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Divergence of opinion and equity returns under different states of earnings expectations ☆

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Abstract

In this paper, we show that divergence of opinion trades at a discount when analysts' earnings forecasts are optimistic and at a premium when analysts' earnings forecasts are pessimistic. Our results suggest that investors tend to exaggerate the quality of their foresight and invest in low dispersion stocks when earnings expectations are optimistic (i.e., *sure winners*) and avoid low dispersion stocks when earnings expectations are pessimistic (i.e., *sure losers*). In sharp contrast with Miller's (1977) view that high divergence of opinion leads to overvaluation, we find that overvaluation occurs when divergence of opinion is low and analysts' earnings predictions are optimistic. When analysts' forecasts are pessimistic low dispersion in analysts' forecasts reverses this valuation pattern.

1. Introduction

While differences of opinion among investors are generally believed to play an important role in asset pricing, the conflicting theoretical predictions of divergence of

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investor opinion on asset prices remain an unresolved issue.[1] Moreover, there is very little and contradictory evidence on how differences of opinion influence asset prices.[2] Cragg and Malkiel (1968, 1982), Friend et al. (1978), and Harris (1986) provide some evidence in favor of a positive association between stock returns and dispersion in analysts' earnings forecasts. Doukas et al. (2004) show that divergence of opinion is more pronounced among value stocks and that it behaves as a risk factor that can partly explain the value-growth anomaly. Similarly, Qu et al. (2003) show that dispersion is priced as an information risk factor especially for small, value firms. In contrast, Diether et al. (2002) show that stocks with higher dispersion in analysts' earnings forecasts earn lower future returns than otherwise similar stocks. They interpret their findings as being consistent with Miller's (1977) prediction that divergence of opinion is priced at a premium. This evidence in support of Miller's hypothesis relies on the underlying assumption that all stocks in their study are short constrained. Scherbina (2001), however, reports similar dispersion pricing effects in the S&P index, which consists of stocks that are easier to short. So it's not clear if short-selling constraints drive the Diether et al. (2002) results. Furthermore, Johnson (2004) argues that dispersion can be viewed as a proxy for unpriced information risk when fundamentals are unobservable. As a result, a rise in dispersion (unpriced/idiosyncratic risk) raises the option value of a levered firm, which lowers its expected return.[3] Hence, he claims that the negative association between dispersion and future returns documented in Diether et al. (2002) is not necessarily a manifestation of mispricing in the spirit of Miller (1977).

In this paper, we argue that divergence of opinion conditional on earnings expectations may have opposite effects on stock returns. We base this argument on the assumption that ambiguity-averse investors rely on expert (security analysts') opinion to make investment decisions and that their confidence in the validity of the analyst-generated information increases with the degree of agreement among analysts. These assumptions are founded on research that documents humans' tendency toward conformity (Gilovitch (1991) and forming of beliefs leading to cascades (Kuran and Sunstein, 1999).[4] It follows that, if investors use the degree of agreement among analysts as confirmation of the average expectation about future earnings, two opposite price phenomena are likely to emerge. In the presence of optimistic expectations, high agreement (low dispersion) among analysts will result in higher valuations, while in the presence of pessimistic expectations high agreement will result in lower valuations. In other words, when the average mood in the market is optimistic (pessimistic) investors may tend to overstate the quality of their

[1] Williams (1977), Mayshar (1983), Epstein and Wang (1994), Goetzmann and Massa (2001), Merton (1987) and Varian (1985) emphasize the importance of heterogeneous investor expectations suggesting that divergence of opinion among investors proxies for risk. In contrast, Miller (1977) argues that, in the presence of market frictions, divergence of opinion among investors does not represent risk and is priced at a premium.

[2] While several recent papers (Harris and Raviv, 1993; Kandel and Pearson, 1995; Odean, 1998; Hong and Stein, 1999; Loughran and Marietta-Westberg, 2005) stress the importance of differences of opinion among investors, they focus on understanding the consequences of differences of opinion among investors on trading volume and stock market crashes.

[3] This, of course, requires that the asset's risk premium remains constant.

[4] A cascade is a string of identical and potentially erroneous recommendations. It arises when investors face an uncertain decision in sequential order and seek to reinforce their own limited judgment by looking at the decisions of others, disregard their own judgment, and follow the crowd.

foresight and buy (sell) low dispersion stocks (i.e., stocks about whose future prospects analysts' beliefs are in strong agreement). Essentially, we argue that when investors deal with uncertainty in Knights' sense where the consequences of their investment choices are unknown or ambiguous they prefer bets with known probabilities over those with ambiguous probabilities.

To address the association between disagreement and stock returns, we analyze the returns of stocks with high (low) divergence of opinion across different states of earnings expectations while we also control for the severity of alternative short sale constraints. Previous studies have not met these requirements in testing the impact of divergence of opinion on stock returns. The conflicting theoretical views of whether divergence of opinion is priced at a premium or a discount, the inconclusive evidence and the testing limitations of previous work have motivated this study.

This study contributes to the literature by shedding new light on the conflicting theoretical views and empirical findings in the extant literature about the workings of divergence of opinion. While our results indicate that differences of opinion have an important and significant effect on stock prices, they also show that the nature of this price effect is dependent on whether earnings expectations are optimistic or pessimistic. First, when we do not control for the nature of earnings expectations, we show that the price effect of dispersion in analysts' forecasts is consistent with the findings of Diether et al. (2002) who show a negative relationship between dispersion in analysts' forecasts and stock returns. Second, a more important finding of our analysis is that, once we control for the effects of earnings expectations, high dispersion in analysts' forecasts is priced at a discount when analysts' forecasts are optimistic, suggesting that investors tend to overstate the quality of their foresight and invest in low dispersion stocks (i.e., *sure winners*). In sharp contrast with Miller's view that divergence of opinion leads to overvaluation, our results show that overvaluation occurs when analysts' earnings predictions are optimistic and there is low divergence of opinion among them about the future prospects of a stock. Third, our evidence that dispersion in analysts' forecasts is priced at a premium, when the earnings expectations are pessimistic, suggests that the findings of Diether et al. (2002) are, at least partly, driven by the lack of control for the nature of earnings expectations.

Most importantly, our results do not appear to be sensitive to the severity of alternative short sale constraints. Contrary to Miller's theory, we find that stock overvaluation occurs when analysts' earnings expectations are optimistic and there is low dispersion among analysts' forecasts.

Overall our findings suggest that investors perceive analyst information to be more reliable whenever there is low dispersion in their forecasts. As a result, when there is optimism and a high degree of agreement among analysts, investors tend to exaggerate the quality of analysts' foresight and buy more low divergence of opinion stocks (i.e., *sure winners*) than high divergence of opinion stocks. On the other hand, when there is pessimism and high agreement among analysts, investors tend to overstate the value of analysts' foresight and avoid low divergence of opinion stocks (i.e., *sure losers*) in favor of high divergence of opinion stocks.

The rest of the paper is organized as follows. Section 2 illustrates the pricing effects of divergence of opinion in the context of analysts' earnings expectations. Section 3 describes the data sources, sample selection and the variables used in the analysis. Section 4 presents and describes the empirical results. Section 5 concludes the paper.

2. Divergence of opinion and analysts' earnings forecasts

Previous empirical studies designed to determine the effects of divergence of opinion on stock returns suffer from two limitations that raise serious concerns about the validity of their findings. First, they implicitly assume that all firms are subject to the same short-sale constraint. However, empirical tests attempting to discriminate between the two competing views on the relationship between divergence of opinion and asset prices require that we control for the effects of short-sale constraints.[5] This is important because, in the presence of divergence of opinion and less binding short selling constraints, prices will not reflect optimistic valuations since low short selling costs allow more pessimistic investors to participate in the market. On the other hand, in the presence of divergence of opinion, prices will reflect more optimistic valuations if pessimistic investors are kept out of the market by high short selling costs. Hence, Miller's prediction that high divergence of opinion stocks should realize low (high) future returns should hold when the short selling constraint becomes more (less) binding. Testing this hypothesis requires that the relationship between divergence of opinion and stock returns is appraised in the context of varying short selling costs. Accordingly, our analysis is conducted by double sorting stocks on divergence of opinion and different short selling costs. Furthermore, we use alternative short sale constraints.

Second, and most importantly, examining how dispersion in analysts' forecasts, a proxy for divergence of opinion, affects security prices requires controlling for the nature (optimistic/pessimistic) of earnings expectations.[6] High divergence of opinion among analysts per se simply means that analysts' earnings expectations differ, but it does not reveal whether analysts' disagreement is about optimistic or pessimistic earnings expectations. Investors are less likely to use dispersion in isolation of earnings expectations. Dispersion in combination with analysts' earnings expectations is practically more meaningful to investors than dispersion alone.[7] These two elements of security analysis provide investors with a framework to profile a firm's prospects and its industry. This need becomes even greater when future contingencies and their probabilities are unknown and conflicting interpretations of the same information coexist. Furthermore, Diether et al. (2002) show that the upward bias in consensus earnings forecasts, a widely used measure of the degree of investor optimism, is positively related to dispersion in analysts' forecasts. It is conceivable that the negative relationship between dispersion of analyst forecasts and returns reported in their study arises from the contamination of greatly dispersed forecasts by high levels of optimism. Therefore, in order to examine the relationship between dispersion in analysts' forecasts and stock returns we account for the market's degree of optimism using an ex-ante earnings expectations measure.

[5]The two competing theoretical views rely on different assumptions about the feasibility of short selling. For example, Merton (1987) and Varian (1985), relying on the assumption of frictionless markets, develop a model that shows that divergence of opinion represents risk and is priced at a discount. On the other hand, Miller (1977) assumes that the short-sale constraint is absolute in the sense that short selling is prohibited. In reality, however, short selling is neither frictionless nor prohibited.

[6]Financial analysts' forecasts are generally believed to represent a good proxy for the market's expectations of future earnings (see Elton et al., 1981; La Porta, 1996; Doukas, 2002, among others).

[7]DeBondt and Thaler (1985, 1990) show the importance of systematic optimism in explaining anomalous market behavior.

Investigating whether divergence of opinion is priced at a discount or a premium without taking into consideration the nature of analysts' earnings expectations does not permit us to determine how investors classify stocks and make investment decisions.[8] Specifically, if investors use divergence of opinion among analysts to evaluate the credibility of analysts' earnings forecasts, low disagreement among analysts would be interpreted as a more reliable forecast.[9] This argument is based on two facts. First, investors have a proven distaste for ambiguity (Camerer (1995)), and therefore stocks with widely divergent analyst forecasts would be less attractive (i.e., investors would perceive their future earnings performance as more ambiguous). Second, the issuance of several similar analysts' forecasts leads to an "availability cascades" (see Kuran and Sunstein (1999)) effect, wherein an expressed perception (in this case the optimistic or pessimistic nature of analysts reports and forecasts) is perceived by investors to be more plausible as a consequence of its increased availability in public discourse (due to the similarity among the different analyst forecasts). Thus, less dispersed forecasts would increase investors' confidence in the quality of the information they process and therefore they would be more willing to trade on the basis of that information.

In general, we argue that a combination of judgment and decision biases may lead investors to exhibit strong (weak) preference for low- relative to high-divergence of opinion stocks when earnings expectations are optimistic (pessimistic). Given that people are ambiguity averse (Ellsberg, 1961; Camerer, 1995 and regret averse (Josephs et al., 1996; Ritov, 1996), and that they tend to put too much emphasis on confirming evidence (a.k.a. confirmatory bias, see Gilovitch, 1991, among others), a greater degree of agreement among security analysts would provide investors with a self-deception mechanism, wherein their cognitive resource constraints make them more likely to adopt analyst opinion and trade more aggressively. Hence, investors should find low (high) divergence of opinion stocks less attractive when earnings expectations are pessimistic (optimistic). In addition, since it has been shown that overconfident and aggressively trading investors do badly (see Barber and Odean 2000a, b; Odean, 1999, it follows that low divergence among analyst forecasts may result in overvaluation and low future returns when earnings expectations are optimistic.

We have argued that divergence of opinion could be priced either at a discount or a premium depending on whether analysts' earnings expectations are optimistic or pessimistic. We illustrate this point with an example. Suppose analysts are optimistic about the prospects of a class of stocks. However, for a subset of stocks within this class analysts have strong differences of opinion about the future performance (i.e., high divergence of opinion stocks) of these stocks while there is strong consensus among them about the rest of the stocks within the same class (i.e., low divergence of opinion stocks). If investors use analysts' earnings predictions and the divergence of opinion among them to decide whether to buy or sell stocks, it is reasonable to assume that they would be more skeptical about the stocks that have more dispersed forecasts and therefore doubtful about the prospects of the high divergence of opinion stocks. Analysts' high disagreement about the future valuation of a stock, in the presence of optimistic earnings expectations, would

[8]Since financial analysts' forecasts proxy for the market's earnings expectations, we use the terms of divergence of opinion among analysts and divergence of opinion among investors interchangeably.

[9]In a different context, low dispersion in analysts' forecasts has been shown to be associated with higher quality financial reporting (Lang and Lundholm, 1996; Barron et al., 1997).

signal ambiguity about a stock's future performance. Thus, investors will opt for the low divergence of opinion stocks where there is greater convergence of beliefs among analysts that they will do well in the future. This relative demand shift toward low divergence stocks will cause these stocks to trade at a premium. To put it differently, when analysts' earnings expectations are optimistic but divergence of opinion among them about a stock's future payoff is low (i.e., there is high agreement among analysts that it will do well) investors will be more confident about the good prospects of such a stock. As a result, investors searching for "*sure winners*" will bid up the prices of such stocks, and therefore realize lower future returns than on high divergence of opinion stocks. Alternatively, one can argue that when analysts' earnings expectations are optimistic, investors will perceive the high divergence of opinion stocks (i.e., low analyst certification stocks) as riskier than the low divergence of opinion stocks (i.e., high analyst certification stocks).

Now, suppose analysts are pessimistic about the prospects of a class of stocks. In this case, investors would be less willing to hold such stocks. Low analysts' divergence of opinion for certain stocks within this class would be interpreted by investors as a strong signal about the poor earnings prospects of these stocks. As a result, investors' doubts about the poor prospects of these stocks would be removed and, therefore, they would be even less willing to hold them relative to the rest of the stocks within this class. Consequently, in the presence of pessimistic earnings expectations, low divergence of opinion stocks would result in lower valuations than high divergence of opinion stocks. Based on the previous considerations, this analysis yields the following testable implication: whether divergence of opinion trades at a discount or a premium depends on the nature of analysts' earnings expectations. Specifically, this hypothesis postulates that divergence of opinion is priced at a discount (premium) when analysts' earnings expectations are optimistic (pessimistic). That is, when analysts' earnings expectations are optimistic, high divergence of opinion stocks should earn higher returns than otherwise similar stocks with low divergence of opinion. When analysts' earnings expectations are pessimistic, high divergence of opinion stocks should earn lower returns than otherwise similar stocks with low divergence of opinion. We test this hypothesis by analyzing the returns of stocks with high (low) divergence of opinion across different earnings expectations while we control for the severity of short sale constraints.

3. Sample selection and variable definitions

In this section we describe the sources of data and the sample selection procedure. We also present the explanatory variables used in the empirical analysis. We obtain analyst forecasts information from the Institutional Brokers Estimate System (I/B/E/S) U.S. Detail History dataset.[10] We employ individual analysts' forecasts issued in June, and if not available in June, we use forecasts issued in May, or April and last confirmed as "recent" in June. For instance, if the forecast was made in April or May and was last confirmed in June, it is used in our computation of averages and standard deviations for June. If an analyst releases more than one forecast from April to June, only the last forecast is used in our estimations. Each stock is required to be covered by at least two analysts, since dispersion is estimated as the standard deviation of earnings forecasts scaled by the absolute mean forecast.

[10]The use of the Detail History I/B/E/S data allows us to exclude stale forecasts.

To make sure that our results are not influenced by the problems of the rounding procedure (i.e., rounding of forecasts and actual EPS estimates to the nearest penny (two decimals)) and stock-split adjustment of I/B/E/S, which have overwhelmed previous studies (Payne and Thomas, 2003), we make use of the I/B/E/S Detail file. Rounding to the nearest penny is especially difficult because the adjusted I/B/E/S database may report a zero forecast error when, in fact, the forecast error is different from zero relying on unadjusted data. Moreover, the rounding procedure tends to shrink the variation in forecasts across analysts resulting in a downward bias in forecast dispersion for firms with subsequent stock splits. Obviously, this bias rises with the number of stock splits. The data supplied in the Detail file are rounded to one hundredth of a cent (i.e., four decimals) and consequently the misclassification bias is not dramatic.[11]

Stock returns are taken from the Center for Research in Securities Prices (CRSP) Monthly Stocks Combined File, which includes NYSE, AMEX, and NASDAQ stocks. Book value data are from COMPUSTAT using book equity for the fiscal year end. We obtained the firm size (market value of common equity) data from CRSP, as of the end of June of each year. We abide by the Fama and French (1993, 1996) procedure in creating portfolios based on size rankings. Portfolios based on dispersion of analyst forecast rankings are created annually utilizing the information from the I/B/E/S datasets as described earlier. Our reported portfolio returns are average monthly equally weighted returns computed over the annual period starting in the beginning of July of year t and ending at the end of June of year $t+1$.[12] The study spans the period from July 1983 through December 2001. The initial point of this study was dictated by the availability of data in the I/E/B/S Detail History file. The combination of the I/B/E/S, CRSP and COMPUSTAT datasets resulted in a sample that contains 35782 firm-year observations. Additionally, we use the Compustat Disclosure CD-Roms to obtain information on the percent of equity shareholdings by institutional investors. This information is not available to us for the years before 1987. Hence, the sample of institutional shareholdings is smaller (28297 firm-year observations). As an alternative short sale constraint we use short interest for the month of June of each year. We use this variable to control for the impact of short selling costs. The short sale constraint information is obtained from NYSE and NASDAQ records starting in 1995. The section of our analysis that uses short interest data draws on of a sample of 15120 firm-year observations.

The variables used in the empirical analysis are defined as follows. Dispersion, D, is measured as the standard deviation of analyst fiscal year-end forecasts deflated by the absolute value of the mean forecast.[13] Returns, RET, are average monthly returns for equally weighted portfolios calculated over a one-year period starting from July of year t and ending with June of year $t+1$. The book-to-market (BM) and $SIZE$ (market value of common equity) measures are computed as in Fama and French (1996). Institutional shareholdings measured as percent of total common shares outstanding in year t, IO, are from filings with the SEC in the first half of year t. We construct a short-selling costs index,

[11]In our sample we identified only 3 firms (7 firm-year observations) with a cumulative adjustment split-factor exceeding 100. Our results are not sensitive to the inclusion of these observations.

[12]Similar results are obtained using value-weighted portfolio returns. We report results based on equally-weighted portfolios in order to maintain comparability with Diether et al. (2002).

[13]We also obtain similar results when we construct the dispersion measure based on alternative deflators. We choose to present the absolute mean forecast deflated results in order to maintain comparability to the Diether et al. (2002) results.

SSCI, which is defined as [(11—Rank *SIZE*) + (11—Rank *IO*)], where Rank *SIZE* (Rank *IO*) takes values from 1 to 10 depending on which size (institutional shareholdings) decile the firm belongs to. Our short selling costs index (*SSCI*) uses firm characteristics (i.e., firm-size and *IO*) to proxy for the supply of stock lenders can provide to short sellers as suggested by D'Avolio (2002). Relative short interest, *RSI*, is the percentage of each firm's outstanding shares held short in June of each year. This is the short interest scaled by the firm's total number of outstanding shares in June of each year. The mean forecast error, *MNFE*, is the difference between the average forecasted fiscal year-end earnings per share (EPS) and the actual EPS, deflated by the absolute value of the mean forecast. Mean forecast is computed from non-stale annual EPS forecasts issued in June, May and April, in that sequence. The degree of optimism/pessimism, *OPTIM*, is an ex-ante measure of the state of earnings expectations. The ex-ante state of earnings expectations (i.e., optimism/pessimism) is gauged by comparing the earnings forecasts to expected rather than actual earnings. Based on the assumption that actual earnings follow a random walk, we use the last fiscal year-end earnings per share as an expected earnings measure. Thus, we define ex-ante optimism (*OPTIM*) as the difference between the mean forecast at time t and the previously announced earnings standardized by the absolute value of the industry median for the one-year ahead mean forecasts.

4. Empirical results

4.1. Sorting by dispersion and alternative measures of short sale constraints

Table 1 reports descriptive statistics for the sample firms sorted on dispersion in analysts' earnings forecasts. Consistent with the findings of Diether et al. (2002), the first row demonstrates that high dispersion stocks (Q5) realize lower future returns than low dispersion stocks (Q1). The return difference is statistically significant at the one percent level (with a t-value of 5.99).[14] High dispersion stocks (Q5) have significantly higher book-to-market ratios than low dispersion stocks (Q1). The book-to-market difference between high and low dispersion stocks, Q5-Q1, is 0.3069 and statistically significant at the one percent level (with a t-value of 22.15). To our surprise, high dispersion stocks (Q5) earn a lower return than low dispersion stocks (Q1) despite the fact that they have higher book-to-market risk. This is in sharp contrast with the book-to-market premium result documented in the literature because high dispersion stocks have high book-to-market ratios and realize lower future returns than low dispersion stocks with low book-to-market ratios.

Furthermore, an interesting observation that emerges from these results is that high dispersion stocks are more than three times smaller in size than low dispersion stocks. The difference in size between these two types of stocks is −2399.29 (with a t-value of −13.52). In addition, high dispersion stocks have noticeably lower institutional ownership (*IO*) than low dispersion stocks indicating that they are more difficult to short than low dispersion

[14]Our monthly return difference of −0.0041 translates into an annual return differential of about 4.92%. This is roughly half the size of the 9.48% annual return difference reported in Diether et al. (2002, p.2120). The higher return difference of Diether et al. (2002) can be attributed to the fact that: (i) they use the Summary I/B/E/S data for computing dispersion, (ii) they do not control for the length of the forecast horizon in estimating dispersion, and (iii) they rebalance dispersion-based portfolios on a monthly basis.

Table 1
Descriptive statistics

This table presents the mean values and the number of firm-years for the different dispersion (D) of analyst forecasts' quintile portfolios and for the whole sample. Firms are assigned to the different portfolios annually after sorting on dispersion of analyst forecasts. The mean difference between the highest and lowest quintiles and corresponding t-statistic (adjusted for autocorrelation) is also reported in the last column. D is measured as the standard deviation of non-stale annual EPS forecasts issued in June, May and April of year t, in that sequence, deflated by the absolute value of the mean forecast. The variables presented here are defined as follows: RET = average monthly return. Return period is from July of year t to June of $t+1$. BM = book-to-market, as in Fama and French (1996). $SIZE$ = market value of common equity as of the end of June of year t. IO = institutional shareholdings as percent of total common shares outstanding as reported to the SEC in filings made in the first half of year t. $SSCI$ = Short-selling costs index = [(11−Rank $SIZE$) + (11−Rank IO), where Rank $SIZE$ (Rank IO) takes values from 1 to 10 depending on which size (institutional shareholdings) decile the firm belongs to. RSI = relative short interest in June of year t as a percent of shares outstanding. $MNFE$ = Mean forecast error, deflated by the absolute value of the mean forecast (as in Diether et al., 2002). Optimism ($OPTIM$) is an ex-ante measure computed as the difference between the mean forecast and the previously announced annual EPS, standardized by the absolute value of the industry median for the one-year ahead mean forecasts. Mean forecast is computed from non-stale annual EPS forecasts issued in June, May and April, in that sequence. *, **, *** denote significance at the 10%, 5% and 1% levels.

	Dispersion (D)						
	Low (D) Q1	Q2	Q3	Q4	High (D) Q5	All firms	Q5-Q1 [t-statistic]
RET	0.0128 (7147)	0.0125 (7158)	0.0110 (7144)	0.0114 (7159)	0.0087 (7174)	0.0113 (35782)	−0.0041*** [−5.99]
BM	0.5265 (7147)	0.5771 (7158)	0.6256 (7144)	0.6974 (7159)	0.8334 (7174)	0.6521 (35782)	0.3069*** [22.15]
SIZE	3409.67 (7147)	3467.90 (7158)	2570.06 (7144)	1905.46 (7159)	1010.38 (7174)	2471.70 (35782)	−2399.29*** [−13.52]
IO	0.4687 (5561)	0.4810 (5671)	0.4656 (5677)	0.4343 (5662)	0.3900 (5636)	0.4480 (28297)	−0.0787*** [−18.35]
SSCI	10.5314 (5651)	9.8856 (5671)	10.5198 (5677)	11.5150 (5662)	12.8854 (5636)	11.0653 (28297)	2.3540*** [27.22]
RSI	1.3984 (3051)	1.6584 (3074)	1.8021 (3043)	2.2229 (3003)	2.7525 (2949)	1.9604 (15120)	1.3541*** [10.26]
MNFE	0.0525 (7147)	0.0502 (7158)	0.1014 (7144)	0.2196 (7159)	1.2188 (7174)	0.3291 (35782)	1.1663*** [18.65]
OPTIM	0.2581 (7147)	0.2346 (7158)	0.2376 (7144)	0.2568 (7159)	0.5598 (7174)	0.3094 (35782)	0.3017** [1.92]

stocks. The difference in *IO* between high and low dispersion stocks, Q5−Q1, is −0.0787 (with a *t*-value of −18.35). In addition, the cost of establishing short positions, as the short selling costs index (*SSCI*) shows, is significantly higher for high dispersion stocks (i.e., more difficult to short) than low dispersion stocks. This is further confirmed by the relative short interest measure (*RSI*), a commonly used short-sale constraint proxy in several past studies.[15] The statistics illustrate that the marginal cost of short selling is rising with dispersion and it is much greater for high dispersion than low dispersion stocks. The mean difference is 1.3541 and is statistically significant at the one percent level (with a *t*-value of 10.26). This pattern suggests that high dispersion stocks face greater short selling costs and as a result are more likely to be held by investors that are more optimistic about their future prospects. The mean forecasts error (*MNFE*), an ex-post measure of optimism, is larger for high dispersion stocks. This is also substantiated when we use the ex-ante measure of optimism/pessimism (*OPTIM*). An interesting observation that emerges from these descriptive statistics is that all four short selling constraint measures (*SIZE, IO, SSCI*, and *RSI*) exhibit the same pattern between low and high dispersion.

Since stock returns are likely to be affected by short sale constraints we examine the impact of divergence of opinion on stock returns while we simultaneously sort stocks based on short selling characteristics.[16] We control for the effects of short sale constraints using four alternative proxies size (*SIZE*), institutional ownership (*IO*), a short sale costs index (*SSCI*), and relative short interest (*RSI*).

Earlier research recommends firm size as a short selling characteristic.[17] Given that small capitalization stocks tend to be held mainly by individual investors, the supply of shortable shares for small firms should be low. Because it is rare that individual investors lend their shares directly or indirectly, the cost of shorting small capitalization stocks is higher than in large capitalization stocks. Moreover, outstanding shares of small firms are not necessarily floated because insiders may hold a considerable portion of the shares outstanding. However, large capitalization firms are more widely held and hence finding a lender of shares should be less difficult. In addition, shares of small firms are less likely to be "on special" than large firms (Reed, 2002). For that reason, small firms have a higher cost to borrow and short-sell. Finally, short selling entails search and bargaining costs (Duffie et al., 2003). Search and bargaining costs are expected to be higher in small than large firms.

To differentiate between short sale constrained and short sale unconstrained stocks, we also make use of institutional ownership. D'Avolio (2002) shows that institutional ownership is the major determinant of the quantity of shares supplied and, as a result, the cost of borrowing should be less (more) costly for stocks with high (low) institutional ownership. A strong relationship between institutional ownership and liquidity is reported by Gompers and Metrick (2001). They argue that the cost of trading large quantities of shares for stocks with high institutional ownership should be low. The search and bargaining cost for stocks with high institutional ownership is also predicted to be low. In fact, if several institutional investors are lending many shares, it should be less costly to

[15]Initially proposed by Figlewski (1981). A rise in *RSI* indicates that the marginal cost of short selling is increasing (Boehme et al., 2002).

[16]See also Diamond and Verrecehia (1987), Asquith and Meulbroek (1998) and Desai et al. (2002).

[17]Firm size has been used as a short sales constraint proxy in several previous studies (see for example Chen et al., 2002; Diether et al., 2002).

find them and competition should lower the cost of direct borrowing. Finally, derivative instruments, and in particular put options, an alternative method of creating a short position, are expected to be more readily available for stocks with high levels of institutional shareholdings.[18] Consequently, stocks with low institutional ownership face higher cost of short selling and they should be associated with lower future returns.[19] In addition, we create a short-sale costs index (*SSCI*) as an alternative short-selling restriction measure based on firm characteristics such as size and institutional ownership (i.e., *SIZE* and *IO*) to proxy for the supply of stock lenders can provide to short sellers, as suggested by D'Avolio (2002). The *SSCI* is estimated as [(11−Rank *SIZE*)+(11−Rank *IO*)], where Rank *SIZE* (Rank *IO*) takes values from 1 to 10 depending on which size (institutional shareholdings) decile the firm assigned to. Hence, *SSCI* is expected to capture the joint effect of size and institutional shareholdings on the supply of shares borrowed by short sellers.

Relative short interest (*RSI*) is one of the most common short sale constraint proxies. As already discussed, high relative short interest indicates high loan demand and therefore the level of short interest can be viewed as a proxy for the marginal cost of shorting a security (Chen et al., 2002; D'Avolio, 2002; Lamont and Thaler, 2003). This indicates that stocks with high (low) relative short interest will be subject to higher (lower) short sale constraints. In our analysis we employ the relative short interest variable to distinguish between short sale constrained and short sale unconstrained stocks.

To make an inference about the average returns of stocks in the presence of divergence of opinion, we assign stocks to portfolios sorted on dispersion in analysts' earnings forecasts and alternative measures of short selling constraints (i.e., size, institutional ownership (*IO*), short selling costs index (*SSCI*), and relative short interest (*RSI*). The results are reported in Table 2. Panel A shows average monthly dispersion returns on size-sorted portfolios. As can be seen, high dispersion stocks (High (*D*)/Q5) are associated with significantly lower returns than low dispersion stocks (Low (*D*)/Q1) for all size sorted portfolios. The return difference between high dispersion (Q5) and low dispersion (Q1) stocks, reported in the last row, is statistically significant in all portfolios. This suggests that low dispersion stocks realize substantially higher returns than high dispersion stocks when we control for size effects. This evidence is in line with the results of Diether et al. (2002) who utilize size to control for the effects of short sale constraint. However, if small capitalization stocks are more short sale constrained than large capitalization stocks, in line with Miller's (1977) hypothesis, the return difference between Q5 and Q1 for the small size portfolio (−0.0040) would be expected to be substantially higher than the return spread between Q5 and Q1 for the large size portfolio (−0.0043). However, this does not gain support from the data because the return difference between these two arbitrage portfolios is small and not statistically significant at conventional levels. Consequently, size may not be an ideal proxy of the short sale constraint as it may capture other effects.

Panel B of Table 2 reports average returns for portfolios sorted on dispersion in analysts' earnings forecasts and institutional ownership. When the short sale constraint is

[18]Ofek et al. (2003) show that the violation of the put-call parity is strongly related to lending fees. Lending fees, however, are related to institutional ownership.

[19]See Chen et al. (2002), Diether et al. (2002) and Reed (2002).

Table 2
Portfolio returns, dispersion of analyst forecasts and short-selling constraints

This table presents average monthly returns for portfolios of firms for different combinations of Dispersion (*D*) quintiles and quintiles of alternative measures of short-selling restrictions. The alternative measures of short-selling restrictions are: *SIZE* (Panel A), and *IO* (institutional ownership, Panel B). Portfolio returns are average monthly returns for the July of year t to June of year $t+1$ period. Portfolios are formed annually after sorting independently on: (i) *D*, estimated as the standard deviation of non-stale annual EPS forecasts issued in June, May and April of year t, in that sequence, deflated by the absolute value of the mean forecast, (ii) *SIZE* based on the market value of common equity as of the end of June of year t, and (iii) *IO*, based on the percent common shares owned by institutional investors as reported to the *SEC* in filings made in the first half of year t. The mean difference tests among extreme portfolios (Q5-Q1) and the corresponding t-statistics (adjusted for autocorrelation) in brackets, are also reported. *, **, *** denote significance at the 10%, 5% and 1% levels.

Panel A: Portfolios returns of firms sorted independently on dispersion (D) and SIZE (n = 35782)

Dispersion (*D*)	Small *SIZE* Q1	Q2	Q3	Q4	Big *SIZE* Q5	All firms	Q5-Q1 [*t*-statistic]
Q1 Low (*D*)	0.0130	0.0117	0.0126	0.0134	0.0135	0.0128	0.0005 [0.33]
Q2	0.0092	0.0134	0.0122	0.0128	0.0132	0.0125	0.0040 ** [2.34]
Q3	0.0112	0.0095	0.0102	0.0118	0.0123	0.0110	0.0011 [0.68]
Q4	0.0140	0.0111	0.0120	0.0110	0.0102	0.0114	−0.0038 ** [-2.13]
Q5 High (*D*)	0.0090	0.0086	0.0070	0.0098	0.0092	0.0087	0.0002 [0.11]
All firms	0.0111	0.0107	0.0106	0.0119	0.0122	0.0113	0.0011 [1.40]
Q5-Q1	−0.0040**	−0.0031**	−0.0056***	−0.0036***	−0.0043***	−0.0041***	
[*t*-statistic]	[−2.29]	[−2.01]	[−3.75]	[−2.77]	[−2.99]	[−5.99]	

Panel B: Portfolio returns of firms sorted independently on dispersion (D) and institutional ownership (IO) (n = 28297)

Dispersion (*D*)	Low *IO* Q1	Q2	Q3	Q4	High *IO* Q5	All firms	Q5-Q1[*t*-statistic]
Q1Low (*D*)	0.0106	0.0130	0.0130	0.0139	0.0115	0.0125	0.0009 [0.55]
Q2	0.0113	0.0105	0.0127	0.0135	0.0125	0.0122	0.0012 [0.73]
Q3	0.0069	0.0100	0.0130	0.0116	0.0117	0.0110	0.0048*** [2.59]
Q4	0.0109	0.0143	0.0129	0.0111	0.0108	0.0119	−0.0001 [−0.06]
Q5High (*D*)	0.0074	0.0077	0.0116	0.0125	0.0128	0.0098	0.0054*** [3.04]
All firms	0.0092	0.0112	0.0127	0.0126	0.0118	0.0115	0.0026*** [3.26]
Q5-Q1	−0.0032*	−0.0053***	−0.0014	−0.0014	0.0013	−0.0027***	
[*t*-statistic]	[−1.76]	[−2.89]	[−0.69]	[−0.82]	[0.80]	[−3.28]	

more binding we expect to see high dispersion stocks realizing lower returns than low dispersion stocks. Indeed, high dispersion stocks realize lower returns than low dispersion stocks in the lowest two *IO* quintile portfolios. Undoubtedly, these two *IO* quintile portfolios are associated with more binding short sale constraints. However, as the last row indicates, the return difference between high dispersion and low dispersion stocks, is statistically insignificant in most cases. In addition, to the extent that institutional ownership proxies for the difficulty of shorting stocks, we expect stocks with low institutional ownership (i.e., high short-selling cost) to realize lower returns than high institutional ownership stocks. The results, as shown for the high dispersion stocks (Q5), point out that the portfolio of low institutional ownership stocks, Low (*IO*)/Q1, (i.e., short-sale constrained portfolio of stocks) realizes a lower return than the portfolio of stocks with high institutional ownership, High (*IO*)/Q5, (i.e., short-sale unconstrained stocks). The return difference of 0.0054 (with a *t*-value of 3.04) suggests that short-sale constrained stocks (Low (*IO*)/Q1) tend to be overpriced relative to short-sale unconstrained stocks (High (*IO*)/Q5) when the dispersion of investor opinion is at a high level (High (*D*)). This finding seems to be more in line with Miller's hypothesis. We obtain similar results when we replicate the analysis using the *SSCI* and the (*RSI*) measures of short-selling constraints.[20]

Overall, the evidence from Table 2 demonstrates that when we control for the effects of the short selling constraint, using four alternative short-selling constraint proxies, high dispersion stocks, in general, earn lower returns than low dispersion stocks. These results are consistent with a greater amount of dispersion returns remaining unexploited for stocks with high short sale constraints. With the exception of dispersion and relative short interest sorted portfolios, portfolios formed based on (i) dispersion and firm size, (ii) dispersion and institutional ownership, and (iii) dispersion and short selling costs index seem to be consistent with Miller's view that dispersion of opinion among investors is priced at a premium in the presence of binding short selling constraints.

4.2. Sorting by dispersion, earnings expectations and alternative short selling restrictions

We have argued that divergence of investor opinion should trade at a discount when market participants are more optimistic about the prospects of firms and at a premium when their future prospects are pessimistic. Testing this hypothesis requires triple-sorting stocks on dispersion, analysts' earnings expectations and alternative short selling constraints such as firm size, institutional ownership, short selling costs, based on our short-selling cost index, and relative short interest.

Table 3 presents the returns on the resulting 27 portfolios. Consistent with the previous evidence the results in Panel A show that the mean return difference between high dispersion and low dispersion stocks is positive and statistically significant across all size portfolios when analyst earnings forecasts are optimistic. These results also suggest that investors view low (high) dispersion stocks as *sure winners* (*losers*) when analysts' earnings expectations are optimistic (pessimistic). Therefore, Miller's overvaluation of high dispersion stocks does not hold when analysts' earnings forecasts are more optimistic about the future prospects of stocks. In general, our results suggest that overvaluation

[20] These results are not reported here for the sake of brevity, but are available upon request.

Table 3

Returns of portfolios of firms sorted on: (i) dispersion of analyst forecasts; (ii) alternative measures of short-selling restrictions; and (iii) ex-ante optimism

This table presents average monthly returns for portfolios of firms that belong to different combinations of low/medium/high groups based on Dispersion (*D*), alternative measures of short-selling restrictions, and an ex-ante optimism measure (*OPTIM*). The low (high) group includes the bottom (top) 30th percentile of firms ranked on a particular variable. The four alternative measures of short-selling restrictions are: *SIZE* (used in Panel A), *IO* (institutional ownership, used in Panel B), *SSCI* (short-selling costs index, used in Panel C) and *RSI* (relative short interest, used in Panel D). Portfolio returns are average monthly returns over the July of year t to June of year $t+1$ period. Portfolios are formed annually after sorting independently on: (i) *D*, computed as the standard deviation of non-stale annual EPS forecasts issued in June, May and April of year *t*, in that sequence, deflated by the absolute value of the mean forecast, (ii) *SIZE* based on the market value of common equity as of the end of June of year *t*, (iii) *IO*, based on the percent common shares owned by institutional investors as reported to the SEC in filings made in the first half of year *t*, and (iv) *SSCI*, which is computed as [(11−Rank *SIZE*)+(11−Rank *IO*), where Rank *SIZE* (Rank *IO*) takes values from 1 to 10 depending on which size (institutional shareholdings) decile the firm belongs to, and (v) *RSI* based on the short interest as percent of shares outstanding in June of year *t*. The *ex-ante* optimism (*OPTIM*) is measured as the difference between the mean forecast and the previously announced annual EPS, standardized by the absolute value of the industry median for the one-year ahead mean forecasts. Mean forecast is computed from non-stale annual EPS forecasts issued in June, May and April, in that sequence. Also reported are the mean difference tests among extreme portfolios (High *D*—Low *D*) and the corresponding t-statistics (adjusted for autocorrelation) in brackets. Bold numerals indicate that the difference between the High *D* and the Low *D* portfolio returns is positive and significant. *, **, *** denote significance at the 10%, 5% and 1% levels.

Panel A: Mean monthly returns for portfolios of firms sorted annually on dispersion of analyst forecasts (D), SIZE, and ex-ante optimism (OPTIM)

Dispersion (*D*)	Small *SIZE*			Medium *SIZE*			Big *SIZE*		
	Low *OPTIM*	Med. *OPTIM*	High *OPTIM*	Low *OPTIM*	Med. *OPTIM*	High *OPTIM*	Low *OPTIM*	Med. *OPTIM*	High *OPTIM*
Low (*D*)	0.0120	0.0155	0.0047	0.0161	0.0156	0.0046	0.0162	0.0156	0.0068
Medium	0.0111	0.0144	0.0067	0.0111	0.0137	0.0057	0.0129	0.0148	0.0085
High (*D*)	0.0109	0.0109	0.0086	0.0081	0.0122	0.0084	0.0083	0.0118	0.0094
All firms	0.0112	0.0139	0.0072	0.0108	0.0143	0.0062	0.0120	0.0149	0.0083
High-Low	−0.0011	−0.0046***	**0.0039***	−0.0080***	−0.0034**	**0.0038****	−0.0079***	−0.0037*	**0.0026***
[*t*-statistic]	[−0.49]	[2.38]	**[1.80]**	[−5.21]	[−2.23]	**[2.53]**	[−4.96]	[−1.94]	**[1.69]**

Panel B: Mean monthly returns for portfolios of firms sorted annually on dispersion of analyst forecasts (D), institutional shareholdings (IO), and ex-ante optimism (OPTIM)

Dispersion (*D*)	Low *IO*			Medium *IO*			High *IO*		
	Low *OPTIM*	Med. *OPTIM*	High *OPTIM*	Low *OPTIM*	Med. *OPTIM*	High *OPTIM*	Low *OPTIM*	Med. *OPTIM*	High *OPTIM*
Low (*D*)	0.0108	0.0147	0.0005	0.0173	0.0150	0.0068	0.0158	0.0163	0.0051
Medium	0.0097	0.0121	0.0055	0.0126	0.0154	0.0077	0.0122	0.0152	0.0072
High (*D*)	0.0083	0.0118	0.0076	0.0107	0.0129	0.0102	0.0124	0.0145	0.0117

Table 3 (*continued*)

Panel B: Mean monthly returns for portfolios of firms sorted annually on dispersion of analyst forecasts (D), institutional shareholdings (IO), and ex-ante optimism (OPTIM)

Dispersion (*D*)	Low *IO*			Medium *IO*			High *IO*		
	Low *OPTIM*	Med. *OPTIM*	High *OPTIM*	Low *OPTIM*	Med. *OPTIM*	High *OPTIM*	Low *OPTIM*	Med. *OPTIM*	High *OPTIM*
All Firms	0.0093	0.0130	0.0055	0.0126	0.0149	0.0083	0.0129	0.0156	0.0077
High-Low	−0.0017	−0.0029	**0.0071*****	−0.0066***	−0.0021	**0.0033***	−0.0034	−0.0017	**0.0066*****
[*t*-statistic]	[−1.17]	[−1.42]	**[2.59]**	[−3.46]	[−1.13]	**[1.69]**	[−1.42]	[−0.79]	**[3.87]**

Panel C: Mean monthly returns for portfolios of firms sorted annually on dispersion of analyst forecasts (D), short-selling restrictions (SSCI), and ex-ante optimism (OPTIM)

Dispersion (*D*)	Low *SSCI*			Medium *SSCI*			High *SSCI*		
	Low *OPTIM*	Med. *OPTIM*	High *OPTIM*	Low *OPTIM*	Med. *OPTIM*	High *OPTIM*	Low *OPTIM*	Med. *OPTIM*	High *OPTIM*
Low (*D*)	0.0182	0.0160	0.0049	0.0155	0.0146	0.0055	0.0114	0.0157	0.0036
Medium	0.0147	0.0157	0.0082	0.0101	0.0138	0.0062	0.0111	0.0143	0.0064
High (*D*)	0.0100	0.0174	0.0123	0.0103	0.0116	0.0091	0.0102	0.0123	0.0088
All Firms	0.0135	0.0160	0.0081	0.0113	0.0138	0.0070	0.0106	0.0143	0.0070
High-Low	−0.0082***	0.0014	**0.0074*****	−0.0052***	−0.0030*	**0.0036***	−0.0012	−0.0034	**0.0052****
[*t*-statistic]	[−4.00]	[0.55]	**[4.45]**	[−3.06]	[−1.73]	**[1.91]**	[−0.52]	[−1.64]	**[2.02]**

Panel D: Mean monthly returns (excluding EPS announcement month) for portfolios of firms sorted annually on dispersion of analyst forecasts (D), relative short interest (RSI) and mean forecast error (OPTIM)

Dispersion (*D*)	Low *RSI*			Medium *RSI*			High *RSI*		
	Low *OPTIM*	Med. *OPTIM*	High *OPTIM*	Low *OPTIM*	Med. *OPTIM*	High *OPTIM*	Low *OPTIM*	Med. *OPTIM*	High *OPTIM*
Low (D)	0.0171	0.0188	0.0089	0.0166	0.0178	0.0071	0.0056	0.0113	-0.0033
Medium	0.0208	0.0178	0.0118	0.0125	0.0184	0.0074	0.0065	0.0102	0.0011
High (D)	0.0134	0.0175	0.0224	0.0160	0.0176	0.0132	0.0095	0.0054	0.0068
All Firms	0.0170	0.0182	0.0143	0.0147	0.0180	0.0088	0.0082	0.0097	0.0019
High-Low	−0.0043	−0.0013	**0.0135*****	−0.0006	−0.0002	**0.0061****	0.0039	−0.0059	**0.0101*****
[*t*-statistic]	[−1.30]	[−0.42]	**[3.20]**	[−0.16]	[−0.07]	**[2.15]**	[0.92]	[−1.58]	**[3.22]**

occurs when analysts' earnings predictions are optimistic and there is low divergence of opinion among them about the future prospects of a stock.

What is even more surprising is that Miller's hypothesis is predicted to hold in small capitalization stocks that are subject to a more binding short-selling constraint. When analysts' earnings expectations tend to be more pessimistic, the return spreads between high dispersion and low dispersion stocks within each size category are −0.0011 (with a *t*-value of −0.49) for the small size portfolio, −0.0080 (with a *t*-value of −5.21) for the medium size portfolio and −0.0079 (with a *t*-value of −4.96) for the big size portfolio, respectively. These results contradict Miller's overvaluation prediction for high dispersion stocks despite the fact that the short selling constraint is more binding in small size firms. Instead, our evidence indicates that the overvaluation effect is present in medium and large size firms when analysts' earnings predictions are pessimistic. Consistent with our previous evidence, these results further suggest that when analysts' earnings expectations are pessimistic investors tend to avoid the low dispersion stocks (i.e., *sure losers*). That is, when analysts' earnings expectations about a stock are pessimistic and dispersion among analysts' forecasts is low investors tend to overstate the quality of their foresight predicting with certainty that share prices of low dispersion stocks will fall.

The results in Panel B further show that when the institutional ownership measure is used as an alternative short-sale constraint proxy, we are able to confirm the size-based return results. Once again, when the market is pessimistic (low *OPTIM* portfolios), as shown in Panel A, the return spreads between high dispersion and low dispersion stocks within each institutional ownership (*IO*) category are: −0.0017 (with a *t*-value of −1.17) for the low *IO* portfolio, -0.0066 (with a *t*-value of −3.46) for the medium *IO* portfolio, and −0.0034 (with a *t*-value of −1.42) for the high *IO* portfolio, respectively. These results do not support Miller's hypothesis. Another important pattern that emerges from Panel B is that within each *IO* category, when we move to high levels of optimism, the return spread between high and low dispersion stocks is positive and statistically significant in all cases, confirming our claim that dispersion trades at a discount when the market becomes optimistic. As before, Panel B shows that when earnings expectations become highly optimistic, the return difference between high dispersion and low dispersion stocks for the institutional ownership category are: 0.0071 (with a *t*-value of 2.59) for the low *IO* portfolio, 0.0033 (with a *t*-value of 1.69) for the medium *IO* portfolio, and 0.0066 (with a *t*-value of 3.87) for the high *IO* portfolio, respectively. We obtain similar results in Panel C, when we use *SSCI* as an alternative short-selling restriction measure.

Finally, in Panel D, the average return difference between the two extreme (High–Low) dispersion portfolios is mostly positive and consistently statistically significant at high levels of market optimism indicating that high dispersion stocks are associated with higher returns than otherwise similar low dispersion stocks. In general, this result is consistent with the evidence reported in the previous panels.

Overall, our results are inconsistent with Miller's prediction that high dispersion stocks earn lower returns than low dispersion stocks in the presence of short sale constraint. Further, these findings contradict the Diether et al. (2002) evidence suggesting that when we account for the state of analysts' earnings expectations, dispersion of opinion trades at a discount. We interpret these results to suggest that dispersion trades at a discount (premium) when analysts' earnings expectations are optimistic (pessimistic), consistent with our hypothesis.

4.3. Robustness tests: multi-factor regressions

The univariate results have shown that investors' return expectations are likely to be influenced by investors' disagreement about future earnings of stocks as well as about the degree of optimism/pessimism regarding future earnings. To examine whether high divergence of opinion stocks outperform (underperform) low divergence of opinion stocks in optimistic (pessimistic) states of earnings expectations on a risk-adjusted basis, we conduct two multi-factor regressions' tests.

The first test addresses the question of whether the demand for risky assets characterized by varying degrees of disagreement (i.e., dispersion of analyst forecasts, *D*) is sensitive to investors' hedging concerns arising from the degree of optimism/pessimism regarding future earnings prospects. That is, we test whether the degree of optimism/pessimism (in the form of a risk factor, PMO, that captures the "pessimistic minus optimistic" return differential) has a distinct and pervasive influence on the determination of returns of stock portfolios sorted on the degree of investor disagreement. High (low) PMO values mirror market's greater optimism (pessimism). If the degree of investor disagreement influences stock returns based on the market's state of optimism/pessimism, high and low divergence of opinion stocks should have different loadings on PMO. Specifically, if dispersion trades at a discount (premium) when analysts' earnings expectations are optimistic (pessimistic), the PMO should have a negative (positive) effect on the returns of low (high) dispersion quintile portfolios. This test is performed using an explicit asset pricing model that includes the following five factors: RMF, the excess return on the value weighted market portfolio; SMB, the return on a zero investment portfolio subtracting the return on a big firm portfolio from the return on a small firm portfolio;[21] HML, the return on a zero investment portfolio estimated as the return on a portfolio of high book-to-market minus the return on a portfolio of low book-to-market stocks;[22] UMD, the momentum factor proposed by Carhart (1997), which captures the medium-term continuation in stock returns documented in Jagadeesh and Titman (1993); and PMO, the return on a zero investment portfolio estimated as the difference between the monthly returns of the equally weighted portfolio of stocks that belong to the lowest and highest quintiles after sorting annually on the ex-ante optimism measure (*OPTIM*). An increase in PMO indicates that investors require a higher premium to hold stocks with pessimistic earnings expectations. Table 4 reports the results. First, the PMO enters the return generating process significantly in four out of the five portfolios, suggesting that investor disagreement is associated with market's state of earnings expectations. Second, as predicted, the relationship is not uniform across portfolios of high and low investor disagreement. The coefficient of PMO is positive (negative) and significant for the high (low) *D* quintile stocks, consistent with the notion that optimism (pessimism) is positively related to stock returns when there is high (low) disagreement among investors about future earnings.

The second multi-factor asset pricing test uses the Fama and French (1996) three-factor model inclusive of the momentum factor, UMD, to explain the conditional returns of zero

[21] The breakpoints for small-cap and big-cap firms are determined by allocating NYSE, AMEX, and NASDAQ stocks to two groups based on whether their June (of each year) market equity value is below (small) or above (big) the median of market equity value for NYSE stocks.

[22] The high book-to market portfolio represents the top 30 percent, while the low book-to-market portfolio contains the bottom 30 percent of all firms on COMPUSTAT.

Table 4
Time-series tests for dispersion quintile portfolios using a multi-factor model that accounts for the ex-ante state of earnings expectations

This table presents OLS regression coefficients (heteroscedasticity-adjusted) and corresponding *t*-values (in parentheses). The sample includes 216 monthly observations spanning the July 1983–June 2001 period. We sort firms on dispersion of analyst forecasts (*D*) in June of each year and create five equally weighted portfolios, corresponding to the five different *D* quintiles. *D* is computed as the standard deviation of non-stale annual EPS forecasts issued in June, May and April, in that sequence, deflated by the absolute value of the mean forecast. RMRF is the value-weighted market return (*RM*) minus the one-month Treasury Bill rate (RF). SMB (small minus big) is the difference each month between the return on small and big firms, while HML (high minus low) is the monthly difference of the returns on a portfolio of high book-to-market and low book-to-market firms. UMD (up minus down) is the momentum factor computed on a monthly basis as the return differential between a portfolio of winners and a portfolio of losers. PMO ("Pessimistic minus optimistic") is the differential between the monthly returns of the equally weighted portfolio of stocks belonging to the lowest and highest quintiles after sorting annually on the ex ante optimism measure (*OPTIM*). *OPTIM* is measured as the difference between the mean forecast and the previously announced annual EPS, standardized by the absolute value of the industry median for the one-year ahead mean forecasts. Mean forecast is computed from non-stale annual EPS forecasts issued in June, May and April, in that sequence. RMRF, HML, SMB and UMD are extracted from *K*. French's website. *, **, *** denote significance at the 10%, 5% and 1% levels.

Variables	$R_{Qj}\,(t) = a + b\text{RMRF}(t) + \text{sSMB(t)} + h\text{HML}(t) + m\text{UMD}(t) + p\text{PMO}(t) + e(t)$				
	Q1 Low *D*	Q2	Q3	Q4	Q5 High *D*
Intercept	0.1292*** (10.56)	0.1259*** (13.12)	0.1198*** (13.53)	0.0113*** (11.18)	0.0086*** (6.63)
RMRF	0.3333*** (6.13)	1.0405*** (39.80)	1.0880***(47.12)	1.1536*** (45.37)	1.1961*** (29.92)
SMB	0.1367 (1.62)	0.3344*** (8.23)	0.4852***(11.99)	0.7275*** (15.66)	0.9347*** (13.90)
HML	0.2257*** (3.28)	0.1523*** (2.99)	0.0629 (1.30)	0.0259 (0.55)	0.1789** (2.52)
UMD	−0.1765*** (−3.63)	−0.2053*** (−5.43)	−0.2905*** (−6.80)	−0.2622** (−2.00)	−0.3752*** (−7.80)
PMO	−0.2433*** (−3.09)	−0.1523** (−1.97)	−0.0144 (−0.15)	0.2349** (2.00)	0.2200** (2.25)
R^2	0.8831	0.9234	0.9473	0.9522	0.9188

investment divergence of opinion arbitrage portfolios. The zero investment portfolio returns are estimated for different ex-ante optimism states as the difference between the equally weighted portfolio returns of the top and the bottom 30th percentile of firms after they have been ranked on divergence of opinion, *D*. Consistent with the sorting procedure of the univariate tests, sorting on ex-ante optimism and divergence of opinion is performed independently. The intercept from the time-series regressions of the arbitrage portfolio between high divergence of opinion stocks and low divergence of opinion stocks is used as a measure of risk-adjusted abnormal performance.[23]

If the return difference between high and low divergence of opinion stocks is a manifestation of confounding effects (i.e., differences in market beta, size, book-to-market and momentum), the regression intercepts should be economically and statistically indistinguishable from zero. However, if high divergence of opinion stocks realize lower risk-adjusted returns than low divergence of opinion stocks when investors are optimistic (i.e., high divergence of opinion stocks underperform low divergence of opinion stocks in the spirit of Miller, 1977), the alpha of the arbitrage portfolio should be negative and statistically significant. The four-factor time-series regression results for the arbitrage portfolios are presented in Table 5. The signs of the intercepts across different states of ex-ante optimism/pessimism are consistent with our previous results and in contradiction with Miller's prediction. The intercept for the high optimism state is positive, albeit insignificant. However, for the pessimistic state, the intercept is negative and statistically significant. The mean difference between the two extreme states of expectations is 0.0047 and statistically significant (with a *t*-value of 1.82, *p*-value 0f 0.07). These results provide additional evidence in support of the claim that high divergence of opinion stocks earn higher returns in optimistic states than low divergence of opinion stocks. The opposite is true when analysts' earnings expectations are pessimistic.

5. Conclusion

In this paper, we examine whether divergence of opinion under different states of earnings expectations about future stock return payoffs is priced at a premium or a discount. Our results suggest that analysts' earnings expectations play an important role in determining whether divergence of opinion is priced at a premium or a discount. We show that divergence of opinion is priced at a premium when analysts' earnings expectations are pessimistic and at a discount when they are optimistic.

This is consistent with the notion that when there is low divergence of opinion among analysts, the credibility of their earnings forecasts increases, and so does the confidence of investors in analysts' forecasts, causing overvaluation (undervaluation) when earnings expectations are optimistic (pessimistic). Our findings support the view that investors tend to overweight the quality of their foresight, driven by the combination of analysts' low dispersion and pessimistic earnings forecasts, causing them to avoid low dispersion stocks (i.e., *sure losers*) because they are convinced that their prices will fall. Our results also suggest that when analysts' earnings forecasts are optimistic, low divergence of opinion among analysts exaggerates the quality of investors' foresight causing them to bid up the share prices of low divergence stocks earning low future returns.

[23]The intercept in these regressions is similar in spirit to Jensen's alpha in the context of CAPM, but controls for size, book-to-market and momentum factors in addition to the overall market factor.

Table 5
Time-series tests of a multi-factor model for dispersion arbitrage portfolios ($R_{\text{High }D}$–$R_{\text{Low }D}$) across ex-ante states of earnings expectations

This table presents OLS regression coefficients (heteroscedasticity-adjusted) and corresponding t-values (in parentheses). The sample includes 216 monthly observations spanning the July 1983–June 2001 period. We sort firms on an ex-ante optimism measure (*OPTIM*) and, independently, also on dispersion of analyst forecasts in June of each year. The dispersion in analyst forecast arbitrage portfolios are constructed as the difference in equally weighted returns ($R_{\text{High }D}(t)$–$R_{\text{Low }D}(t)$) between the top and the bottom 30th percentile dispersion portfolios. We create three such portfolios, corresponding to three different OPTIM groups (low, medium and high *OPTIM*, corresponding to the lowest 30th, medium 40th and highest 30th percentiles of *OPTIM*). Low (High) *OPTIM* signifies pessimism (optimism). RMRF is the value-weighted market return (RM) minus the one-month Treasury Bill rate (RF). SMB (small minus big) is the difference each month between the return on small and big firms, while HML (high minus low) is the monthly difference of the returns on a portfolio of high book-to-market and low book-to-market firms. UMD (up minus down) is the momentum factor computed on a monthly basis as the return differential between a portfolio of winners and a portfolio of losers. RMRF, HML, SMB and UMD are extracted from *K*. French's website. *OPTIM* is measured as the difference between the mean forecast and the previously announced annual EPS, standardized by the absolute value of the industry median for the one-year ahead mean forecasts. Mean forecast is computed from non-stale annual EPS forecasts issued in June, May and April, in that sequence. *D* is computed as the standard deviation of non-stale annual EPS forecasts issued in June, May and April, in that sequence, deflated by the absolute value of the mean forecast. *, **, *** denote significance at the 10%, 5% and 1% levels.

Variables	$R_{\text{High }D}(t)-R_{\text{Low }D}(t) = a + b\text{RMRF}(t) + s\text{SMB}(t) + h\text{HML}(t) + m\text{UMD}(t) + e(t)$			
	Low *OPTIM*	Medium *OPTIM*	High *OPTIM*	High-Low(t-statistic) [*p*-value]
Intercept	−0.0038** (−2.19)	−0.0008 (−0.41)	0.0009(0.49)	0.0047* (1.82) [0.070]
RMRF	0.1773*** (4.73)	0.0315 (0.81)	0.0624 (1.36)	−0.1149*(−1.90) [0.058]
SMB	0.4850*** (7.46)	0.5262*** (7.74)	0.4755*** (5.31)	−0.0095 (−0.09) [0.932]
HML	−0.0658*** (−0.96)	−0.1809** (−2.06)	0.1011 (1.16)	0.1669(1.51) [0.133]
UMD	−0.2157*** (−4.61)	−0.1845*** (−1.95)	0.0196 (0.35)	0.2353*** (3.24) [0.001]
R^2	0.4377	0.4721	0.2509	

The evidence corroborates that investors tend to buy (sell) low divergence of opinion stocks when analysts' forecasts are optimistic (pessimistic), thus realizing low future returns. That is, low dispersion in analysts' forecasts along with optimistic earnings forecasts is a salient stock characteristic that fosters overvaluation. When analysts' forecasts are pessimistic low dispersion in analysts' forecasts reverses this valuation pattern. These results are robust to the severity of alternative short sale constraints. This evidence fails to support Miller's theory that divergence of opinion is priced at a premium.

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