DIVERGENCE OF OPINIONS, SHORT SALES, AND ASSET PRICES

A Dissertation

by

BILAL ERTURK

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

August 2006

Major Subject: Finance

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ABSTRACT

Divergence of Opinions, Short Sales, and Asset Prices. (August 2006)

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Prior research has established that stocks with high dispersion of earnings forecasts or short interest are associated with low subsequent returns. Assuming dispersion of forecasts is a proxy for divergence of opinions and short interest is a proxy for short selling constraints, these results have been traditionally attributed to correction for overpricing created by binding short selling constraints. This argument is provided by Miller (1977), and states that prices reflect an optimistic view when investors with pessimistic views can not trade due to short selling constraints, and that the more opinions diverge, the more stocks become overpriced. I test whether dispersion of forecasts exacerbates overpricing, but find evidence contrary to Miller's theory. When dispersion of forecasts increases, prices decrease. I offer an explanation based on analysts' reluctance to quickly revise their forecasts downward. I show that some analysts' sluggish response to bad news results in dispersion of forecasts. The inertia in downward forecast revisions also leads to market underreaction to bad news. Therefore, the negative relationship between dispersion and subsequent returns may be attributable to analysts' sluggish response to bad news. I also examine the return predictability of firms with high short interest and low institutional ownership. Short interest seems to predict not only future stock returns but also future earnings news, especially for firms with lower institutional ownership. Therefore, the return predictability of short interest seems to be associated with value relevant information short sellers seem to have gathered.

Dedicated to my father Ali, and mother Fethiye

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CHAPTER I
INTRODUCTION

Prior studies find stock return patterns, which seem consistent with short sale constraints. A set of studies that examine the relationship between dispersion of analysts' forecasts, short interest and subsequent stock returns find that stocks with high dispersion of forecasts or high short interest earn lower future returns. Diether et al. (2002) and Boehme et al. (2005) contend that stocks with high divergence of opinions would be overpriced due to short selling constraints. Interpreting short interest as shorting demand and institutional ownership as shorting supply, Asquith et al. (2005) argue that stocks with high shorting demand and low supply would be overpriced resulting in lower future returns. Therefore, Asquith et al. (2005), Diether et al. (2002), and Boehme et al. (2005) argue that the empirical evidence is consistent with the idea that short selling constraints cause overpricing.

The argument for short selling constraints was provided by Miller (1977), and states that marginal investor is an optimist; therefore, prices are greater than the consensus value. The argument's main point is that prices reflect optimistic view when investors with pessimistic views can not trade due to short selling constraints and that the more opinions diverge, the more stocks become overpriced.

In this study, I offer alternative explanations for the above empirical findings and demonstrate some evidence, which suggests that the findings may also be consistent with these explanations. Firstly, analysts are under pressure to be optimistic and reluctant to respond to bad news. Sluggish response of optimistic analysts to poorly performing firms results in increased dispersion; therefore, dispersion predicts low future returns. So, dispersion effect may be a consequence of sluggish downward forecast revisions. Secondly, I find that short interest is informative not only for future stock returns but also for future earnings surprises, especially when institutional ownership is low. As a result, return predictability of short interest seems to be associated with value relevant information short sellers seem to have gathered.

This thesis follows the style of The Journal of Finance.

CHAPTER II
DISPERSION OF FORECASTS AND STOCK RETURNS

A. Introduction

Investors hold different opinions on a variety of economic variables[1]. The majority of theoretical papers view the degree by which investors disagree as a risk factor, and therefore, predict a positive relationship between divergence of opinions and asset returns[2]. However, recent empirical papers find that stocks which are associated with higher divergence of opinions earn, on average, lower subsequent returns.[3] This result is interpreted to be consistent with two arguments. The first, set forth by Diether, Malloy, and Scherbina (2002) and Boehme, Danielsen, and Sorescsu (2005), provides empirical evidence consistent with Miller (1977) argument. Miller suggests that whenever there is divergence of opinions among investors and short selling constraints bind, pessimistic investors will be absent from the market while optimistic investors will push stock prices up causing overvaluation. The greater the divergence of opinions, the greater the upward bias in stock prices. Therefore, this upward bias in stock prices is assumed to lead to lower future returns in the subsequent correction periods. The second interpretation views differences of opinion as a proxy for unpriced information risk. Considering equity of a levered firm as an option on the assets of the firm, Johnson (2004) argues that equity prices should increase and expected returns should decrease with the level of idiosyncratic asset risk.

This paper contributes to our understanding of the relationship between dispersion of analysts' forecasts and asset prices (which I'll call *dispersion effect* hereafter) in two directions. First, using dispersion of earnings forecasts to proxy for divergence of opinions, I empirically show that stock prices move in the opposite direction of what Miller predicts: when dispersion of forecasts increases, prices decrease. However,

[1] For example, Welch (2000) reports economists' view on the equity risk premium that ranges from 2% for the pessimists to 13% for the optimists, Diether, Malloy, and Scherbina (2002) report substantial variation in analysts' earnings per share forecasts.
[2] An extensive discussion of these theories is provided later in the literature review section.
[3] For example, Diether et al. (2002) and Boehme et al. (2005) provide evidence that stocks with higher dispersion in analysts' earnings forecasts earn lower returns. Chen, Hong, and Stein (2002) find that stocks whose change in breadth (proportion of investors with long positions) in the prior quarter is the lowest underperform those whose change in breadth is the highest.

according to Miller (1977), the more opinions diverge, the more stocks may become overpriced. As a result, Miller's argument doesn't seem a plausible explanation of the robust finding that dispersion of analysts' forecasts predicts lower returns. Second, I offer an alternative explanation based on some analysts' reluctance to quickly incorporate negative information into their forecasts. I argue that when some analysts are more sluggish than others to respond to bad news, this results in increased dispersion of forecasts. I show that firms with recent negative performance exhibit high dispersion compared to others and that increase in dispersion is associated with downward revision of the consensus estimate. Also, the inertia in downward consensus forecast revisions leads to market underreaction to bad news, which in turn, predicts lower subsequent returns. The negative relationship between dispersion of forecasts and subsequent returns may be, in part, attributable to dispersion created due to some analysts' sluggish response to bad news as the market do not fully recognize incomplete response of analysts to negative news.

Firstly, I investigate the interpretation set forth by Diether et al. (2002) and Boehme et al. (2005) for the dispersion effect. The argument provided by Miller applies to the relationship between differences of opinion and *prices*, not returns. According to Miller, overpricing is directly proportional to the level of opinion divergence. In order to observe a negative relationship between differences of opinion and subsequent returns, overpricing should be corrected via convergence of opinions in the future. Price correction should be associated with the resolution of disagreement. If disagreement about the stock value does not diminish, future returns will not be abnormally low. Therefore, Miller implies that, over the same period, *changes* in dispersion of opinions and *returns* should be positively correlated. In his own words:

"… as long as a minority of potential investors can absorb the issue, an increase in the divergence of opinion will increase the market clearing price….. On the other hand, if the divergence of opinion decreases, ….. the market clearing price falls." (p. 1153)

I examine the predictions of Miller (1977) in a dynamic setting when dispersion of forecasts is used to proxy for divergence of opinions, and find that Miller's argument is not consistent with the data. I investigate the cross-sectional correlation between changes in dispersion and returns, and find that, in fact, changes in dispersion are negatively correlated with contemporaneous returns. When I sort stocks into five portfolios based on each firm's monthly change in dispersion and compare with the returns in the same period, I find that stocks in the top portfolio (that experience increase in dispersion) underperform stocks in the bottom portfolio (that experience decrease in dispersion) by 0.94% monthly. The results hold after controlling for size, book to market, and momentum effects. This finding is not consistent with Miller's prediction mentioned above since an increase in dispersion does not increase prices if dispersion of analysts' forecasts is used to proxy for divergence of opinions.

Secondly, I provide a new approach to dispersion effect based on (dis)incentives that some analysts face while reporting their forecasts. Prior research have documented that analysts' forecasts are overly optimistic (e.g. Ackert and Hunter (1994), Easterwood and Nutt (1999), De Bondt and Thaler (1990), Daniel, Hirshleifer, and Teoh (2002) among others). Analysts' positive bias is generally attributed to conflicts of interest due to brokerage houses' investment banking relationships (Michaely and Womack (1999), and Ackert and Hunter (1994)) or analysts' efforts to maintain good relations with the firm management in order to have access to management's private information (Francis and Philbrick (1993) and Lim (2001)).

The positive bias of analysts is found to be mostly due to analysts' reluctant response to poorly performing firms. Analysts may have disincentives to be the front runner with the bad news because this might harm the relations with the management. Some analysts may find it in their best interest to wait for additional confirmation of poor earnings before slowly revising their estimates downwards. Therefore, some analysts may refrain from fully revising their estimates downwards for poorly performing firms and act sluggishly when it comes to downward revisions (see Francis and Philbrick (1993), Lim (2001), Chan et al. (1996), and Conrad et al. (2005)). If some analysts are sluggish in responding to bad news, consensus downward revisions may be insufficient too (Elliot et al. (1995)), which suggests that on average analysts underreact to bad news.

Although analysts are, on average, optimistic and reluctant to downward revisions, there are differences across analysts in terms of their forecast accuracy and responsiveness to bad news. For example, Dugar and Nathan (1995), Lin and McNichols

(1998), and Michaely and Womack (1999) document that analysts who follow firms that are also investment banking clients of their firms are more optimistic in their forecasts relative to other analysts. Experienced analysts (Mikhail et al. (2003b)) and "All American" analysts (Stickel (1992)) are found to have more accurate forecasts and less underreaction to prior earnings information. They also supply forecasts more often than other analysts. Zhang (2005) report that about half of the analysts revise their forecasts within three trading days after earnings announcements, whereas the other half take more than a month to update their forecasts. Since some analysts are more reluctant to revise their forecasts downward than others and some are quicker in terms of updating forecasts, we would observe two consequences of these behaviors. Not only revision in consensus estimates would be insufficient, but also dispersion may be observed as a consequence of some analysts' reluctance to downgrade for poorly performing firms. For the simplest example, think of a firm followed by two analysts. When negative information comes in for the firm, the optimistic analyst may want to wait for additional confirmation to revise her forecast while the other downgrades the firm. This would consequently increase the dispersion of forecasts.

These observations are particularly important since analysts' behaviors become relevant for asset pricing as the evidence shows that investors rely on analysts' forecasts for price discovery (Dechow and Soan (1997), and Dechow et al. (2000)). Mikhail et al. (2003a) find that post earnings announcement drift associated with firms with more experienced analysts following is lower because experienced analysts have more accurate forecasts. The authors suggest that the efficiency of a firm's stock price is, in part, affected by the analysts' forecast accuracy. Michaely and Womack (1999) show that long run performance of firms recommended by underwriter analysts are significantly worse than those of firms recommended by other analysts. Similarly, the significance of analysts' actions on stock prices are documented by Zhang (2005) who finds that post-earnings announcement drift is significantly lower when the analysts following the firm are quicker in terms of updating their forecasts. She concludes that the speed at which analysts incorporate new information into their forecasts is closely related to market underreaction to earnings announcements. Significant price drifts are also found after consensus forecast revisions especially for firms with poor earnings performance (Chan et al. (1996)). Price drifts may occur if analysts are especially slow in revising their estimates downward, and in turn, the inertia in revising forecasts may prevent the market to incorporate new information in a timely fashion. The above empirical results demonstrate that analysts' forecasts and recommendations are part of the information set market participants use for price discovery; however, it seems that investors do not fully recognize and correct for possible biases of analysts' behaviors.

In this paper, I propose that due to heterogeneity among analysts' behaviors, after negative news about a firm, if some analysts update their forecasts downward and others act reluctantly and refrain from revising their forecasts downward, forecasts may become more dispersed. We would observe high dispersion for firms with recent poor performance or, put differently, increase in dispersion would be associated with downward revision of the consensus estimate. When I use past return or earnings performance to determine whether there was good or bad news about the firm, I empirically confirm that poorly performing firms have high dispersion of forecasts compared to others. Moreover, I find that dispersion and standard deviation of analysts' forecasts increase following poor performance. This result also sheds some light on why we observe lower returns when dispersion increases as found above which is not consistent with Miller (1977) explanation. As indicated by previous research, since investors may not recognize and fully correct for analysts' insufficient response to bad news, market reaction to bad news might be incomplete. Therefore, we would empirically observe continuation of low returns for poorly performing firms with high dispersion of forecasts. The argument set forth here asserts that the negative relationship between dispersion and subsequent returns may be in part attributable to dispersion of forecasts created due to some analysts' sluggish response to bad news and, in turn, insufficient revision of the consensus estimate. Therefore, the return differential between high dispersion and low dispersion stocks should be most pronounced for firms with recent poor performance. On the other hand, dispersion of forecasts should not predict low returns for firms with good performance.

Consistent with this argument, I find that only among firms that have negative performance in the recent past (three or six months), high dispersion stocks underperform low dispersion stocks. For example, among poorly performing firms, high dispersion stocks underperform low dispersion stocks by 1.07% monthly; however, among firms with good performance, the return differential is an insignificant 0.43%. Additionally, cross-sectional regressions of return show that the interaction variable between dispersion and recent past performance is significantly negative, which suggests that the dispersion effect is most pronounced for poorly performing firms.

This paper is related to Scherbina (2004), which links optimistic bias of earnings to dispersion of forecasts. Scherbina (2004) calculates a measure of bias in earnings assuming that when an analyst does not post a forecast, her estimate is one cent below the lowest existing estimate. She finds that the positive bias predicts lower future returns. However, this paper differs in major respects. First, while Scherbina assumes that when an analyst has a negative opinion, she might not report at all, this paper proposes that an analyst might keep her previous estimate and act sluggishly to change it downward[4]. Second, while Scherbina takes dispersion of forecasts as given, this paper provides an explanation about how dispersion may occur due to non-synchronous response of analysts to bad news. Third, this paper's implications regarding the dispersion effect do not depend on analysts dropping out from the data.

The paper is organized as follows. Section B reviews theoretical and empirical arguments explaining the relationship between differences of opinion and stock returns. Section C shows the data, the methodology and procedure of forming portfolios on the basis of dispersion in analysts' forecasts. Section D presents our results where we test Miller's predictions Section E describes analysts' biases and their reactions toward positive versus negative news, and cross-sectional explanations of dispersion of opinions. Section F describes how analysts' biased behaviors may have implications for asset prices.

B. Differences of Opinion: A Literature Review

In this section, I provide a brief literature review on the implications of divergence of opinions on asset prices, and show some empirical evidence, which suggests that firms with high dispersion of forecasts earn lower subsequent returns. In a

[4] The assumption in this paper seems more reasonable since IBES keeps the previous estimate even if an analyst chooses not to report in a particular month.

world of heterogeneous beliefs, asset prices may be affected by the consensus of the market as well as by the degree by which investors disagree about the stochastic properties of cash flows. Since means cannot be estimated without error from observed returns, this introduces the possibility of heterogeneous expectations among investors. Many theoretical papers find that differences of opinion should be a priced risk factor. Williams (1977) shows a positive association between future stock returns and differences of opinion. He asserts that the difficulty in assessing the probability distribution of stock return payoffs should have pricing implications. When investors tend to hold different subjective opinions about stocks' future return payoffs, investors will demand high rates of return in order to invest, and its impact on prices should be compounded by the degree of disagreement.

If we assume perfect capital markets and ignore short selling constraints, the cross-sectional variation of investors' expectations always emerge as a risk factor in theoretical models. For example, in Basak's (2004) Bayesian learning framework, the standard consumption CAPM type expression obtains, with the risk premium of a security replaced by a risk-tolerance-weighted average of each investor's perceived risk premium. David (2004) constructs a general equilibrium exchange economy in which each agent faces the risk of trading loss if prices move more in line with the beliefs of other agents. As a result, the premium agents demand to hold stocks is larger at times of higher dispersion of beliefs. In Varian's (1985) Arrow-Debreu model, in general, an asset with more dispersed subjective probabilities will have a lower price than an asset with less dispersed subjective probabilities. Anderson, Ghysels, and Juergens (2005) use a constant dividend growth model to extrapolate return forecasts. They show that dispersion of earnings forecasts is a priced factor when they substitute earnings forecast in for expected future dividend and long-term earnings forecast for the growth of dividends to estimate expected future returns. Lastly, Qu, Starks, and Yan (2004) show that portfolios with higher levels of dispersion have more exposure to Fama-French three factors.

The theoretical rational expectations models that acknowledge short selling constraints also do not predict a consistent overpricing. Diamond and Verrecchia (1987) suggest that restrictions on short sales drive relatively uninformed traders out of the pool of shorts more so than it drives out relatively informed traders. The short positions in the presence of short selling constraints constitute a stronger signal to the market which in turn is incorporated into investors' expectations. These predictions imply the assumption that rational investors will try to adapt to the market conditions and thus eliminate mispricing. Moreover, in a dynamic general equilibrium economy with heterogeneous beliefs, Gallmeyer and Hollifield (2005) find that stocks prices are more depressed in an economy with short sale constraints compared to one without short sale constraints. In their model, a large increase in interest rates more than offsets the decrease in risk premium and depresses the stock prices when short sale constraints are introduced.

Recent empirical research uses several proxies for differences of opinion inherent in the market, and finds that asset returns are decreasing in differences of opinion. For instance, the pricing factor that Anderson et al. (2005) construct from disagreement among analysts' earnings forecasts has a negative premium. Chen, Hong and Stein (2002) argue that when breadth of ownership is low (when few mutual funds have long positions), this signals that short sales constraint is binding tightly and that prices are high relative to fundamentals. They find that the stocks whose change in breadth in the prior quarter is the lowest underperform those in the top change in breadth decile by 6.38% in the first 12 months. However, their results are questionable if mutual fund managers have better stock picking skills than individuals, and if further rounds of buying push the price up in subsequent quarter via price pressure effect. Chen et al. (2002) lend some support to this criticism with the finding that when funds are net buyers of a stock, the stock tends to outperform over the next year, and vice versa.

Additional evidence is provided by Diether et al. (2002) and Boehme et al. (2005) who use dispersion in analysts' earning forecasts as a proxy for differences of opinion. Diether et al. (2002) find that stocks with high dispersion of forecasts underperform stocks with low dispersion by 0.79% per month. Moreover, Boehme et al. (2005), using existing short interest level to proxy for short selling constraints, demonstrate that dispersion effect is more pronounced among short sale constrained firms. Both papers argue that the evidence is consistent with the Miller (1977) hypothesis, which states that prices reflect optimistic view when investors with pessimistic views can not trade due to short selling constraints. Therefore, the bigger the disagreements about a stock's value, the higher the market price relative to the true value of the stock, and the lower its future returns. In addition, Sadka and Scherbina (2006) show that the mispricing is mostly concentrated on the less liquid stocks. On the other hand, Scherbina (2001) reports some results inconsistent with the short selling constraints argument. She finds that the return differential between low and high dispersion stocks is still significant for the stocks in S&P 500 index, which should be very cheap to short sell. Johnson (2004) has an alternative approach to dispersion of analysts' forecasts. He views it as uncertainty about the firm value, and argues that it is a non-systematic risk, therefore should not be priced. If we consider equity of a levered firm as a call option on the firs assets, Johnson (2004) shows that option value of equity should increase and expected equity returns should decrease with the idiosyncratic asset risk. As a result, there may be other factors that explain the relation between dispersion and subsequent stock returns.

C. Data and Methodology

This section explains the data and portfolio construction methods used. I use three data sources for this paper. Return and volume data are drawn from the monthly stock file of the Center for Research in Securities Prices (CRSP). Accounting data are taken from COMPUSTAT annual files. The analysis on financial analysts' earnings estimates is obtained from the Institutional Brokers Estimate System (I/B/E/S). Specifically, I use "unadjusted" U.S. Summary History datasets from I/B/E/S in order to be free of any biases due to stock splits[5]. The Summary History dataset contains the summary statistics on analyst forecasts of earnings per share, such as the number, mean and standard deviation values. These variables are calculated according to all outstanding forecasts as of the third Thursday of each month. I choose the time period of January 1983 through December 2001 for analysis in this paper so that the results are comparable to those of Diether et al. (2002) and Johnson (2004). Table I presents summary statistics.

I follow Diether et al. (2002) by employing a portfolio-based analysis and assigning stocks to portfolios based on firm characteristics in order to reach conclusions for these classes of stocks. This is a standard approach in asset pricing to reduce the

[5] A more detailed discussion of the bias due to stock splits is provided by Diether et al. (2002).

Table I
Summary Statistics on Analyst Coverage

The sample contains NYSE-AMEX-NASDAQ stocks during the period from January 1983 to December 2001. Stocks are included in the sample if it has one earnings estimate, is followed by two or more analysts, and has a price greater than five dollars. Data on analyst forecasts are from Summary I/B/E/S File. Coverage is the number of analysts issuing a forecast in a given month. Dispersion is the ratio between the standard deviation of analysts' earnings forecasts and the absolute value of the mean of the forecasts. Size is the market value of equity.

Year	Number of Firms	Mean coverage	Median coverage	Mean size	Median size	Mean dispersion	Median Dispersion
1983	1641	8.87	7	829.45	264.58	0.33	0.07
1984	2008	8.99	7	726.88	217.58	0.24	0.06
1985	2091	9.69	7	861.06	240.17	0.25	0.06
1986	2125	9.97	7	1,065.58	273.1	0.29	0.07
1987	2192	9.81	7	1,221.67	290.19	0.29	0.07
1988	2176	10.14	7	1,163.91	279.95	0.21	0.06
1989	2258	10.23	7	1,290.6	271.69	0.22	0.05
1990	2156	10.14	7	1,327.9	256.17	0.19	0.06
1991	2188	9.75	7	1,530.71	302.95	0.21	0.06
1992	2331	9.11	6	1,594.53	323.16	0.21	0.05
1993	2691	8.97	6	1,604.68	331.77	0.16	0.05
1994	2991	8.41	5	1,469.09	292.62	0.16	0.04
1995	3132	8.12	5	1,681.43	316.07	0.14	0.04
1996	3491	7.62	5	1,922.80	349.74	0.16	0.04
1997	3741	7.37	5	2,333.42	384.44	0.14	0.03
1998	3658	7.57	5	2,946.35	427.21	0.14	0.03
1999	3392	8.09	6	3,772.91	474.44	0.16	0.03
2000	3104	8.12	6	4,852.49	643.87	0.14	0.03
2001	2625	8.17	6	4,808.63	724.35	0.15	0.03

variability in returns or measurement errors. I include the annual earnings estimates that are made for the current fiscal year end if at least two analysts are following the firm. I exclude stocks with share price lower than five dollars in order to reduce any bias in results that can be caused by small illiquid stocks or by bid-ask bounce. I use a measure of dispersion in analyst forecasts of earnings per share as a proxy for differences of opinion about a firm's prospects. For each month, the coefficient of variation of analysts' earnings estimates for the fiscal year end is calculated as the standard deviation of forecasts scaled by the absolute value of the mean forecasts. For portfolios sorted on dispersion, if the mean earnings forecast is zero, then I assign the stock to the highest dispersion category. For robustness checks, I run the analysis excluding observations with mean earnings forecast of zero. The results are virtually identical. I also use book value of equity per share as an alternative way to scale the standard deviation of earnings

Table II
Cross-sectional Explanations of Dispersion

This table represents the level of dispersion based on average firm characteristics. The period covered is January 1983 to December 2001. Stocks are included in the Summary History I/B/E/S File that have at least two analyst coverage and have price greater than or equal to five dollars. Each month, stocks are sorted into five groups based on specific firm characteristics (size, B/M, R&D, Dividends per share, return momentum, and change in consensus forecast as calculated from the past six months). The dispersion of analysts' forecasts is presented for each portfolio. Dispersion is defined as the ratio between the standard deviation and the absolute value of the mean forecasts of earnings per share for the current fiscal year end.

	Mean Level of Dispersion					
	Size	B/M	Momentum	R&D	Dividends	Forecast Change
Portfolio1 (low)	0.54	0.26	0.53	0.22	0.60	0.47
	0.34	0.21	0.26	0.25	0.40	0.14
	0.27	0.22	0.18	0.22	0.25	0.07
	0.21	0.24	0.22	0.33	0.17	0.07
Portfolio5 (high)	0.13	0.56	0.29	0.72	0.11	0.22

forecasts. This alternative specification does not significantly affect our results either.[6] To minimize problems associated with outliers and non-linearity, I follow Johnson (2004) to use percentile rank for dispersion in cross-sectional regressions.

I employ portfolio approach and Fama and MacBeth (1973) cross-sectional regressions in order to demonstrate the relationship between dispersion of opinions, firm characteristics, and subsequent returns. I use return momentum and earnings momentum to determine whether a particular firm is associated with good or bad news during the recent past (3-6 months). Momentum is calculated as past returns from month t-7 to t-2. I follow Chan et al. (1996) to calculate earnings momentum using changes in analysts' forecasts of earnings.

$$REV(n)_{it} = \sum_{m=0}^{n} \frac{F_{it,-m} - F_{it,-m-1}}{P_{it,-m-1}} \qquad (1)$$

[6] The results under alternative specifications of excluding observations with zero mean earnings forecast and using book value of equity per share for scaling are available upon request.

I define REV(n), n-month moving average of past changes in analysts' earning forecasts. F_{it} is the consensus forecast in month *t* of firm *i*'s earnings for the current fiscal year. The monthly consensus forecast revisions are scaled by the prior month's stock price.

Firm size is calculated each month as the number of shares outstanding times price per share. B/M ratio is obtained by dividing the book value of equity from the previous fiscal year to the market value of equity at the end of each month, so the B/M ratio is updated each month. The accounting data such as R&D expenses and dividends per share are obtained from the previous fiscal year end of the observed dispersion variable. For the portfolio analysis, each month I assign stocks into five quintiles depending on each of the cross-sectional firm characteristics. Then, I compare the level of dispersion of analysts' earnings forecasts across these portfolios. Table II demonstrates a number of stylized facts about dispersion. First, I find that firms that may be characterized with greater information asymmetry have higher dispersion of forecasts. For example, smaller firms, firms with high R&D expenses and low dividends per share are associated with high dispersion. Diether et al. (2002) also report similar results regarding size. These findings are consistent with the notion that financial analysts disagree more about firms, which have relatively narrower information sets available to the public (Barron et al. (1998)). Second, I also document significant relationship between dispersion and performance measures. It seems financial analysts disagree more about poorly performing firms. Stocks with negative earnings and return momentum, and low dividend per share seem to exhibit high dispersion of analysts' forecasts. Finally, stocks with high B/M also exhibit higher dispersion. This might sound surprising since analysts would be expected to disagree more about growth stocks, which have more intangible value. Instead distressed firms or firms that have done poorly in the past have more dispersed forecasts. Diether et al. (2002) and Johnson (2004) confirm the findings regarding B/M and momentum. However, they don't elaborate on this finding, which is a key argument in this paper.

I replicate the findings of Diether et al. (2002), and confirm that high dispersion stocks exhibit lower subsequent returns. Each month, I sort stocks into five quintiles based on dispersion in analyst earnings forecasts as of the previous month. I calculate monthly portfolio returns as the equal-weighted average of the returns of all the stocks in

Table III
Mean Portfolio Returns Based on Dispersion in Analysts' Earnings Forecasts

This table represents average monthly returns of dispersion portfolios. The period covered is January 1983 to December 2001. Stocks are included in the Summary History I/B/E/S File that have at least two analyst coverage and have price greater than or equal to five dollars. Each month, stocks are sorted into five groups based on the level of dispersion in analysts' earnings forecasts for the previous month. Dispersion is defined as the ratio between the standard deviation and the absolute value of the mean forecasts of earnings per share for the current fiscal year end. Stocks with a mean forecast of zero are assigned to the highest dispersion portfolio. t-statistics are calculated according to robust standard errors. [a, b, c] shows statistical significance at the one, five, and ten percent levels, respectively.

	Dispersion	Mean Returns			
		Holding Period			
Dispersion Quintiles		1-month	3-month	6-month	January Only
D 1 (low)	0.012	1.48	1.43	1.42	2.40
D 2	0.028	1.35	1.33	1.32	2.91
D 3	0.049	1.24	1.17	1.17	3.14
D 4	0.098	1.13	1.05	1.06	3.74
D 5 (high)	0.804	0.73	0.76	0.79	4.67
Low – High	0.792[a]	0.75[b]	0.67[b]	0.63[b]	-2.27[b]
t-statistic	15.12	2.38	2.75	2.51	2.47

	Mean Returns			
	80s		90s	
Dispersion Quintiles	January Only	All Months	January Only	All Months
D 1 (low)	3.48	1.51	1.64	1.45
D 2	3.39	1.40	2.37	1.31
D 3	3.44	1.23	2.53	1.22
D 4	3.63	0.98	3.25	1.18
D 5 (high)	4.17	0.53	4.35	0.82
Low – High	-0.69	0.98[a]	-2.71[b]	0.63
t-statistic	0.93	3.24	2.11	1.58

the portfolio, and then compare average returns across portfolios sorted on dispersion. A zero investment strategy, which buys low dispersion stocks and sells high dispersion stocks, earns 0.75% per month. Indeed, high dispersion stocks yield significantly lower subsequent returns than low dispersion stocks, which is apparently in contradiction with any risk-based argument for differences of opinion. Holding periods longer than one month are also shown in Table III. The return of zero investment strategy monotonically declines with the holding period as reported by Diether et al. (2002). Moreover, I report January returns of portfolios sorted on dispersion. Interestingly contrary to the rest of the year, high dispersion stocks earn higher returns in January. Since it's found that loser stocks exhibit high dispersion, this finding is consistent with the earlier research, which suggests that loser stocks outperform others in January unlike the rest of the year.

D. The Effect of Changes in Dispersion on Stock Returns

In this section, I present a test of Miller's (1977) argument as an explanation for why high dispersion stocks earn lower returns. The empirical evidence in Diether et al. (2002) and Boehme et al. (2005) seems consistent with Miller (1977); assuming dispersion of forecasts is an unbiased measure of disagreement in the market. However, with a more direct test, I demonstrate that stock price movements in relation with dispersion of opinions are inconsistent with Miller's predictions since increase in dispersion of opinions is associated with decrease in prices.

The primary argument set forth by Miller actually applies to the relationship between differences of opinion and stock prices. He indicates that constraining pessimists without constraining optimists results in an upward bias in stock prices. The assertion that high dispersion stocks will underperform low dispersion stocks has an implicit assumption regarding convergence of opinions. Within the framework of Miller's argument in order the high dispersion stocks to underperform; convergence of prices down to fundamental values should be due to a decrease in divergence of opinions. When the uncertainty about the stock value is resolved, upward bias in prices fades away, leading to low returns on the high dispersion stocks. Otherwise, if the divergence of opinions remains the same, prices would continue to stay upwardly biased leading to no relation between divergence of opinions and stock returns. Therefore, the translation of Miller's overpricing argument into returns would suggest that decrease in dispersion should be associated with lower returns. According to Miller, stocks would underperform if opinions converge from one period to the next; and stocks would overperform if opinions further diverge since the stocks would become even more overpriced in the next period. If differences of opinion exacerbate overpricing, greater dispersion would generate greater overpricing. More specifically, a decrease in dispersion should generate lower returns, and an increase in dispersion should generate higher returns.

Table IV
Mean Portfolio Returns by Change in Dispersion and Standard Deviation of Analysts' Earnings Forecasts.

This table presents average monthly returns of portfolios sorted on change in dispersion and change in standard deviation of analysts' forecasts. Also, each month, stocks are sorted into five groups by the level of dispersion, and stocks in each of these groups are then sorted into five additional groups based on change in dispersion in analysts' earnings forecasts. The period covered is January 1983 to December 2001. Changes in dispersion and standard deviation of forecasts are calculated contemporaneously with the returns. t-statistics are calculated according to robust standard errors. [a, b, c] shows statistical significance at the one, five, and ten percent levels, respectively.

	Mean Returns						
	ΔStdDev	Δ Dispersion					
	All Firms	All Firms	D1 (Low)	D2	D3	D4	D5 (High)
Portfolio1 (low)	1.38	1.31	1.76	1.63	1.62	1.46	1.08
Portfolio2	1.43	1.72	1.99	1.81	1.74	1.57	1.81
Portfolio3	1.27	1.25	1.56	1.46	1.25	1.16	0.47
Portfolio4	1.21	1.11	1.31	1.15	1.17	1.25	0.69
Portfolio5 (high)	0.64	0.37	0.85	0.38	0.33	0.26	0.17
Low-High	0.74[a]	0.94[a]	0.91[a]	1.25[a]	1.29[a]	1.20[a]	0.91[a]
t-stat	8.33	7.28	2.13	5.38	6.77	6.85	5.30

In order to test Miller (1977) argument, I calculate the changes in dispersion contemporaneously with the returns. Each month, I assign stocks into five quintiles based on the change in dispersion in analyst earnings forecasts as of the same period that I obtain returns. Monthly portfolio returns are, again, calculated as the equal weighted average of the returns of all the stocks in the portfolio. Table IV shows that this sort produces a strong negative relation between average returns and change in dispersion. The stocks in the highest change in dispersion portfolio underperform those in the lowest change in dispersion portfolio by 0.94% per month. The portfolio results based on the percentage change in standard deviation of analysts' forecasts also yield similar results. Stocks in the highest change in standard deviation portfolio experience lower returns than those in the lowest change in standard deviation portfolio by 0.74% per month. So, the data suggest that an increase in dispersion is actually associated with lower returns, and a decrease in dispersion with higher returns. This result is, in fact, the opposite of Miller (1977) prediction. I also present results of portfolios sorted on two-dimensions, first on the level of dispersion then on the change in dispersion. These results also suggest that, conditioning on the level of dispersion, stocks that experience an increase in dispersion

Table V
Time-series and Cross-sectional Regressions of Stock Returns on Change in Dispersion, Change in Standard Deviation of Analysts' Forecasts, Size, B/M, and Momentum.

Panel A presents Fama-MacBeth regressions. Regressions include firm observations from January 1983 until December 2001. In each month, stock returns are regressed on log of size (market capitalization as of the previous month), log of B/M (book value of equity divided by market value of equity as of the previous month), momentum (past six months' return), log of dispersion (the ratio between the standard deviation and the absolute value of the mean forecasts of earnings per share), consensus forecast revision for past six months(Rev6), and change in dispersion or standard deviation of forecasts contemporaneously measured with returns. Panel B presents time-series regressions of return on Fama-French 3-factors, dispersion, and standard deviation of forecasts as well as their changes contemporaneously with stock returns. Time-series regressions are run on individual stocks with at least five years of data. Regression coefficients from each regression are, then, averaged on the cross-section of firms. t-stats in parentheses are calculated according to robust standard errors. p-values for the median coefficients are presented in parentheses. [a, b, c] shows statistical significance at the one, five, and ten percent levels, respectively.

Panel A: Fama-MacBeth Regressions of Return

Dependent Variable	Independent Variables								
Return	Intercept	Size	B/M	Momentum	Disp2	Rev6	ΔDisp	ΔStdDev	R^2
	1.782[b]	0.002	0.412[b]	0.080[a]	-0.009[a]	4.777[a]	-0.135[b]		5.06%
	(1.97)	(0.03)	(2.45)	(3.96)	(2.85)	(3.18)	(2.51)		
	1.966[b]	- 0.006	0.421[b]	0.079[a]	-0.011[a]	4.925[a]		-2.979[a]	5.11%
	(2.01)	(0.1)	(2.51)	(3.95)	(3.15)	(3.29)		(7.78)	

Panel B: Time-series Regressions of Return

Dependent Variable	Independent Variables								
Return	Intercept	SMB	MKTRF	HML	Disp1	ΔDisp	StdDev	ΔStdDev	R^2
Mean	0.005[a]	0.542[a]	1.118[a]	0.296[a]	0.014[c]	-0.033[a]			25.32%
	(9.91)	(37.83)	(114.70)	(9.96)	(1.95)	(2.97)			
	0.007[a]	0.545[a]	1.118[a]	0.297[a]			-0.014[b]	-0.051[a]	25.28%
	(13.23)	(33.02)	(112.77)	(12.15)			(2.01)	(5.15)	
Median	0.004[a]	0.486[a]	1.104[a]	0.412[a]	-0.001	-0.007[a]			24.55%
	(0.000)	(0.000)	(0.000)	(0.000)	(0.104)	(0.000)			
	0.006[a]	0.486[a]	1.103[a]	0.420[a]			-0.002[b]	-0.021[a]	24.56%
	(0.000)	(0.000)	(0.000)	(0.000)			(0.04)	(0.000)	

yield returns lower than those that experience a decrease in dispersion. So, increase in dispersion does not further push prices up to cause overpricing.

I also run cross-sectional and time-series regressions of stock returns on change in dispersion or standard deviation of analysts' forecasts together with a number of control variables. Panel A of Table V reports Fama-MacBeth regressions. Controlling for size, B/M, six-month return and earnings momentum, and dispersion, the coefficients on change in dispersion and change in standard deviation of analysts' forecasts are -0.135 and -2.979, significant at the five and one percent levels, respectively. Negative coefficients suggest that increase in dispersion is associated with lower returns, which confirms the univariate tests. Additionally, for each firm, I run time-series regressions of return on changes in dispersion and changes in standard deviation of analysts' forecasts controlling for Fama-French 3-factors, and dispersion. After estimating the regressions for each firm, I compute the mean and median of the coefficients from each regression. Panel B of Table V reports the results. Consistent with the cross-sectional results, mean and median of the coefficients for change in dispersion and change in standard deviation of forecasts from individual time-series regressions are significantly negative. These results also suggest that when a firm experiences increase in dispersion, its contemporaneous return is lower.

As a result, the data does not seem to support Miller (1977) if we use dispersion of analysts' forecasts to proxy for divergence of opinions; actually, the data suggest the opposite of Miller's prediction since an increase in dispersion is associated with lower returns. These results seem consistent with argument that due to the analysts' incentives explained in the following section, analysts' forecast dispersion increases when firms exhibit poor performance; therefore, we empirically observe lower returns for firms that experience increase in dispersion.

E. Analysts' Forecast Revisions and Dispersion

In this section, I will examine how an increase in dispersion may be associated with poor firm performance. I argue that earnings forecasts may become more dispersed in the face of bad news due to analysts' incentive structures as a possible mechanism.

Several researchers have documented that analyst forecasts are overly optimistic (Debondt and Thaler (1990), Easterwood and Nutt (1999), and Daniel et al. (2002) among others). As Michaely and Womack (1999), and Ackert and Hunter (1994) point out there is an implicit pressure on analysts to maintain positive opinions on a firm that is an investment banking client (or a potential client); therefore, the conflicts of interest due to brokerage houses' investment banking relationships may result in positively biased recommendations. Hong and Kubik (2003) provide confirmatory evidence by finding that, controlling for accuracy, optimistic analysts are more likely to get jobs at more prestigious brokerage houses. For analysts following stocks that are underwritten by the analysts' brokerage houses, job prospects depend less on accuracy and more on optimism. Maintaining good relations with the firm management in order to have access to management's private information might be another reason for positively biased forecasts (see Francis and Philbrick (1993)). Lim (2001) models analysts' forecasting where analysts' objective function is to minimize forecast error. In this setting, analysts trade off positive bias to improve management access and forecast accuracy since management is a significant source of information. Therefore, Lim argues that optimal forecasts are positively biased.

The positive biases of analysts are generally attributed to analysts' response to poorly performing firms. The analysts seem to be sluggish in reflecting negative news into their forecasts. Ali, Klein, and Rosenfeld (1992), and Dowen and Bauman (1995) demonstrate that analysts underreact to prior earnings information and that the overestimation bias in forecasts is most pronounced for firms that recently experienced negative earnings. Francis and Philbrick (1993), and Lim (2001) show that analysts act sluggishly when revising their estimates downwards for poorly performing firms, leading to greater positive bias. Recent evidence by Conrad et al. (2005) also suggests that analysts are reluctant to downgrade because of conflict of interests due to investment banking relationships. They find that recommendations are asymmetrically "sticky" since only very large stock price drops seem to break the optimistic view and change analysts' opinions downward. As Chan et al. (1996) argue, analysts may have disincentives to be the front runner with the bad news because this might antagonize management. They will need to decide whether the news has a permanent or temporary effect on annual earnings.

So, some analysts may want to give the benefit of the doubt and wait for additional confirmation before revising their estimates. Jegadeesh et al. (2004) and Barber et al. (2004) also provide consistent evidence regarding analysts' failure to quickly downgrade firms that are investment banking clients. Since analysts generally underreact to negative news, Elliot et al. (1995) provides evidence that analysts' consensus downward revisions are insufficient. The asymmetry in reacting to good versus bad news is also found in herding literature. Welch (2000) finds that, among security analysts, herding towards the consensus is significantly stronger when recent returns were positive and when the consensus is optimistic. This shows that analysts are also reluctant to follow other analysts when it comes to downward revisions.

Analysts' behaviors are not uniform either; they differ in forecast accuracy and the speed at which they react to news. The heterogeneity of analysts' behaviors suggests that some analysts may lag others while revising their forecasts in the face of bad news. Michaely and Womack (1999) document that analysts affiliated with an investment bank issue 50% more buy recommendations on the IPO firms than do other analysts. While experienced analysts have more accurate forecasts and less underreaction to prior earnings information (Mikhail et al. (2003)), Dugar and Nathan (1995), and Lin and McNichols (1998) show that analysts who follow firms that are also investment banking clients of their firms are more optimistic in their earnings forecasts and investment recommendations relative to other analysts. Stickel (1992) finds that "All American" analysts not only have more accurate earnings forecasts but also supply forecasts more often than other analysts. Zhang (2005) demonstrates that some analysts are quicker than others in incorporating new information. She reports that about half of the analysts revise their forecasts within three trading days after earnings announcements, whereas for the other half, it takes more than a month to update their forecasts.

This paper assumes that analysts' reluctance to change their forecasts is most pronounced for bad news due to their incentive structures described above. Analysts face a difficult decision between accuracy and optimism when there is bad news about the firm. No such dilemma would bother analysts when there is good news. As documented by the literature, the analysts whose brokerage houses have investment banking relationships with the firm, or inexperienced, young analysts would be more hesitant to change their forecasts downwards. Therefore, after bad news, we would observe more dispersed forecasts since some analysts update their forecasts downward while others refrain from revising their forecasts. As a result, sluggish response to bad news may lead to dispersion of forecasts.

Scherbina (2004) examines an alternative way earnings estimates may be upwardly biased. She argues that optimistic bias is higher when earnings are more uncertain. She proposes an analyst behavior: if you do not have something good to say, do not speak at all, which is also consistent with the career concerns explained above. Scherbina calculates a positive bias in consensus estimate whenever the number of analysts following a firm declines from its value three months ago assuming that the quiet analyst's estimate is one cent lower than the lowest estimate present. In this construction, the greater the dispersion the greater the bias. She finds that the positive bias can predict future earnings surprises. Therefore, she suggests that at least part of the return predictability of dispersion could be due to analysts' self selection bias. While Scherbina's (2004) explanation may have merit on its own, this paper presents an alternative mechanism for the predictive power of dispersion that does not depend on a decrease in the number of analysts following a firm. Moreover, this paper does not assume dispersion of forecasts as given, but provides a mechanism by which earnings forecasts may become more dispersed conditional on negative information.

Table II presents some results that are consistent with the above predictions. Simple portfolio sorts suggest that stocks, which had bad news in the recent past and performed poorly, exhibit higher dispersion of forecasts. Portfolios that are poor performers based on past return and earnings performance as well as portfolios that have high book to market ratios have the highest dispersion of forecasts. The univariate results that show that analysts' forecasts are more dispersed for poorly performing firms is consistent with the hypothesis that some analysts are reluctant in responding to bad news than others. If some analysts wait for additional confirmation to slowly revise their estimates, the lack of response from those analysts together with quick downward revision by others would create dispersion of forecasts for firms with recent poor performance. Moreover, consistent with the above discussion, good news does not seem

Table VI
Fama-MacBeth Regressions of Dispersion on Size, B/M, Momentum, and Past Forecast Revision.

Regressions include firm observations from January 1983 until December 2001. For each month, Dispersion is regressed on log of size (market capitalization as of the previous month), log of B/M (book value of equity divided by market value of equity as of the previous month), Momentum (past six months' return), Rev3 (past three month's forecast revision). Disp1 is the ratio between the standard deviation and the absolute value of the mean forecasts of earnings per share for the current fiscal year end. Disp2 is in percentile rank form. t-stats in parentheses are calculated according to robust standard errors. [a, b, c] shows statistical significance at the one, five, and ten percent levels, respectively.

Dependent Variable	Independent Variables					
	Intercept	Size	B/M	Momentum	Rev3	R^2
Disp1	0.690[a]	-0.035[a]	0.081[a]	-0.634[a]	-1.494[a]	3.47%
	(11.82)	(9.62)	(8.74)	(5.36)	(4.58)	
Disp2	90.12[a]	-3.010[a]	6.022[a]	-37.120[a]	-62.21[a]	10.54%
	(69.41)	(36.65)	(14.92)	(7.62)	(8.59)	
	Intercept	Size	B/M	Momentum	Rev_Up	R^2
Disp1	0.731[a]	-0.034[a]	0.081[a]	-0.608[a]	-0.075[a]	2.28%
	(12.35)	(9.42)	(8.24)	(5.70)	(12.83)	
Disp2	89.94[a]	-2.844[a]	5.807[a]	-33.53[a]	-4.029[a]	9.41%
	(70.80)	(34.77)	(15.37)	(7.11)	(15.40)	

to have similar impact on dispersion as bad news does as Table II shows that best performers have lower dispersion of forecasts.

After the univariate comparisons of dispersion, I run cross-sectional and time-series regressions of dispersion on certain firm characteristics to examine what increases dispersion of analysts' earnings forecasts. Fama and MacBeth (1973) regressions using dispersion as the dependent variable confirm the univariate analysis. For each month, I run regressions of dispersion (Disp1) on size, book to market ratio, previous six month's return performance (Momentum), and previous three month's change in consensus earnings forecast (Rev3). Time-series averages of the coefficients from cross-sectional regressions are reported on Table VI. I also use a dummy variable (Rev_Up) taking the value of one if the consensus forecast revision is upwards in the last three months. This variable simply differentiates between firms that had good news and bad news in the past. In order to correct for outliers, following Johnson (2004) I use Disp2 variable, which is the monthly percentile rank of the dispersion variable. The regression results show that analysts' forecasts are more dispersed for small firms, high B/M firms, and poorly

Table VII
Cross-sectional Explanations of Change in Dispersion

This table represents the change in dispersion based on past earnings and return performance. The sample data are obtained as explained in Table II. On Panel A, each month, stocks are sorted into five groups based on one or six month return and earnings performance. Contemporaneous change in the dispersion of analysts' forecasts is presented for each portfolio. Dispersion is defined as the ratio between the standard deviation and the absolute value of the mean forecasts of earnings per share for the current fiscal year end. Panel B presents Fama-MacBeth regressions of change in dispersion on contemporaneous return or earnings performance. Momentum1 and Momentum6 are the return performance during the previous 1 and 6 months, respectively. Rev1 and Rev6 are past one and six month's earnings forecast revision, respectively. [a, b, c] shows statistical significance at the one, five, and ten percent levels, respectively.

Panel A:

	Change in Dispersion			
	Momentum1	Momentum6	Rev1	Rev6
Portfolio1 (low)	0.019	0.108	0.021	0.169
	0.000	0.019	0.002	0.002
	0.002	-0.014	-0.000	-0.009
	-0.003	-0.019	-0.001	-0.009
Portfolio5 (high)	-0.006	-0.039	-0.003	-0.988

Panel B: Fama-MacBeth Regressions of Change in Dispersion

Dependent Variable	Independent Variables				
Change in Dispersion	Intercept	Momentum6	Rev6	Rev_Up	R^2
	0.031	-1.176	-0.0817		0.7%
	(3.65)	(7.94)	(3.80)		
	0.086	-1.192		-0.093	0.7%
	(7.54)	(7.65)		(7.97)	

performing firms. The coefficients for return and earnings momentum variables are highly significantly negative. The result that poorly performing firms, in terms of return and earnings performance, exhibit higher dispersion is also consistent with the evidence provided by Francis and Philbrick (1993), Chan et al. (1996), Lim (2001), and Conrad et al. (2005), which suggest that some analysts are reluctant or slow in responding to bad news.

I further examine whether changes in dispersion of forecasts are associated with firms' recent performance. Every month, I sort stocks into five portfolios in terms of their return and earnings performance in the past one or six months. Then, I report changes in dispersion during the same time period that firm performance is measured. Table VII shows that analysts forecast dispersion increases as firms perform poorly. On the other hand, dispersion decreases to some extent for firms that have better performance. Especially for firms which experience increase in consensus earnings estimates, dispersion significantly decreases. This finding is consistent with the evidence that analysts herd (Graham (1999), Lamont (2002), and Hong et al. (2000)), and herding towards the consensus is significantly stronger when the consensus is optimistic (Welch (2000)) since herding generally translates into less dispersion. Panel B of Table VII also shows the Fama-MacBeth regressions of change in dispersion on return and earnings performance. The regression results are consistent with univariate portfolio sorts, and suggest that analyst forecast dispersion increases as bad news for the firms comes in.

Next, I investigate, for each firm, whether dispersion of forecasts are higher after bad news. For this purpose, I run time-series regressions of dispersion and standard deviation of forecasts on past three month's forecast revisions for each firm. Recall that dispersion of forecasts is calculated as standard deviation of forecasts scaled by mean consensus estimate. Therefore, I also use standard deviation of earnings forecasts for individual firm time-series regressions since, for a poorly performing firm, a decrease in consensus estimate mechanically inflates the dispersion measure. I require at least five years of data to be available in order to run time-series regression for a particular firm. Mean and median coefficients across all the stocks used in the regressions are provided on Table VIII. A downward consensus forecast revision suggests that there is some bad news about the firm. If some analysts update their forecasts downwards and some are reluctant or wait for more confirmation, we would observe higher dispersion for firms with recent bad news. Time-series regressions on Table VIII demonstrate that all of the coefficients of the variables measuring past three month's consensus forecast revision are significantly negative. Median of the individual coefficients is smaller than mean of the coefficients suggesting some skewness. Nevertheless, all of the coefficients reported on Table VIII are highly significant. So, when there is bad news about a particular firm, the reluctance of some analysts to quickly update their forecasts downwards results in a higher dispersion of forecasts. Since the reluctance for downward revisions also leads to insufficient change in the consensus estimate, it might have implications for price discovery process especially for poorly performing firms. This issue is going to be examined in the next section.

Table VIII
Time-Series Regressions of Dispersion and Standard Deviation of Analyst Forecasts on Past Forecast Revision.

Regressions include firm observations from January 1983 until December 2001. For each firm, Dispersion and StdDev (standard deviation of analysts' earnings forecasts) is regressed on Rev3 (past three month's forecast revision), and Rev_Up (dummy variable taking the value of 1 if forecast revision is upward, 0 otherwise). Disp1 is the ratio between the standard deviation and the absolute value of the mean forecasts of earnings per share for the current fiscal year end. Time-series regressions are run on individual stocks with at least five years of data. Mean and median regression coefficients are calculated on the cross-section of firms. t-stats in parentheses are calculated for mean coefficients according to robust standard errors. p-values for the median coefficients are presented in parentheses. [a, b, c] shows statistical significance at the one, five, and ten percent levels, respectively

	Dependent Variable	Independent Variables			
Mean		Intercept	Rev3	Rev_Up	R^2
	Disp1	0.176[a]	-2.220[a]		6.79%
		(21.61)	(9.90)		
		0.218[a]		-0.077[a]	3.04%
		(25.28)		(9.01)	
	StdDev	0.129[a]	-0.256[a]		5.5%
		(31.96)	(4.79)		
		0.178[a]		-0.008[a]	3.72%
		(5.51)		(2.46)	
Median					
	Disp1	0.072[a]	-0.611[a]		2.92%
		(0.000)	(0.000)		
		0.087[a]		-0.016[a]	1.87%
		(0.000)		(0.000)	
	StdDev	0.088[a]	-0.087[a]		2.47%
		(0.000)	(0.000)		
		0.090[a]		-0.003[a]	1.67%
		(0.000)		(0.000)	

F. Dispersion of Forecasts and Stock Returns

Even if we accept that analyst forecasts are more dispersed and consensus forecast revisions are incomplete after negative event news, it would not have a significant impact on asset prices if investors can recognize and correct for this biased behavior when pricing assets. However, current literature suggests otherwise. Mikhail, Walther, and Willis (2003a) examine analyst firm specific experience and its relation to post earnings announcement drift. Because experienced analysts have more accurate forecasts, they find that post earnings announcement drift is smaller for firms that are followed by more experienced analysts. Similarly, Zhang (2005) examines analysts' responsiveness to new information and its relation to post earnings announcement drift. She finds that post-earnings announcement drift is significantly lower when the percentage of responsive analysts following the firm is higher. Therefore forecast accuracy and the speed at which analysts incorporate new information into their forecasts seems to be associated with the market underreaction to earnings announcements. These results suggest that analysts' earnings estimates are an important part of the information set that is reflected in stock prices.

It also seems that investors naively rely on analysts' optimistic growth forecasts as described by Dechow et al. (2000). The authors demonstrate that controlling for optimistic growth forecasts, post equity issue underperformance disappears. Moreover, Dechow and Sloan (1997) also find that investors' naïve reliance on analysts' optimistic forecasts of earnings growth can explain half of the profits to contrarian investment strategies (using fundamental to price ratios). They suggest that because investors do not fully correct for biases, analysts' biased growth forecasts are reflected in stock prices. Michaely and Womack (1999) show that long run performance of firms recommended by underwriter analysts are significantly worse than those of firms recommended by other analysts. Therefore, they suggest that investors do not fully correct for the optimistic bias of underwriter analysts. Lastly, after finding significant price drift especially for firms with poor past earnings performance, Chan et al. (1996) suggest that because analysts are slow in revising their estimates downward, the inertia in revising forecasts may prevent the market to incorporate new information in a timely fashion.

Reluctant response of some analysts to negative news leads to not only more dispersed forecasts, but also insufficient revision of the consensus estimate. Within this framework, the above findings can be explained in a boundedly rational world where an investor follows a particular analyst or the consensus. In this case, high dispersion stocks among poorly performing firms would underperform. However, it would not be the case for better performing firms. To illustrate this point, first, I present two-dimensional, independent sorts using size, B/M, six month momentum, and consensus forecast revision as additional sorting variables. Mean portfolio returns for two dimensional sorts are reported on Table IX. The results I find are also consistent with those of Diether et al. (2002). I observe a strong size, B/M, and momentum (return and earnings) effect in Table IX. The return differential between low and high dispersion stocks is highly significant for the smaller stocks, stocks with high B/M, and stocks with negative

Table IX

Mean Portfolio Returns by Size, B/M, Momentum, Rev6 and Dispersion in Analysts' Earnings Forecasts

This table represents average monthly returns of dispersion portfolios conditioning on Size, B/M, Momentum, and Consensus Forecast Revision. The period covered is January 1983 to December 2001. Each month, stocks are sorted into five groups by size (S), B/M, momentum (M), and past six month's forecast revision (Rev6), then sorted into five additional groups based on the level of dispersion in analysts' earnings forecasts for the previous month. Momentum is calculated as the past returns from month t-7 to t-2. Stocks with a mean forecast of zero are assigned to the highest dispersion portfolio. t-statistics are calculated according to robust standard errors. [a, b, c] shows statistical significance at the one, five, and ten percent levels, respectively.

	Mean Returns				
	Size Quintiles				
Dispersion	S1 (Small)	S2	S3	S4	S5 (Large)
D1 (low)	1.54	1.52	1.55	1.47	1.46
D2	1.42	1.50	1.48	1.26	1.28
D3	1.08	1.24	1.37	1.14	1.40
D4	0.73	1.17	1.34	1.45	1.32
D5 (high)	0.32	0.74	0.93	1.08	1.42
Low-High	1.22[a]	0.79[a]	0.62[b]	0.38	0.05
t-stat.	5.44	2.95	2.17	1.36	0.66

Mean Returns				
B/M Quintiles				
B/M1 (Low)	B/M2	B/M3	B/M4	B/M5 (High)
1.31	1.34	1.42	1.66	1.92
1.30	1.21	1.33	1.57	1.71
1.23	1.25	1.07	1.49	1.47
1.47	1.04	0.97	1.28	1.29
0.97	0.55	0.64	0.81	0.76
0.34	0.79[a]	0.77[a]	0.85[a]	1.15[a]
0.90	2.7	3.05	3.65	4.70

	Mean Returns				
	Momentum Quintiles				
Dispersion	M1 (Losers)	M2	M3	M4	M5 (Winners)
D1 (low)	1.05	1.59	1.57	1.39	1.83
D2	0.76	1.53	1.46	1.31	1.67
D3	0.66	1.23	1.32	1.33	1.95
D4	0.38	1.26	1.28	1.14	1.97
D5 (high)	0.04	0.99	0.93	0.81	1.59
Low-High	1.01[a]	0.60[b]	0.64[b]	0.58[c]	0.24
t-stat	3.92	2.09	1.97	1.68	0.94

Mean Returns				
Forecast Revision Quintiles				
Rev6 (Losers)	Rev6	Rev6	Rev6	Rev6 (Winners)
1.38	1.30	1.38	1.47	1.91
1.27	1.12	1.18	1.40	1.71
1.06	0.95	1.16	1.39	1.65
0.69	0.98	1.00	1.29	1.65
0.31	0.64	1.06	1.11	1.48
1.07[a]	0.66[b]	0.32	0.36	0.43
3.49	1.99	0.83	1.02	1.46

momentum. A zero investment strategy for the smallest quintile earns a significant 1.22% per month while the biggest quintile earns 0.05% per month, which is not significant. Results regarding firm size are consistent with Brown (1997) who finds that analysts' biases are significantly smaller for large firms. The same strategy earns a significant 1.15% per month for the highest B/M portfolio while there are no significant returns for the lowest B/M portfolio. The same pattern can bee seen for momentum portfolios, negative momentum stocks exhibiting greater differential between low and high dispersion stocks.

Portfolio sorts based on past six month's change in consensus estimates provide insightful results for the argument set forth in the previous sections. Some analysts' reluctance to revise their estimate downwards results in more dispersed forecasts as well as incomplete change in consensus forecasts. Underreaction of the consensus estimate to negative news leads to continuation of low returns. Therefore, even though there might be various reasons why analysts' forecasts may be dispersed, we would expect to observe more pronounced lower subsequent returns for high dispersion stocks if the dispersion is created due to slow response to bad news. Otherwise, high dispersion stocks should not significantly underperform low dispersion stocks. Table IX shows that a zero investment strategy for the loser portfolio earns 1.07% per month while winner portfolio earns an insignificant 0.43%. So, lower subsequent returns of high dispersion stocks are, in some part, due to poorly performing firms for which some analysts' reluctant response to negative news creates dispersion of forecasts and insufficient reaction to bad news.

Furthermore, I use Fama-MacBeth regressions to test the hypothesis that the negative relationship between dispersion and subsequent returns should be more pronounced for poorly performing firms. For this purpose, I run cross-sectional regressions of stock returns on size, B/M, past six month's return as the return momentum, dispersion in percentile rank form (Disp2), and a dummy variable taking the value of one if the average forecast revision in the past six months is negative or zero otherwise (Rev_D). Empirically, we should observe the interaction variable between Rev_D and Disp2 to be significantly negative to support the idea that dispersion predicts lower returns especially for poorly performing firms. Table X shows that the interaction

Table X
Fama-MacBeth Regressions of Return on Size, B/M, Momentum, Dispersion, Past Six Month's Forecast Revision, and Their Product.

The period covered is January 1983 to December 2001. Dispersion is defined as the ratio between the standard deviation and the absolute value of the mean forecasts of earnings per share for the current fiscal year end. Disp2 is dispersion of forecasts in percentile form. Momentum is calculated as the past returns from month t-7 to t-2. Rev6 is calculated as the average change in consensus forecast in the past six months. Rev_D is a dummy variable taking the value of one if the average revision in the past six months is negative or 0 otherwise. In each month, return is regressed on Size, B/M, Momentum, Disp2, Rev_D, and the interaction variable between Disp2 and Rev_D. Time-series averages of the coefficients from cross-sectional regressions are reported. t-statistics are calculated according to robust standard errors. [a, b, c] shows statistical significance at the one, five, and ten percent levels, respectively.

Dependent variable	Independent Variables							
Return	Intercept	Size	B/M	Momentum	Disp2	Rev_D	Interaction	R^2
	1.672[c]	0.005	0.351[b]	0.091[a]	-0.009[a]			4.4%
	(1.88)	(0.08)	(2.37)	(5.21)	(2.98)			
	1.684[c]	-0.011	0.340[b]	0.086[a]	-0.008[a]	-0.314[a]		4.55%
	(1.85)	(0.18)	(2.12)	(4.95)	(2.87)	(3.54)		
	1.773[c]	-0.009	0.341[b]	0.085[a]	-0.010[b]	-0.198[a]	-0.004[b]	4.62%
	(1.92)	(-0.16)	(2.13)	(5.06)	(2.27)	(3.14)	(2.44)	

variable is -0.004 and significant at the five percent level. This shows that high dispersion stocks earn even lower returns if the firm has negative earnings performance in the recent past. In sum, the empirical results in this paper demonstrate that high dispersion stocks seem to predict low returns. However, this predictability is more pronounced for firms with recent negative performance. The reason for this conditional predictability stems from the argument that some analysts' reluctance to revise their forecasts downward leads to dispersion of forecasts and market underreaction to bad news. In this argument, I don't consider the dynamics between optimist and pessimist investors in the market to explain the dispersion effect. Analysts' insufficient reaction to bad news leads to market underreaction, and therefore low returns for poorly performing firms. Dispersion is merely a byproduct of this behavior.

CHAPTER III
SHORT SALES AND STOCK RETURNS

A. Introduction

Short interest (shares sold short / total shares outstanding) predicts future returns. The literature seems to offer two different explanations for this predictability. Since a typical short seller is considered to be a sophisticated investor, short sellers might have some informational advantage (acquisition or processing) over an average investor. Therefore, short interest level might predict low future returns due to its information content. Dechow et al. (2001) show that short sellers use information in fundamental-to-price ratios to take positions in stocks with lower expected future returns, and unwind their positions as these ratios mean-revert. Desai et al. (2002) demonstrate that short interest level is a bearish signal. They assert that the negative relationship between short interest and subsequent stock returns is due to short sellers being informed investors. Desai et al. (2002) also show that the higher the short interest the greater its informativeness.

Another strand of literature approaches to the same issue in terms of short selling costs. When shorting costs are substantial, market forces will be unable to prevent an overpricing in the amount of shorting costs. In this case, today's overpricing therefore the price correction in the future would be directly proportional to the shorting costs. The greater the shorting costs, the greater the possible overpricing; and therefore, the lower the subsequent stock returns. Particularly, Asquith, Pathak, and Ritter (2005) (APR hereafter) argue that stocks with high short interest and low institutional ownership have high short selling constraints/costs and that based on Miller (1977) argument, they underperform because today's temporary overpricing gets corrected in the future. In this argument, there is no informational role of short interest for future returns, but rather short interest as a proxy for the higher cost of shorting is the primary reason of lower future returns.

This paper argues that the empirical evidence provided by APR may also be consistent with an information argument. Diamond and Verrecchia (1987) propose that high cost of shorting could function as a filter, which drives out uninformed trades from the pool of short sales. Therefore, the resulting observed short interest will reflect relatively more informed trades when shorting costs are significant. As a result, short interest might be more informative about future stock returns when shorting is costly.

APR assume that short interest is a proxy for short sale demand, and institutional ownership is a proxy for supply. They contend that when there is high demand and low supply, short sale constraints are binding. Therefore, stocks with high short interest and low institutional ownership would earn significantly lower future returns. The argument set forth by APR has some merit. Stocks can be overpriced when short sale constraints bind. And we would observe underperformance when prices revert to their equilibrium levels in the future. D'Avolio (2002) find that short sale costs decrease with size and institutional ownership, and that loan fees increase with short interest level as the stocks with the highest short interest level have loan fees about 1.8% per year. Examining costs of shorting directly, Jones and Lamont (2002) find that stocks that are expensive to short have low subsequent returns, but they underperform by more than the costs of shorting. Moreover, relating short interest level to short sale costs has a fundamental conceptual flaw. As Cochrane (2005) points out unmet demand for shorting should be correlated with lower subsequent returns. A large met demand only means that short sellers were able to express their opinions. This paper argues that documented short sale costs associated with high short interest stocks are too small to explain the predictive ability of short interest for future returns. And, using future earnings news, we empirically demonstrate that short interest is informative regarding the future firm performance especially when institutional ownership is low.

I first confirm the predictive ability of short interest. Each month, I sort stocks into ten portfolios based on their short interest level, and compare one-month ahead returns across ten groups. From January 1988 to December 2002, highest shorted stocks underperform lowest shorted stocks by 1.6% per month and 1.62% per month after adjusting for four factors (market, size, book to market, momentum). I also find that among stocks with the highest short interest, those with lower institutional ownership underperform the most. I rank stocks in the top short interest decile into three groups based on institutional ownership. Consistent with APR results, I find that the underperformance of stocks with lower institutional ownership is -0.93% per month on a risk adjusted basis while it is -0.21% for stocks with higher institutional ownership.

In order to test whether this predictability is a mere consequence of short selling costs or whether informativeness of short sales varies with institutional ownership, I conduct an experiment to see whether short interest can also predict earnings announcement surprises. If the return predictability is due to overpricing caused by short selling costs, short interest should have no relation with future earning surprises. On the other hand, if short sellers are better able to acquire or process firm specific information and institutional ownership as a proxy for shorting costs increases the informativeness of short interest, short interest level would be negatively related with earning surprises especially when institutional ownership is low. I find that short interest level predicts earning surprises. Specifically, the ability of short interest to predict earnings surprises is greater for stocks with lower institutional ownership (i.e stocks with higher shorting costs). Stocks with lower institutional ownership experience more negative earning surprises that stocks with higher institutional ownership. These findings are consistent with Diamond and Verrecchia's (1987) argument and shed some light on the observation that why stocks with high short interest and low institutional ownership earn lower subsequent returns.

For a robustness check, I examine return and earnings announcement predictability of short interest level using a sample of stocks that are unlikely to be short sale constrained. D'Avolio (2002) reports that the vast majority of hard to borrow stocks are in the bottom size decile or are under $5. So, I conduct the tests based on this sub-sample and find that short interest level still predicts lower subsequent returns and future earning surprises although predictive power is lower.

The findings in this paper suggest that the return predictability of short interest may not be entirely due to Miller (1977) argument. The results are consistent with the idea that the level of short interest is informative regarding future firm performance especially for stocks with low institutional ownership. Therefore, the results in this paper are in line with those that find short sellers are informed. Christophe et al. (2004) find that, among 913 Nasdaq-listed firms, short sellers increase their positions five days before earnings announcements for stocks with negative earnings performance. Desai et al. (2006) find that short sellers accumulate positions prior to earnings restatement announcements and later cover their positions. Francis et al. (2006) show that analysts use the information in short interest since analysts downgrade their earnings forecasts more severely for firms with high unexpected short interest. Boehmer et al. (2006) find that short sellers' trades are informative regarding future returns. And finally, Cohen et al. (2005) show that an increase in shorting demand predicts negative abnormal returns in the subsequent month.

The rest of the paper is organized as follows. In section B, I formalize the hypotheses regarding stock return predictability based on short sale constraint and information stories. Section C provides the data and methodologies used in the paper. I present the results in section D that show that short interest predicts not only future returns but also future earnings surprises.

B. Hypotheses

APR find that stocks with high short interest and low institutional ownership earn abnormally low returns in the future. They interpret their empirical results to be consistent with Miller (1977). That is, since they assume that high short interest and low institutional ownership stocks are short sale constrained, currently those stocks would be overpriced resulting in lower future returns. The predictability of future returns is directly proportional to the magnitude of market frictions or short sale costs rather than the information content of short interest. In this section, I argue that the observed empirical findings are more consistent with the idea that short sellers exploit their informational advantage and that they are better able to do so when institutional ownership is low.

B.1 Changes in Short Sale Constraints and Contemporaneous Returns

Miller (1977) argument is based on the premise that short sale constraints may cause overpricing since the marginal investor would be an optimist because of short sale restrictions. A natural consequence of this argument is that the higher the constraints, the higher the overpricing.[1] Therefore, for a particular firm, if short sale constraints become

[1] Duffie et al. (2002) also explain a case where investors might be willing to pay higher than the stocks fair value due to the expectation to receive lending fees. However, this effect should be more pronounced for

more severe, stocks would become more overpriced, hence a positive relationship between changes in short sale constraints and contemporaneous stock returns. Boehme et al. (2005) reports some results consistent with this idea. Since APR uses short interest and institutional ownership jointly to proxy for short sale constraints, an increase in short interest and/or a decrease in institutional ownership should be positively correlated with contemporaneous returns. On the other hand, information story of short interest has no predictions regarding changes in institutional ownership, but has the same predictions with changes in short interest. Short sellers might increase their positions in stocks, which they think is getting more overpriced and have lower expected future returns. Consistent with this argument, Brent et al. (1990) find that investors tend to increase their short interest positions when the stock price increases. Also, Dechow et al. (2001) find that short sellers position themselves as prices go up and unwind their short positions as prices mean-revert. Here are the predictions of both arguments.

	$\rho(r_{t,t+1}, \Delta\text{short interest}_{t,t+1})$	$\rho(r_{t,t+1}, \Delta\text{institutional ownership}_{t,t+1})$
Miller (1977)	+	-
Information	+	?

We test the following hypothesis:

Hypothesis 1: *The contemporaneous stock returns are positively correlated with changes in short interest and negatively correlated with changes in institutional ownership.*

B.2. Short Interest and Future Earnings Surprises

According to Miller (1977), predictability of future returns is a result of short sale constraints: the higher the constraints, the greater the overpricing today, therefore the lower the future returns. In this argument, return predictability is not related with future firm (operating) performance. APR find that stocks with high short interest and low institutional ownership earn lower future returns. Assuming high short interest and low

firms with high institutional ownership because lenders who own the stock in street name do not receive the lending fee.

institutional ownership as a proxy for short sale constraints, APR interpret this finding to be consistent with Miller (1977). Nevertheless, this measure of short sale constraints should predict future returns but not future company events (good news or bad news). For example, using a direct cost of shorting, Reed (2003) finds no relationship between earnings announcements and rebate rates.

On the other hand, information story has some predictions regarding firms' future (operating) performance. As supported by Desai et al. (2002), Christophe et al. (2004), Desai et al. (2006), Boehmer et al. (2006), and Francis et al. (2006) short sellers are informed regarding the future fundamental value of firms. Therefore, short interest would be a good predictor of future firm performance as well as stock returns. Moreover, Boehmer and Kelley (2006) find that stocks with higher institutional ownership are priced more efficiently. Institutions seem to enhance the informational environment that helps to price stocks, therefore reducing the profitable opportunities for short sellers. Therefore, short sellers would be better able to exploit their informational advantage when institutional ownership is low. Moreover, Diamond and Verrecchia (1987) point out that short sales might be more informative when costs of shorting are high. As a result, information story of short interest posits that short interest predicts future value relevant firm news, and therefore future returns, and that this predictability is stronger when institutional ownership is low. This paper uses future earnings announcements as value relevant company news to determine whether short sellers are informed. Here are predictions of both arguments:

	ρ(high short and low institutional ownership, future earnings surprises)
Miller (1977)	0
Information	–

I test the following hypotheses:

Hypothesis 2a: *Stocks with high short interest is not related with future earnings surprises.*

Hypothesis 2b: *Institutional ownership does not affect the relationship between short interest and future earnings surprises.*

C. Data and Methodology

Data on stock returns are from CRSP for NYSE, Amex, and NASDAQ stocks with share code 10 or 11 between January 1988 and December 2002. Short interest, *Short*, is defined as total shares sold short divided by shares outstanding. Data on institutional ownership are obtained from 13F filings. Total amount of institutional holdings are calculated by summing the holdings of all institutions for each stock in each quarter. Stocks that have available return data but no reported institutional holdings are assumed to have zero institutional ownership. The variable, *instown*, is defined as total institutional ownership divided by common shares outstanding obtained from CRSP. Since institutional ownership data is available only quarterly, I assume institutional ownership remains the same for all months in the quarter.

Book values, wherever needed, are taken from COMPUSTAT annual files. *Size* is the market value of equity calculated as the number of shares outstanding times the month-end share price. Book value is calculated as book value of equity plus deferred taxes. *B/M* is book value divided by market value of equity where book value of equity is from the most recent fiscal year-end that is preceding calculation date of market value by at least 3 months. I exclude firms with negative book values. *MOM* is the total return performance of a firm in the last 12 months.

Quarterly earnings and announcement dates are obtained from COMPUSTAT quarterly files. I use two measures of earnings news. First is the standardized unexpected earnings (*SUE*) variable. Following Foster et al. (1984), I use the following model of expected earnings. The *SUE* in month t is defined as

$$SUE = \frac{EPS_t - E[EPS_t]}{\sigma_t} \qquad (2)$$

where EPS_t is the quarterly earnings per share most recently announced, $E[EPS_t]$ is expected earnings per share, and σ_t is the standard deviation of unexpected earnings

(EPS_t – $E[EPS_t]$) over the preceding eight quarters. I use two models to estimate expected earnings. First is a seasonal AR(1), second is a seasonal random walk model. Since these two measures provide very similar results, we report the results for the second and the simpler model.

$$E[EPS_t] = EPS_{t-4} + \alpha + \beta(EPS_{t-1} - EPS_{t-5}) \qquad (3)$$

$$E[EPS_t] = \alpha + EPS_{t-4} \qquad (4)$$

Following Chan et al. (1996), second measure of earnings news is the average daily abnormal stock returns around the earnings announcement date (*ABR*), defined as

$$ABR_i = \frac{1}{4}\sum_{j=-2}^{j=1}(r_{ij} - r_{mj}) \qquad (5)$$

where r_{ij} is the stock i's return on day j and r_{mj} is the return on the equally-weighted CRSP market index. Day 0 is the earnings announcement date. This measure of earnings news is free of a model for earnings expectations since it captures the market's surprise when the earnings are announced.

I use a standard portfolio approach to test the predictive ability of short interest for future returns. Each month, I rank stocks on the basis of short interest. The ranked stocks are then assigned to one of ten decile portfolios. Then, I compute average returns for each portfolio in the following month after portfolio formation. All stocks are equally weighted in a portfolio. Time-series means of portfolio returns are presented in Table XI. Portfolio abnormal returns are calculated from a four-factor model

$$r_{pt} - r_{ft} = \alpha + \beta_1(r_{mt} - r_{ft}) + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 MOM_t + \varepsilon_{pt} \qquad (6)$$

where $r_{pt} - r_{ft}$ is the portfolio return minus the return on one-month T-bill, $r_{mt} - r_{ft}$ is the market excess return, SMB is the size factor return, HML is the B/M factor return, and MOM is the momentum factor return. Factor returns are taken from Kenneth French's

Table XI
Mean Portfolio Returns Based on Short Interest

This table shows the short interest, institutional ownership, size and mean returns of portfolios sorted on short interest.
The sample contains NYSE-AMEX-NASDAQ stocks during the period from January 1988 to December 2002. *Short* is short interest divided by shares outstanding. *Instown* is the percentage of shares owned by institutions as reported in 13F filings. *Size* is the market value of equity and defined as share price times the number of shares outstanding. *BM* is the book value of equity divided by the market value of equity calculated at least three months before the short interest data. α is the intercept from a four-factor model including mktrf, smb, hml, and umd. Each month stocks are sorted into ten portfolios based on *Short.* P1 is the portfolio with the lowest short interest. Time-series means of firm characteristics as well as raw and abnormal monthly returns for each portfolio are presented. T-stats are calculated according to robust standard errors.

	Short	*Instown*	*Size*	*BM*	Raw ret.	α	t-value
P1 (low)	0.002	12.27	68.83	1.09	1.75	1.17	4.21
	0.014	15.84	128.36	0.98	1.49	0.92	2.94
	0.046	18.91	192.01	0.93	1.54	0.88	3.52
	0.112	22.88	432.58	0.88	1.51	0.81	3.51
	0.238	27.95	1,465.25	0.81	1.22	0.56	2.36
	0.434	33.24	2,990.54	0.73	1.14	0.42	2.16
	0.739	37.86	3,088.06	0.69	0.91	0.14	1.10
	1.251	41.12	2,469.46	0.66	0.84	0.08	0.70
	2.335	41.53	1,770.05	0.71	0.48	-0.16	-1.22
P10 (high)	7.642	43.14	1,006.96	0.74	0.15	-0.45	-2.47
P1 – P10					1.60	-1.62	-6.28

web site. The intercepts from a time-series regression of the four-factor model, α, for each portfolio sorted on short interest are presented in Table XI.

D. Results

This section provides some empirical results where I test aforementioned hypotheses and try to determine whether predictability of stock returns by short interest is more consistent with a short sale constraints argument or with an information argument. I first replicate APR's results and report in Table XI that stocks with high short interest underperform those with low short interest by 1.60% per month, and 1.62% by a risk adjusted basis. The stocks in the tenth decile portfolio, on the average, have 7.6% of short interest, and these stocks' monthly average risk adjusted returns are -0.45% and highly statistically significant with a t-value of -2.47.

The above results are consistent with both of the arguments. What APR suggest is that the predictability not only comes due to the level of short interest but, in fact, due to

Table XII
Mean Portfolio Returns Based on Constraint

This table shows the short interest, institutional ownership, constraint and mean returns of portfolios sorted on constraint.
The sample is constructed similarly as in Table I. Data frequency is quarterly. *Constraint* is defined as the *Instown* minus *Short*. Panel A reports mean monthly returns of the subsequent three months for portfolios sorted on *Short*. In Panel B, each quarter stocks are sorted into portfolios based on *Constraint*. Mean monthly returns of the subsequent three months for each portfolio are calculated. Time-series means are reported.

Panel A

	Short	*Raw Ret.*
P1	0.001	1.69
	0.013	1.55
	0.045	1.46
	0.114	1.45
	0.244	1.20
	0.448	1.04
	0.762	0.92
	1.285	0.80
	2.398	0.55
P10	7.815	0.04
P1 – P10		1.65

Panel B

	Constraint	*Instown*	*Short*	*Raw Ret.*
P1	73.80	75.87	2.06	1.06
	58.08	59.98	1.89	1.04
	46.84	48.57	1.73	1.10
	36.78	38.26	1.47	1.03
	27.97	29.25	1.28	0.96
	20.13	21.21	1.08	0.92
	13.35	14.27	0.92	1.03
	7.57	8.32	0.75	1.32
	2.99	3.59	0.60	1.16
P10	-0.19	1.13	1.31	1.08
P1 – P10				0.02

the stocks with high short interest and low institutional ownership. APR assert that stocks with high short interest and low institutional ownership are shot sale constrained and that "*only stocks with binding short sale constraints should have negative future abnormal returns*". To follow this line of argument, I define a variable, *constraint*, as institutional ownership minus short interest. According to APR, stocks with the lowest value of the variable *constraint* are the ones with the highest short sale constraints. Table XII reports that the most constrained stocks have a value of -0.19 for the *constraint* variable. This means that for these stocks, short interest is actually higher than institutional ownership. If the return predictability is truly due to the binding short selling constraints as APR

Table XIII
Change in Institutional Ownership, Short Interest, and Contemporaneous Returns

This table reports the contemporaneous returns of portfolios sorted on change in institutional ownership (Panel A) and change in short interest (Panel B).
The sample contains NYSE-AMEX-NASDAQ stocks during the period from January 1988 to December 2002. *ΔInstown* is the change in institutional ownership from quarter t to t+1. *ΔShort* is the change in short interest ratio from quarter t to t+1. In Panel A, each quarter t, stocks are first sorted into five portfolios based on *Short*, then sorted into five additional portfolios based on *ΔInstown*. Mean quarterly returns are calculated contemporaneously with *ΔInstown*. Time-series means are reported. For Panel B, each quarter t, stocks are first sorted into five portfolios based on *Short*, then sorted into five additional portfolios based on *ΔShort*. Mean quarterly returns are calculated contemporaneously with *ΔShort*. Time-series means are reported.

Panel A

	Short Interest Quantiles				
	Short 1				*Short* 5
ΔInstown 1	0.99	0.39	-0.71	-1.41	-3.35
	1.17	0.80	0.30	-0.04	-1.04
	1.51	0.74	0.77	0.43	0.10
	1.98	1.81	1.73	1.71	1.59
ΔInstown 5	3.07	3.79	3.66	3.92	4.49

Panel B

	Short Interest Quantiles				
	Short 1				*Short* 5
ΔShort 1	-0.05	-0.14	-0.21	-0.34	-0.51
	0.24	0.25	0.30	0.36	-0.18
	1.19	0.95	0.88	0.77	0.28
	2.41	2.24	1.79	1.71	1.06
ΔShort 5	4.95	4.23	2.99	2.09	1.15

argue, we should observe a clear predictability of future returns based on the variable, *constraint*. However, as Table XII Panel B demonstrates, there is no evidence that stocks, which are highly short sale constrained, underperform others since the hedge portfolio earns an insignificant 0.02% per month. Therefore, the results in Table XII cast some doubt on the arguments of APR.

Next, I turn to testing Hypothesis 1. APR argues that, consistent with Miller (1977), stocks with binding short sale constraints (high short interest and low institutional ownership) are overpriced today and therefore should have negative subsequent abnormal returns. So, the basic premise of Miller (1977) argument is that when short sale constraints become more binding, overpricing increases, and vice versa. Therefore, we should observe a positive relationship between changes in short sale constraints and changes in prices. Since APR use short interest and institutional ownership to determine short sale constraints, I conduct tests on both of the variables.

Each quarter, I first rank stocks into five portfolios based on short interest, then I rank each of these portfolios into additional five portfolios based on changes in institutional ownership or short interest, and I report contemporaneous mean quarterly returns for each portfolio. An increase in institutional ownership means increasing the supply of loanable stocks therefore relaxing short selling constraints. According to APR, we should observe lower contemporaneous returns for those stocks. However, Table XIII Panel A demonstrates that, in fact, increase in institutional ownership is associated with higher contemporaneous returns. For example, among the highest short interest stocks, the stocks with lowest change in institutional ownership earn -3.35% while stocks with the highest change in institutional ownership earn 4.49% during the quarter where changes in institutional ownership are measured. Therefore, this result is not consistent with APR's application of Miller (1977) argument to short interest level. In a similar study, Cohen et al. (2005), considering a decrease in shorting supply as tightening of short sale constraints, find that a decrease in shorting supply does not have a significant predictability for subsequent returns.

I also examine contemporaneous returns relative to changes in short interest. According to APR, an increase in short interest increases the short selling constraints, therefore, should increase prices and exacerbate overpricing. Table XIII Panel B shows that contemporaneous returns are indeed positively correlated with changes in short interest: prices and short interest increase (decrease) together. However, there is an alternative explanation for this finding. Dechow et al. (2001) report that short sellers position themselves in stocks with lower expected future returns and reduce their positions as prices come down. The two arguments have the same predictions but differ in terms of the direction of causality. APR argue that the change in short selling constraints drives the prices, whereas Information story argues that the change in prices drives the change in short interest. Since I don't make causal conclusions, the test using changes in short interest is inconclusive in regards to differentiating between Miller (1977) and Information argument.

Next, I examine short interest in terms of its predictive power regarding future company (good or bad) news. I use future earnings announcements to proxy for value relevant news events. As discussed in Hypothesis 2, if the return predictability of short interest is due to information advantage of short sellers about fundamental value of firms, short interest should also predict future earnings surprises as well as future returns. In fact, the return predictability is a product of short sellers' ability to identify firms that they expect to do poorly in the future. However, if the return predictability is merely due to market frictions/short selling constraints as APR suggests, short interest should have no predictive power regarding future earnings announcements.

Table XIV Panel A reports some descriptive statistics about earnings surprises between 1988 and 2002. When stocks are sorted into five portfolios based on standardized unexpected earnings, *SUE*, I see that the stocks with the most positive (negative) earnings surprises earn 0.48% (-0.48%) abnormal return per day around announcement days [-2,1]. Table XIV Panel B replicates the results in Table 5 in APR. Each month, stocks are sorted into ten portfolios based on short interest, and the portfolio with the highest short interest is then sorted into additional three portfolios based on institutional ownership. One month ahead raw returns and four-factor model adjusted abnormal returns are reported. Similar to the findings of APR, among stocks with high short interest, the lower the institutional ownership, the more negative are the portfolio's abnormal returns. Institutional ownership affects the predictive power of short interest. At first sight these results seem consistent with Miller (1977) argument as APR interprets since the stocks with the highest short sale constraints (high short interest and low institutional ownership) earn the lowest subsequent returns. But on closer inspection, the fact that this varying predictive power also applies to future earnings surprises makes the results more consistent with an information argument. As the results for *SUE* and announcement abnormal returns suggest, short sellers are better able to predict future earning surprises when institutional ownership is low. For example, while stocks with the highest institutional ownership experience 0.03% return during the first future earnings announcement, stocks with the lowest institutional ownership experience -0.24%. The difference between the two groups is statistically and economically significant. This result is consistent with information argument as explained in Section B.2. As Panel B

Table XIV
Short Interest and Earnings Announcements Surprises

This table demonstrates the relationship between short interest and future earnings announcement surprises. *SUE*, standardized unexpected earnings is unexpected earnings (the change in quarterly earnings per share from quarter t-4 to quarter t) divided by the standard deviation of unexpected earnings over the last eight quarters. *ABR* is the mean daily abnormal return around earnings announcement date, [-2,+1] where t=0 is the announcement date. Panel A reports descriptive statistics. Each quarter, stocks are sorted into five portfolios based on *SUE*, and time-series means of *SUE* and announcement abnormal returns are reported. In Panel B, stocks are sorted into ten portfolios based on *Short*. The portfolio with highest Short is then sorted into three additional portfolios based on *Instown*. Time-series means of raw returns, four factor adjusted abnormal returns, SUE, and mean daily earnings announcement abnormal returns are reported. Panel C reports standardized unexpected earnings. Each quarter, stocks are first sorted into five portfolios based on *Instown*, then sorted into five additional portfolios based on *Short*. *SUE* for the closest future earnings announcement is calculated and time-series means for each portfolio is reported. Panel D reports mean daily abnormal returns around earnings announcement date, [-2,+1] where t=0 is the announcement date. Each quarter, stocks are first sorted into five portfolios based on *Instown*, then sorted into five additional portfolios based on *Short*. Abnormal returns for the closest future earnings announcement is calculated, and time-series means for each portfolio is reported.

Panel A

	SUE 1				*SUE* 5
SUE	-2.49	-0.31	0.15	0.74	2.66
ABR	-0.48	-0.22	0.17	0.39	0.48

Panel B (*Short* > 90^{th} percentile)

	Raw Ret.	*α*	*t-value*	*SUE*	*ABR.*
Instown 1	-0.71	-0.93	2.17	-0.29	-0.24
	0.37	-0.20	-1.09	-0.06	-0.04
Instown 3	0.78	-0.21	-1.46	0.25	0.03
3 – 1	1.49			0.54	0.27
t-value	2.64			11.50	7.05

Panel C

	Standardized Unexpected Earnings (*SUE*)				
	Instown 1				*Instown* 5
Short 1	0.06	0.05	0.07	0.12	0.26
	0.05	0.10	0.16	0.27	0.44
	0.02	0.06	0.18	0.36	0.47
	-0.04	-0.05	0.13	0.27	0.40
Short 5	-0.18	-0.25	-0.14	0.06	0.36
1 - 5	0.24	0.30	0.21	0.06	-0.10
t-value	4.03	5.21	3.12	1.51	-1.46

Panel D

	Mean Daily Abnormal Returns Around Earnings Announcements (*ABR*)				
	Instown 1				*Instown* 5
Short 1	0.32	0.18	0.13	0.12	0.16
	0.23	0.11	0.07	0.07	0.03
	0.09	0.02	-0.02	0.01	0.02
	-0.05	-0.06	-0.03	0.00	0.04
Short 5	-0.22	-0.21	-0.09	0.01	0.05
1 - 5	0.64	0.39	0.22	0.11	0.11
t-value	7.69	6.86	4.16	2.62	1.83

demonstrates*, the return predictability of short interest seems to come from value relevant information short sellers have.*

A short sale can be the result of a merger arbitrage, convertible arbitrage, tax saving strategy (shorting against the box), or an effort to profit from overpriced stocks. The literature provides considerable evidence of informed short selling. Desai et al. (2004) find that short sellers start taking positions in firms, which have earnings restatements two years before the restatement announcement. After the restatement, they cover their positions. Desai et al. (2004) show that the increase in short interest is more pronounced for firms with higher accruals. Francis et al. (2005) also argues that short sellers target firms where the market has overestimated the fundamentals. They show that analysts revise their forecasts downward following an unexpected increase in short interest. Nevertheless, the informativeness of short sales might vary with the level of institutional ownership. As Boehmer and Kelley (2006) suggest if institutional investors enhance price efficiency, short sellers might have limited profitable opportunities to exploit when institutional ownership is high. Moreover, short interest might be more informative when institutional ownership is low since Diamond and Verrecchia (1987) suggest that the pool of short sales would be more informative when it's harder to borrow shares. Both of these arguments strengthen the idea that short interest level is more informative about future firm performance and return predictability is stronger when institutional ownership is low.

Table XIV Panel C and D show results consistent with this idea. Each quarter, I first sort stocks into five portfolios based on institutional ownership, each portfolio then is sorted into additional five portfolios based on short interest. Time-series means of *SUE* and abnormal returns around the first earnings announcement in the future for each portfolio is reported. An investigation of Panel C and D reveals that short interest predicts more negative earnings surprises when institutional ownership is low. For example, while among low institutional ownership stocks a hedge portfolio between high short interest and low short interest stocks experience 0.64% (t-value 6.79) market reaction during the first future earnings announcement, a similar hedge portfolio among high institutional ownership stocks experience 0.11% (t-value 1.43). The comparisons are very similar with respect to standardized unexpected earnings, *SUE*. *Short interest seems to be better able*

Table XV
Fama-MacBeth Regressions

Size, *BM*, *Short*, and *Instown* are calculated as described in Table I. *MOM* is the mean return performance over the past 12 months. *SUE*, standardized unexpected earnings is unexpected earnings (the change in quarterly earnings per share from quarter t-4 to quarter t) divided by the standard deviation of unexpected earnings over the last eight quarters. *Ann. Ret* is the mean daily abnormal return around earnings announcement date, [-2,+1] where t=0 is the announcement date. Ret – Rf is the excess stock return after subtracting the return on one-month T-Bill. Dependent variables are *SUE*, *ABR*, and *Ret – Rf*. Each month, independent variables are transformed into decile ranks, which are then standardized to take values between zero and one. Cross-sectional regressions are run each month, and time-series averages of the coefficient estimates are reported. T-stats in parentheses are calculated according to robust standard errors.

	SUE	*ABR.*	*Ret – Rf*
Intercept	-0.001	0.256	-0.121
	(-0.07)	(4.92)	(-0.14)
Size	0.234	-0.383	-1.430
	(3.53)	(-9.19)	(-1.98)
Bm	-1.089	0.107	1.937
	(-21.26)	(2.94)	(3.10)
MOM	1.452	0.236	2.036
	(34.94)	(8.70)	(3.05)
Short	-0.720	-0.497	-2.224
	(-14.73)	(-9.75)	(-2.76)
*Short*Instown*	0.403	0.502	2.241
	(7.08)	(9.01)	(3.23)
Average R^2	8.9%	0.9%	3.7%

to predict value relevant company news when institutional ownership is low. And, this predictive ability is reflected in future total returns, consistent with information argument. A similar study is done by Reed (2003) who looks at the relationship between the absolute value of earnings announcement price reactions and short selling costs. He finds that stocks with high short selling constraints have larger price reactions to earnings announcements especially for bad news. A major difference with this paper is that Reed (2003) investigates the absolute value of the earnings surprise not the sign of the surprise. Actually, he finds that shorting costs can not predict future earnings surprises, which is consistent with the arguments in this paper.

Table XV is a more formal presentation of the portfolio approach. I conduct Fama-McBeth regressions of stock returns, *SUE*, and announcement abnormal returns on short interest and some control variables to examine short interest's predictive ability. Each month, independent variables are transformed into decile ranks, which are then standardized to take values between zero and one. This transformation makes the interpretation of the coefficients more intuitive and comparable across variables. Cross-sectional regressions are run each month, and time-series averages of the coefficient estimates are reported in Table XV. The regression results in Table XV are consistent with the earlier results using portfolio analysis. Short interest predicts subsequent returns and earnings announcement surprises, and this predictability decreases with institutional ownership. For example, the coefficient estimate for short interest is -2.22% (t-value -2.76). This means that return differential between the highest and lowest short interest stocks is -2.22% per month when institutional ownership is the lowest. However, considering the interaction term between short interest and institutional ownership, this differential approaches zero (-2.224 + 2.241 = 0.017%) when institutional ownership is the highest. Similarly, short interest's predictive power for future earning surprises decreases with institutional ownership. When institutional ownership is in its lowest level, stocks with the highest short interest experience -0.497% (t-value -9.75) during the first future announcement, but this figure approaches to zero (-0.497 + 0.502 = 0.005%) when institutional ownership is the highest.

The regression results confirm the conclusions from the earlier double sorts: predictive power of short interest in terms of predicting future returns and earnings surprises varies with institutional ownership. It becomes stronger when institutional ownership is low.

Finally, for robustness checks I examine return predictability of short interest using a subsample of stocks, which have lower short sale costs. D'Avolio (2002) reports that the vast majority of hard to borrow stocks (where short sale costs are greater than 1% per year) are either in the bottom size decile or have prices less than $5. Therefore, I repeat the analysis excluding those firms from the sample. The stocks in the remaining sample are presumed to have relatively lower short sale costs. Table XVI Panel A and B demonstrate that the results are strikingly similar with those of the full sample. Short interest seems to be informative in terms of future total returns and earnings announcements, and this informativeness is stronger when institutional ownership is lower. Overall results of this paper is also consistent with Cohen et al. (2005) who show that while an increase in shorting demand predicts negative abnormal returns of 2.54% in the subsequent month, a decrease in shorting supply does not have a significant predictability. They suggest that the return predictability associated with shorting is much

Table XVI
Subsample Analysis

This table shows the short interest, and mean returns of portfolios sorted on short interest.
The sample contains NYSE-AMEX-NASDAQ stocks during the period from January 1988 to December 2002. Stocks with price less than $5 or stocks in the lowest size decile are excluded from the sample. The variables are defined as in Table I and Table V. Panel A reports short interest (*Short*), mean monthly stock returns (*Raw Ret.*), and four-factor adjusted abnormal stock returns (α) for portfolios sorted on short interest. Panel B reports time-series averages of coefficients estimated from monthly cross-sectional regressions. T-stats in parentheses are calculated according to robust standard errors.

Panel A

	Short	*Raw Ret.*	α	t-value
P1 (low)	0.004	1.29	0.48	3.04
	0.029	1.42	0.52	3.54
	0.095	1.46	0.40	2.73
	0.214	1.21	0.21	2.08
	0.388	1.09	0.05	0.61
	0.631	0.95	-0.06	-0.77
	0.988	1.00	0.03	0.41
	1.572	0.85	-0.08	0.80
	2.814	0.54	-0.32	-2.51
P10 (high)	8.551	0.24	-0.59	-3.49
P1 – P10	8.547	1.05	-1.07	-5.56

Panel B

	SUE	*ABR.*	*Ret – Rf*
Intercept	0.056	-0.007	-0.75
	(1.61)	(-0.34)	(-1.09)
Size	0.511	-0.148	-0.05
	(11.51)	(-4.05)	(-0.12)
Bm	-1.089	0.079	1.06
	(-27.47)	(2.52)	(1.98)
MOM	1.545	0.206	2.44
	(31.35)	(8.19)	(5.07)
Short	-0.912	-0.302	-1.79
	(-14.75)	(-8.20)	(-3.07)
*Short*Instown*	0.451	0.325	1.38
	(7.31)	(9.39)	(2.91)
Average R^2	10.25%	0.83%	4.98%

greater than the costs of shorting and that the relationship between shorting market and subsequent returns may not be due to market frictions but due to information revelation into stock prices.

CHAPTER IV
CONCLUSION

In this study I present confirming evidence for the negative relationship between dispersion of analysts' forecasts and subsequent stock returns. Earlier research interpret this result being inconsistent with the notion that divergence of opinions is a proxy for risk, and consistent with the idea that, in the presence of short sale constraints, optimists may cause overpricing, which leads to lower subsequent returns while prices get corrected, an argument borrowed from Miller (1977). While heterogeneous beliefs and short sale constraints may be important for asset pricing, I try to demonstrate an alternative mechanism based on analysts' behaviors, which makes it possible to observe a negative relationship between dispersion of forecasts and subsequent stock returns.

In the first part of the paper, I examine whether prices move in the same direction what Miller (1977) predicts when dispersion of forecasts is used to proxy for divergence of opinions in the market. Miller (1977) asserts that differences of opinion exacerbate overpricing since the prices will reflect optimistic view whenever pessimists are restricted from the market. A testable prediction of this argument is that when differences of opinion increase, prices increase, i.e. there should be positive correlation between stock returns and changes in dispersion of opinions. I show that prices, in fact, move in the opposite direction of this prediction since stocks, which experience increase in dispersion earn lower returns.

Furthermore, analysts' biased behaviors in updating their forecasts seem to explain the negative relation between dispersion of forecasts and stock returns. Some analysts exhibit reluctance to revise their forecasts downward quickly either due to investment banking relationships with the firm or the effort to maintain good relations with the firm management to have access to private information. Since some analysts fail to quickly downgrade poorly performing stocks and wait for additional confirmation of poor performance before revising their estimates while others don't, forecasts would be more dispersed for stocks with recent poor performance. Additionally, because of the sluggish response, the change in the consensus estimate would be insufficient. This biased behavior against negative news need not be an irrational behavior for analysts but instead it can be considered to be in line with their incentive structures because brokerage houses generally favor optimistic analysts. Indeed, this paper demonstrates that firms with recent poor performance have higher dispersion of forecasts compared to others. Moreover, dispersion of forecasts increases during the period when there is poor performance.

As indicated above, high dispersion may be correlated with incomplete revision of the consensus estimate for poorly performing firms. If investors follow a particular analyst or the consensus estimate, they may fail to correct for this bias. Sluggish response of some analysts to bad news manifests itself as dispersion of forecasts, so the observation of dispersed forecasts following poor performance hints that prices may not reflect the recent information in a timely fashion, and therefore predict lower returns. In this respect, the explanation for the dispersion effect in this paper is conditional on bad news which consequently suggests that dispersion effect should be more pronounced for firms with recent poor performance. This paper empirically demonstrates that the return differential between high dispersion and low dispersion stocks is most pronounced among loser stocks. High dispersion stocks do not significantly underperform low dispersion stocks unless the recent performance is poor. Moreover, cross-sectional regressions of returns provide confirmatory evidence by showing that the interaction variable between dispersion and recent earnings performance is significantly negative, which also suggest that the dispersion effect is most pronounced for firms with recent bad news.

Although short sale restrictions might impede the flow of all available information in the marketplace into prices, and therefore result in temporary mispricing, the findings in this paper suggest that empirical observations using analysts' forecast dispersion to proxy divergence of opinions may be significantly affected by the bias in analysts' forecast revisions. Since some analysts' reluctant response to bad news may lead to dispersion in forecasts, empirical results of the papers that use analysts' forecast dispersion as a proxy for uncertainty or heterogeneity of beliefs must be interpreted cautiously. Moreover, if forecasts are dispersed after bad news, investors may want to stay away from such firms as the price adjustment for the bad news could continue. Even though our results do not show that differences of opinion may be a proxy for risk, differentiating between information differences and interpretation differences as two reasons for differences of opinion is another research avenue to disentangle the effects of differences of opinion on stock returns.

In the second chapter of the study, I find that, like Asquith et al. (2005), high short interest stocks earn more negative abnormal returns when institutional ownership is low. Asquith et al. (2005) suggest that stocks with high short interest and low institutional ownership are short sale constrained and that the return predictability is caused by high short selling costs, which holds negative opinions off from the market consistent with Miller (1977). The findings in this paper demonstrate that the reason of the return predictability may also be consistent with an information argument.

First, I show that increasing institutional ownership (a proxy for short selling constraints used by Asquith et al. (2005)) does not exacerbate overpricing. Second, I demonstrate that short interest is informative in regards to not only future total returns but also future earnings surprises. Moreover, this informativeness is greater when institutional ownership is lower. The results are consistent with the following argument: if shorting costs work as a filter to drive out relatively uninformed short sales, the resulting short interest would be more informative in a high cost environment. The results taken together suggest that short sellers are sophisticated investors who have value relevant information about firms and position themselves in stocks where expected future returns are lower.

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