stocks	-.03	.00	.04	.05	-.08	-.06	-.04	-.03
	-4.8 **	-.3	3.7 **	3.7 **	-4.8 **	-5.8 **	-2.1 *	-2.0 *
6. Small Stock Quintile	-.03	-.04	-.02	.01	-.30	-.19	-.36	-.21
	-1.5	-1.4	-.5	.4	-6.1 **	-7.2 **	-8.3 **	-5.5 **
7. Large Stock Quintile	-.03	.00	.07	.07	-.12	-.06	-.17	-.08
	-2.7 *	-.2	3.3 **	3.6 **	-3.0 **	-2.5 *	-5.2 **	-2.7 *
8. Mondays	-.03	-.03	.09	.11	-.18	-.08	-.26	-.12
	-2.4 *	-1.4	2.6 *	3.0 **	-3.1 **	-2.6 *	-4.1 **	-2.0 *
9. Other Days of Week	-.04	-.01	.03	.04	-.24	-.10	-.29	-.10
	-6.1 **	-.7	3.3 **	2.4 *	-9.9 **	-7.0 **	-10.3 **	-3.7 **
10. Low PIN Quintile	-.02	-.01	.06	.07	-.23	-.05	-.16	-.06
	-1.5	-.4	3.0 **	3.3 **	-5.5 **	-2.3 *	-4.5 **	-2.0 *
11. High PIN Quintile	-.02	-.02	.00	.07	-.23	-.09	-.27	-.11
	-1.3	-.8	-.1	3.0 **	-5.7 **	-4.0 **	-7.3 **	-3.4 **
12. Low Liquidity Risk	-.04	.00	.02	.05	-.24	-.10	-.26	-.09
	-3.0 **	.1	1.0	2.2 *	-5.6 **	-4.5 **	-7.0 **	-2.9 **
13. High Liquidity Risk	-.06	.05	-.02	.04	-.14	-.09	-.23	-.08
	-3.8 **	1.5	-.8	1.5	-3.3 **	-3.6 **	-6.2 **	-2.2 *

* indicates statistical significance at the .05 level, and ** indicates significance at the .01 level.

Table 8. Portfolio Approach: Stability Tests for Subperiods

This Table focuses on the difference between elements in the bottom versus the top row of every 3 x 3 scheme. We present mean abnormal returns for "hedge portfolios" that are long the tercile with high relative dispersion of opinions near the open (the bottom row by Rel_DISP) and short the tercile with low values (the top row by Rel_DISP), conditional on institutional ownership (the column) and absolute dispersion (the 3 x 3 scheme by Abs_DISP).

We reproduce the analysis in Table 3 for subperiods before and after the crash of March, 2000, as well as for each year of the sample period. Panel A presents stability tests for overnight (cto) returns, while Panel B provides the analogous tests for trading day (otc) returns. For brevity, we only provide results for the first and third 3 x 3 schemes in each case, applied to the terciles with low and high values of absolute dispersion of opinions. Similarly, within each 3 x 3 scheme, we only report results for the terciles based on low and high institutional ownership. The base-case in each Panel reproduces the abnormal "hedge portfolio" returns (mean difference t-tests) from the 3 x 3 schemes in Table 3. In each subsequent row, we apply the same approach to different subsamples.

Panel A. Mean Difference in Abnormal Overnight Returns (cto%), for SubPeriods

Difference across Portfolios (Rows) with High vs Low Rel_DISP

	from 3 x 3 Scheme with Low Abs_DISP				from 3 x 3 Scheme with High Abs_DISP			
Dispersion Measure:	Low Abs_Turn		Low Abs_Vol		High Abs_Turn		High Abs_Vol	
Institutional Ownership:	Low	High	Low	High	Low	High	Low	High
Base Case (Table 3)	.03	.03	-.01	-.02	.14	.06	.07	.02
t-ratio	8.0 **	4.3 **	-2.0 *	-3.5 **	10.1 **	7.6 **	7.6 **	2.2 *
Before March 1, 2000	.03	.03	.03	.02	.14	.09	.11	.07
	6.9 **	3.5 **	4.9 **	3.5 **	9.1 **	8.3 **	9.5 **	8.0 **
After March 1, 2000	.03	.03	-.05	-.06	.14	.04	.04	-.03
	4.8 **	2.8 **	-5.8 **	-6.4 **	6.4 **	3.4 **	2.8 **	-2.6 *
1996	.02	.01	.00	.02	.04	.06	.05	.03
	3.2 **	.7	-.1	1.8	1.6	3.8 **	2.8 **	2.1 *
1997	.01	.03	.01	.01	.06	.08	.04	.02
	.9	2.4 *	1.2	.6	2.8 **	3.1 **	2.2 *	1.0
1998	.04	.05	.01	.01	.13	.10	.11	.07
	4.0 **	2.6 *	1.0	.6	4.1 **	4.2 **	5.4 **	3.7 **
1999	.06	.01	.09	.04	.27	.11	.18	.14
	5.5 **	.6	5.9 **	3.0 **	6.7 **	5.3 **	6.3 **	8.1 **
2000	.05	.05	-.02	-.03	.26	.14	.13	-.01
	2.9 **	2.5 *	-.7	-1.8	5.1 **	4.1 **	3.2 **	-.1
2001	.01	.02	-.06	-.09	.15	-.01	.07	-.02
	.4	1.2	-3.2 **	-4.0 **	2.6 *	-.3	2.0 *	-.8
2002	.02	.05	-.08	-.07	.10	.01	.01	-.03
	1.4	1.7	-4.7 **	-3.1 **	1.7	.3	.3	-1.0
2003	.04	.02	-.01	-.04	.18	.06	.03	-.03
	5.7 **	1.0	-.9	-2.2 *	5.0 **	2.9 **	1.1	-1.9
2004	.02	.02	-.05	-.04	.08	.01	.01	-.03
	2.4 *	.6	-2.6 *	-2.2 *	2.3 *	1.0	.2	-1.9

Table 8, continued

Panel B. Mean Difference in Abnormal Trading Day Returns (otc%), for SubPeriods

	Difference across Portfolios (Rows) with High vs Low Rel_DISP							
	from 3 x 3 Scheme with Low Abs_DISP				from 3 x 3 Scheme with High Abs_DISP			
Dispersion Measure:	Low Abs_Turn		Low Abs_Vol		High Abs_Turn		High Abs_Vol	
Institutional Ownership:	Low	High	Low	High	Low	High	Low	High
Base Case (Table 3)	-.04	-.01	.05	.05	-.23	-.10	-.29	-.10
t-ratio	-6.5 **	-1.2	3.2 **	3.5 **	-10.2 **	-7.4 **	-11.0 **	-4.2 **
Before March 1, 2000	-.04	-.01	.05	.05	-.20	-.10	-.25	-.10
	-4.6 **	-.5	2.9 **	2.7 *	-7.3 **	-5.8 **	-7.8 **	-7.6 **
After March 1, 2000	-.04	-.02	.04	.06	-.26	-.10	-.31	-.11
	-4.8 **	-1.2	2.0 *	2.4 *	-7.4 **	-4.8 **	-8.0 **	-2.8 **
1996	-.04	-.03	.02	-.03	-.16	-.09	.03	-.01
	-3.3 **	-1.7	1.1	-1.3	-3.5 **	-2.6 *	.7	-.2
1997	-.07	.01	.06	.09	-.14	-.12	.06	.06
	-5.3 **	.3	1.8	2.6 *	-3.4 **	-3.0 **	1.1	1.4
1998	-.03	-.02	.04	.09	-.17	-.14	-.17	-.14
	-1.9	-.6	1.0	2.1 *	-3.3 **	-4.1 **	-2.6 *	-2.2 *
1999	-.02	.02	.06	.07	-.29	-.06	-.79	-.25
	-1.0	.8	1.7	1.6	-3.8 **	-1.7	-10.6 **	-4.6 **
2000	-.04	-.03	.18	.19	-.57	-.26	-.65	-.29
	-1.6	-1.1	3.2 **	3.6 **	-7.3 **	-4.9 **	-5.7 **	-2.4 *
2001	-.03	-.04	.01	-.01	-.29	-.07	-.48	-.05
	-1.3	-1.5	.3	-.1	-3.2 **	-1.5	-4.7 **	-.5
2002	-.04	.00	.03	.04	-.10	-.08	-.25	-.08
	-1.9	.0	.7	.8	-1.1	-1.5	-2.9 **	-1.0
2003	-.03	-.02	-.01	.02	-.12	-.05	-.17	-.10
	-2.5 *	-.8	-.2	.3	-1.8	-1.7	-2.7 *	-1.6
2004	-.06	.02	.01	.02	-.25	-.03	-.14	-.07
	-3.5 **	.5	.2	.5	-4.9 **	-1.2	-2.5 *	-1.3

* indicates statistical significance at the .05 level, and ** indicates significance at the .01 level.