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TWO ESSAYS ON INVESTOR DISAGREEMENT AND ASSET PRICES

by

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A dissertation submitted in partial fulfilment of the requirements
for the degree of Doctor of Philosophy
in the Department of Finance
in the College of Business Administration
at the University of Central Florida
Orlando, Florida

Spring Term
2022

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ABSTRACT

My dissertation studies the measurement of investor disagreement and the effects of investor disagreement on asset prices. In my first essay, I clarify the seemingly contradicting theoretical predictions of Miller (1977), and Varian (1985, 1989) and Abel (1989), and design empirical analysis to test the predictions in a unified framework. Miller models the effect of the *level* of disagreement on asset prices and predicts a negative relation between investor disagreement and subsequent asset returns. Varian and Abel present results on the effect of the *change* in disagreement on asset prices and the resulting positive relation between disagreement and subsequent asset returns. I find that, consistent with Varian (1985) and Abel (1989), increases (decreases) in disagreement are always associated with lower (higher) contemporaneous stock returns, regardless of the prior levels of disagreement. Because the level of investor disagreement is highly persistent, stocks with high prior levels of disagreement earn lower subsequent returns as disagreements on these stocks remain high or continue to increase. Consequently, changes in investor disagreement and their impact on stock prices, not overvaluation as in Miller (1977), drive the relation between investor disagreement and subsequent stock returns documented in the existing literature. Empirical analyses based on changing short-sale constraints and earnings announcements provide further support to the central role of changing investor disagreement in asset pricing.

In my second essay, I emphasize and examine the role of the consensus investor opinion in the relation between heterogeneous investor beliefs and stock prices, which is largely overlooked in the prior empirical literature. I measure investors' opinions based on financial analysts' stock recommendations and study how both investors' opinions and their disagreement jointly affect stock prices. I show that the consensus opinion is at least as important as the dispersion of opinion in predicting stock returns. When the consensus opinion is pessimistic, investor disagreement leads to lower stock returns, but the opposite is true when the consensus opinion is optimistic. Moreover, strong investor agreement predicts stock returns and largely drives the return difference between high- and low-agreement stocks. In supporting evidence, I show that both the investor opinion and its dispersion are related to short-sale constraints and strong optimistic agreement is significantly associated with binding short-sale constraints.

This dissertation is dedicated to my family for their unconditional love and support.

ACKNOWLEDGMENTS

First and foremost, I would like to express my sincere gratitude to my advisor, Dr. Qinghai Wang, for his invaluable guidance and continuous support during my Ph.D. study. I am also immensely grateful to the rest of my dissertation committee, Dr. Honghui Chen, Dr. Ajai Singh, and Dr. Yu Tian, for their mentorship, wisdom, patience, and insightful suggestions on my dissertation, without which it would be impossible for me to complete this dissertation.

Additionally, I am deeply indebted to Dr. Ajai Singh, without whose encouragement, motivation, and support I would not have started and been able to complete this Ph.D. journey. I would also like to extend my special thanks to Dr. Vladimir Gatchev, Dr. Yan Lu, and all faculty members in the Department of Finance for their advice, help, and kindness. They have all made my study and life at UCF a wonderful time.

Finally, I also want to thank seminar participants at the 2019 and 2021 Florida Finance Conferences, the 2020 Southern Finance Association Annual Meeting, the 2021 Financial Management Association Doctoral Student Consortium, the 2022 Southwestern Finance Association Annual Meeting for their constructive feedback.

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CHAPTER 1: INTRODUCTION

Financial market participants often disagree about the investment values of financial assets, and such disagreement can have important implications for asset pricing. Both theoretical and empirical studies recognize that differences of investor opinion can predict future asset returns, but substantial disagreements remain on the nature of the relation. Miller (1977), for example, hypothesizes that investor disagreement leads to overvaluation when short-sale constraints are binding as pessimistic views are not reflected in asset prices. Varian (1985, 1989) and Abel (1989) on the other hand predict that increased disagreement is associated with a higher risk premium and reduced asset prices. Empirical evidence on the relation is also mixed. Supporting Miller's prediction, Diether, Malloy, and Scherbina (2002), Goetzmann and Massa (2005), and Berkman et al. (2009) document a negative relation between disagreement and subsequent stock returns. By contrast, Carlin, Longstaff, and Matoba (2014) find that increased disagreement is associated with higher expected returns, lending support to Varian (1985, 1989) and Abel (1989).

In my first essay, I resolve the seemingly contradicting theoretical predictions and empirical evidence. First, I recognize that Miller (1977) models the effect of the *level* of disagreement on asset prices and its resulting relation with *subsequent* returns. Varian (1985, 1989) and Abel (1989) present results on the *contemporaneous* relation between *changes* in disagreement and asset prices. The two theoretical frameworks thus focus on different mechanisms on the effects of investor disagreement, and do not offer directly opposing predictions.

I then empirically examine the effects of the level of and change in disagreement on stock prices in a unified framework. Using financial analysts' quarterly earnings forecasts, I measure the level of and change in forecast dispersion for each month, and study how investor disagreement and its changes are associated with both contemporaneous and subsequent stock returns. I am able to disentangle the two effects and further study how the evolvement of investor disagreement affects stock prices.

Consistent with the predictions of Varian (1985, 1989) and Abel (1989), I find changes in investor disagreement negatively affect stock prices. Increasing investor disagreement is strongly associated with lower contemporaneous stock returns while decreasing disagreement is associated with higher contemporaneous stock returns, regardless of the previous levels of investor disagreement. The relation between changes in investor disagreement and stock returns is contemporaneous, and changes in disagreement do not predict subsequent stock returns. I find however the level of investor disagreement is highly persistent. Stocks with high disagreement have lower subsequent stock returns because disagreements on most of these stocks continue to increase or remain high. Unlike Miller (1977), the realization of lower returns on high-disagreement stocks is not a correction of overvaluation, but a result of continuing or increasing investor disagreement. Overall, changes in investor disagreement, rather than disagreement itself, drive the relation between investor disagreement and asset prices.

Meanwhile, investor opinion is an integral component in theoretical works on divergence of opinion and asset prices. Several recent theoretical works provide clarification on the role of the consensus opinion in asset pricing models of heterogeneous investor beliefs. Jouini and Napp (2007) find that belief dispersion and the consensus belief, a risk tolerance weighted average of individual beliefs in their model, jointly affect the asset value in an Arrow-Debreu economy. The relation between belief dispersion and the asset return depends on the "bias" of the consensus belief. Atmaz and Basak (2018) develop a dynamic general equilibrium model with belief dispersion and show that belief dispersion and the average belief, or its "bias", jointly determine the market equilibrium outcome. Specifically, belief dispersion, in addition to representing extra uncertainty, affects the asset price by amplifying the effect of "bias" in investor belief on the asset price. In spite of the importance of investor opinion in asset pricing models of heterogeneous beliefs, few empirical studies have quantified and examined the effects of investor opinion. One possible explanation perhaps is the difficulty of measuring simultaneously investors' opinions regarding the investment values of the assets and their differences.

In my second essay, I emphasize and examine the role of *opinion*, i.e., investors' aggregate or consensus opinion on a stock's investment value, in the relation between heterogeneous investor beliefs and stock prices. I measure investors' opinions based on financial analysts' stock recommendations and study how both investors' opinions and their disagreement jointly affect stock prices. Financial analysts' stock recommendations, such as 'Strong Buy' or 'Sell' ratings, provide analysts' unambiguous views on the investment values of stocks. One crucial advantage of utilizing analysts' stock recommendations is that one can determine simultaneously the aggregate opinion based on the consensus recommendation and the dispersion of opinion. Because the consensus stock recommendation represents analysts' aggregate view regarding the investment value of the underlying stock, one can differentiate these views (i.e., whether they are optimistic or pessimistic) and study the consensus opinion or its "bias" jointly with the divergence of opinion.

I show that investor opinion, while largely overlooked in empirical studies on the effects of differences of opinion on asset prices, is at least as important as the dispersion of opinion in predicting stock returns. When the consensus opinion is pessimistic, investor disagreement leads to lower stock returns, but the opposite is true when the consensus opinion is optimistic. The relation between differences of opinion and future stock returns not only depends crucially on investor opinion, but also derives largely from strong agreement rather than disagreement among investors. Because investor opinion and disagreement jointly affect stock prices, my findings can partly resolve the discrepancy in the different relations between investor disagreement and stock returns documented in extant empirical studies. Chapter 2 and Chapter 3 present the two essays.

CHAPTER 2: HOW DOES INVESTOR DISAGREEMENT AFFECTS ASSET PRICES?
EVIDENCE BASED ON CHANGING INVESTOR DISAGREEMENT

1. Introduction

There are two opposing views on the relation between investor disagreement and asset prices in the finance literature. Miller (1977), for example, hypothesizes that investor disagreement leads to overvaluation when short-sale constraints are binding as pessimistic views are not reflected in asset prices. Varian (1985, 1989) and Abel (1989) on the other hand predict that increased disagreement is associated with a higher risk premium and reduced asset prices. Empirical evidence on the relation is also mixed. Supporting Miller's prediction, Diether, Malloy, and Scherbina (2002), Goetzmann and Massa (2005), and Berkman et al. (2009) document a negative relation between disagreement and subsequent stock returns. By contrast, Carlin, Longstaff, and Matoba (2014) find that increased disagreement is associated with higher expected returns, lending support to Varian (1985, 1989) and Abel (1989).

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Consistent with the predictions of Varian (1985, 1989) and Abel (1989), I find changes in investor disagreement negatively affect stock prices. Increasing investor disagreement is strongly associated with lower contemporaneous stock returns while decreasing disagreement is associated with higher contemporaneous stock returns, regardless of the previous levels of investor disagreement. The relation between changes in investor disagreement and stock returns is contemporaneous, and changes in disagreement do not predict subsequent stock returns. I find however the level of investor disagreement is highly persistent. Stocks with high disagreement have lower subsequent stock returns because disagreements on most of these stocks continue to increase or remain high. Unlike Miller (1977), the realization of lower returns on high-disagreement stocks is not a correction of overvaluation, but a result of continuing or increasing investor disagreement. Overall, changes in investor disagreement, rather than disagreement itself, drive the relation between investor disagreement and asset prices.

According to Miller (1977), high disagreement leads to higher stock prices when short-sale constraints exist because the prices only reflect the views of the optimistic investors. Consequently, high disagreement should be associated with lower subsequent stock returns as the overvaluation corrects itself. Note that while the Miller argument offers a clear prediction on the relation between the *level* of disagreement and asset prices, the prediction on investor disagreement and *subsequent* asset returns is less clear. When the overvaluation (partially) corrects itself depends on the arrival of new information which reduces investor disagreement, the relaxation of short-sale constraints, or both. Nevertheless, empirical studies have largely examined the relation between investor disagreement and subsequent stock returns at the monthly frequency and find evidence consistent with the Miller prediction.

Varian (1985, 1989) and Abel (1989) show that increasing investor disagreement raises the risk premium and reduces stock prices. This higher risk premium, as an equilibrium result, predicts higher subsequent returns. Again, while there is a clear *contemporaneous* relation between changes in investor disagreement and stock prices in the models, the relation between increasing disagreement and subsequent stock returns is more tenuous. An increase in the risk premium, even if the change is small, can result in a large drop in stock prices and significantly negative stock returns. The same increase in the risk premium, depending on subsequent changes in investor disagreement, may not be manifested in higher subsequent returns. Consequently, a more direct test of the Varian and Abel prediction is to examine the relation between *changes* in investor disagreement and *contemporaneous* stock returns. Carlin, Longstaff, and Matoba (2014) find a positive relation between disagreement and *subsequent* returns in the mortgage-backed security (MBS) market and interpret the results as supporting evidence for the Varian and Abel prediction on disagreement and expected returns.

I study the effects of the level of disagreement and changes in disagreement on stock prices in a unified framework to clearly distinguish the different predictions. To test the Varian and Abel prediction, I examine the *contemporaneous* relation between changes in investor disagreement and stock prices at the monthly frequency. I find robust support for the prediction that changes in investor disagreement negatively affect stock prices during the same period. I study the effects of disagreement on subsequent stock returns by investigating how investor disagreement evolves over time and how the evolvement is associated with stock returns. I show that investor disagreement is highly persistent over time as high- (low-) disagreement stocks tend to subsequently experience continuing or increasing (decreasing) investor disagreement. While changes in disagreement do not predict subsequent stock returns, the persistence of investor disagreement and the *contemporaneous* negative relation between changes in investor disagreement and stock prices lead to a negative relation between investor disagreement and subsequent stock returns.

In addition to the main findings, I provide further support for Varian (1985, 1989) and Abel (1989) and not for Miller (1977) by performing additional tests. First, to test whether changes in short-sale constraints explain the observed lower subsequent returns on high-disagreement stocks, I examine the changes in short interest and short-sale constraints in the subsequent months. I show that high disagreement is associated with higher short interest and higher short-sale costs. However, in the subsequent month, there are no significant changes in short interest or short-sale constraints. Furthermore, high-disagreement stocks are more likely to experience increases rather than decreases in short-sale costs, and are less likely to be associated with increases in short selling. These results suggest that the lower subsequent returns are not driven by the relaxation of short-sale constraints which allows the incorporation of negative information.

Second, I examine whether news arrival such as earnings announcements affects investor disagreement and helps to explain the relation between the level of investor disagreement and subsequent stock returns. I divide the sample period into three groups: pre-earnings announcement months (pre-EA months), earnings announcement months (EA months), and post-earnings announcement months (post-EA months). I confirm that investor disagreement changes more dramatically following quarterly earnings announcements than in periods without earnings news. For example, more than 40% of stocks with high disagreement before earnings announcements experience decreases in disagreement. I find, however, the negative relation between disagreement and subsequent returns is only marginally significant in EA months, and is the strongest in pre-EA months when investor disagreement builds up and is highly persistent. Again, the results show that changing investor disagreement and its impact on stock prices, not the correction of overvaluation, drive the relation between investor disagreement and subsequent stock returns.

In this essay, I clarify and distinguish two seemingly contradicting theories on the relation between investor disagreement and asset prices. I explain that the two theories, Miller (1977) vs. Varian (1985, 1989) and Abel (1989), do not represent opposing views but offer predictions that center on different aspects of the relation. While Miller anticipates a negative relation between the level of investor disagreement and subsequent stock returns, Varian and Abel predict a negative relation between changes in investor disagreement and contemporaneous stock returns. I provide empirical tests of both predictions jointly that help to further clarify the predictions. The tests offer strong support for Varian (1985, 1989) and Abel (1989), and further show that the empirical support for Miller (1977) in the existing literature is largely explained by the Varian and Abel prediction on changes in investor disagreement and contemporaneous stock returns.

The rest of the essay is organized as follows. Section 2 presents the theoretical predictions and hypotheses. Section 3 discusses the data sources, sample selection, and descriptive statistics. Section 4 presents the evolution of disagreement over months with or without earnings announcements. Using the full sample consisting of all months in the sample period, section 5 examines the how disagreement is associated with contemporaneous and subsequent stock returns, and whether changes in short-sale constraints explain the relation between disagreement and stock returns. Section 6 further examines the relation between disagreement and stock returns in EA, post-EA, and pre-EA months separately. Section 7 conducts robustness tests. Section 8 then concludes.

2. Theoretical Predictions and Hypotheses

In this section, I summarize the two theories on the relation between investor disagreement and asset prices in Miller (1977), and Varian (1985, 1989) and Abel (1989). I further present testable hypotheses that help to contrast and distinguish the different predictions based on the two theories.

2.1. Testing the Overvaluation Theory

Miller (1977) provides a simple theoretical framework showing that in the existence of restrictions on short selling, disagreement among investors leads to overvaluation.[1] Because short-sale constraints impede the incorporation of negative opinions into asset prices, prices reflect the more optimistic views than the average valuation of all investors. One immediate implication of the overvaluation result is that high investor disagreement is expected to be associated with lower

[1] See Jarrow (1980) for a general equilibrium result. More recent papers include Gallmeyer and Hollifield (2008).

subsequent returns.

Empirical studies on investor disagreement have largely focused on the relation between disagreement and subsequent returns. Diether, Malloy, and Scherbina (2002) examine the relation between dispersion in analysts' annual earnings forecasts and subsequent stock returns and find that stocks with higher forecast dispersion earn lower returns than stocks with lower forecast dispersion. Berkman et al. (2009) examines five different proxies for disagreement, and find that high-disagreement stocks earn significantly lower 3-day excess returns around earnings announcements than low-disagreement stocks. Both papers argue that the findings support the overvaluation story by Miller (1977). Boehme, Danielsen, and Sorescu (2006) emphasize the role of short-sale constraints in price formation but also show that divergent opinions predict lower stock returns when short-sale constraints are binding.

It is important to note that while the overvaluation story offers a clear prediction on the relation between the *level* of disagreement and asset prices, the extension to *subsequent* asset returns is not immediate. Investor disagreement leads to lower returns in the next period only if the overvaluation can be at least partially corrected during this period. If the overvaluation persists, higher disagreement may not be related to lower returns over the next period or could even predict higher returns.

Correction of overvaluation can take place with the arrival of new information and/or the relaxation of short-sale constraints. New information can help to reduce overvaluation in two ways. First, negative news (more negative relative to aggregate views of the optimistic investors) lowers the price as the new price reflects the negative news without the direct participation of the pessimistic investors. Second, news that is neither positive nor negative but reduces investor disagreement can also lead to a reduction in valuation. In this second scenario, when new information reduces investor disagreement, price now reflects less optimistic views. Clearly, negative news that lowers investor disagreement reduces overvaluation. On the other hand, positive news that lowers investor disagreement may not lead to a reduction in overvaluation.

The Miller overvaluation result relies on the role of binding short-sale constraints. Its prediction on subsequent returns can be driven by changing short-sale constraints in the next period. Even without new information, when short-sale constraints become less binding, some pessimistic investors are able to sell short and their negative opinions will be incorporated into stock prices. As a result, prices of stocks with high disagreement will be at least partially corrected and high disagreement will be associated with lower returns.

I now summarize the empirical predictions of the Miller theory and the proposed tests. In the finance literature, a negative relation between disagreement and subsequent returns is commonly viewed as supporting evidence for Miller (1977). As discussed above, such a relation should be driven by arrival of new information, changing investor disagreement, or changing short-sale constraints. Clear identification of the underlying mechanism of lower returns is crucial for testing the overvaluation story, particularly in light of the predictions and tests of the Varian and Abel risk premium story discussed below and the empirical evidence documented in this essay on the persistence of investor disagreement.

In the empirical tests, I measure investor disagreement based on dispersion in analysts' quarterly earnings forecasts and examine the evolvement of disagreement over time. I first examine the relation between investor disagreement and stock returns at the monthly frequency, and then use quarterly earnings announcements and measures of short selling activities and constraints to assess the role of the arrival of new information and changing short-sale constraints in the relation.

2.2. Testing the High Risk Premium Theory

Varian (1985, 1989) and Abel (1989) present theories showing that increased disagreement among investors will be associated with reduced asset prices. Varian (1985) develops an Arrow-Debreu model with agents holding heterogeneous probability beliefs about the states of nature. In an equilibrium with fixed aggregate consumption, an increase in disagreement among investors will decrease asset prices as long as investors' risk aversion declines less rapidly than it does in the case of logarithmic utility. Varian (1989) extends the work and produces similar predictions regarding the effects of increased disagreement on asset prices. Abel (1989) considers a model in which investors have heterogeneous subjective expectations of the payoffs to risky capital and individual investors' demands for risk capital and riskless bonds depend on their subjective beliefs. Abel (1989) predicts that increased heterogeneity among investors reduces asset prices and increases the equilibrium equity premium on stocks relative to bonds.

Varian (1985, 1989) and Abel (1989) model directly the effects of changes in disagreement on asset prices without restrictions on short selling. The high risk premium theory provides a clear prediction on the relation between the *change* in disagreement and the *contemporaneous* change in asset prices or the *contemporaneous* asset returns. Compared with the contemporaneous relation, the extension to *subsequent* asset returns is a second order effect. While the higher risk premium can affect asset prices immediately and drastically, the realization of higher returns in the subsequent periods depends on the evolution of investor disagreement. If the increase of investor disagreement is followed by a continuing increase in investor disagreement, the subsequent asset returns will not be higher. We should also note that the magnitude of the increase in the equilibrium return should be moderate when the higher risk premium is present in the data.

To test the Varian and Abel model predictions, I first study the contemporaneous relation between changes in disagreement and asset returns, and then examine the relation between changes in disagreement and subsequent asset returns. Similar to the tests of the Miller model, I examine the evolution of investor disagreement and investigate how the persistence of investor disagreement affects the relation between investor disagreement and asset prices.

The Varian and Abel models do not consider the effects of short-sale constraints. The presence of binding short-sale constraints can moderate the contemporaneous relation between the increase in investor disagreement and the drop in asset prices, and consequently should strengthen the positive relation between investor disagreement and subsequent returns. In the empirical tests, I examine the changes in short-sale constraints along with changes in investor disagreement and their impacts on asset prices. I also examine whether the resolution of disagreement following quarterly earnings announcements leads to higher returns on high-disagreement stocks. If the predictions in Varian (1985, 1989) and Abel (1989) hold, high-disagreement stocks should be associated with higher returns as investor disagreement is likely to decrease following earnings announcements.

With the distinct predictions from the two theories, I am able to study the effects of the level of disagreement and changes in disagreement on stock prices in a unified framework. I examine the *contemporaneous* relation between changes in investor disagreement and stock prices at the monthly frequency. I then study the effects of the level of and changes in disagreement on subsequent stock returns by investigating how investor disagreement evolves over time and how the evolvement is associated with stock returns. These tests not only help to distinguish the different predictions but also allow us to understand the relation between the two sets of results. Tests based on earnings news and short-sale constraints further substantiate the main results.

3. Data, Sample, and Descriptive Statistics

3.1. Measuring Investor Disagreement

I measure investor disagreement based on dispersion in analysts' quarterly earnings forecasts, which is defined as the standard deviation of analysts' earnings per share forecasts for a given fiscal quarter scaled by the absolute value of the mean forecast. Using quarterly rather than annual earnings forecasts allows me to better capture the evolution of investor disagreement and examine directly the effects of disagreement and changes in disagreement on stock prices. Annual earnings forecasts contain not only the estimates of earnings for future quarters but also the realized past-quarter earnings in the current fiscal year. Therefore, dispersion computed based on annual earnings forecasts tends to decline toward the end of the fiscal year mechanically.

3.2. Data Sources and Sample Selection

The data on analysts' quarterly and annual earnings forecasts for U.S. firms are drawn from the Institutional Brokers Estimate System (I/B/E/S) Unadjusted Detail History file. In the initial sample, I keep all analysts' earnings forecasts for the current or next fiscal quarter (i.e., FPI = 6 or 7) and for the current fiscal year (i.e., FPI = 1) with a fiscal period end date (FPEDATS) between January 1984 and December 2018.[2] I choose this sample period because quarterly earnings forecasts are not available in I/B/E/S prior to the fourth quarter of 1983.

I compute earnings forecast dispersion for each firm at the end of each month based on quarterly earnings forecasts if the firm is covered by at least two analysts during that month. If analysts' earnings forecasts for multiple fiscal quarters are available, then dispersion in the forecasts pertaining to the closest fiscal quarter is used for analysis. Stocks' dispersions are winsorized at the 99th percentile over the cross section each month. Stocks with a mean forecast of zero are assigned a dispersion value of the 99th percentile (zero) if the standard deviation of the forecasts is nonzero (zero). To avoid stale forecasts, each earnings forecast from each analyst is used until the next forecast issue date, 105 days after it is announced, or the earnings announcement date for the corresponding quarter, whichever comes first. Earnings forecasts issued after the corresponding earnings announcement or contained in the I/B/E/S Stopped or Excluded files are excluded from the computation of dispersion. For comparison, dispersion measures based on annual earnings forecasts are computed in a similar manner.

Stock returns are taken from the Center for Research in Security Prices (CRSP). Firms' financial fundamentals are available from the Compustat quarterly and annual files. The I/B/E/S data file is matched to the CRSP file using mainly the eight-digit CUSIP numbers. For a stock to be

[2] In general, after the earnings announcement for Quarter 1, I/B/E/S sets or changes the FPI of an analyst forecast for Quarter 2 to '6' if the forecast is announced (ANNDATS) or reviewed (REVDATS) after the announcement. However, in many cases, the determination of FPI is ambiguous. Some FPIs remain as '7' even though the estimate has a review date after the announcement of the prior-quarter earnings. In some cases, even when the forecast is announced after the prior-quarter earnings announcement date, the FPI is set to be '7'. Therefore, I keep all quarterly earnings forecasts that have a FPI of '6' or '7'. A similar problem exists in analysts' annual earnings forecasts.

included in the final sample, it must also have 1) return data available from CRSP, 2) a share code of 10 or 11, and 3) book equity information along with other firm accounting values in Compustat. The sample period of the monthly stock-dispersion observation is January 1984 to March 2019 as most earnings reports for fiscal quarters ending in December 2018 are announced in February and March 2019. For the main analyses in the essay, I further require that stocks are covered by at least two analysts and that enough information is available to compute the characteristic-adjusted stock returns employed in Daniel, Grinblatt, Titman, and Wermers (DGTW, 1997). The final samples of quarterly and annual earnings forecast dispersions have 806,328 and 851,719 stock-month observations, respectively.

To examine short-sale constraints, I also obtain monthly short interest data from Compustat and equity lending data from Markit Data Explorer. Markit Data Explorer provides short-selling activity information such as Leandable Quantity, Utilization by Quantity, and the Daily Cost of Borrowing Score (DCBS). Due to data availability, the sample period for this part of analysis is from June 2004 to December 2018.

To conduct robustness tests measuring uncertainty based on textual analysis, I also download firms' 10-K and 10-Q filings from the SEC's EDGAR (Electronic Data Gathering, Analysis, and Retrieval system) website using the Master Index files. The Master Index files list all documents filed through the EDGAR system, and record the central index key (CIK), company name, form type, date filed, and file name for each filing. The file name includes a folder path and can be used to identify and download the specific firm filing. According to the SEC website[3], not all documents filed with SEC by public firms before May 1996 are available on EDGAR. Therefore, for this robustness test, the sample period is January 1997 to December 2018. After downloading the raw text filings filed during the sample period, I follow the parsing procedure employed in Loughran and McDonald (2011) to exclude tables, exhibits, and other irrelevant contents.[4] Those

[3]See https://www.sec.gov/edgar/searchedgar/aboutedgar.htm.

[4]For more information, see the SRAF (Notre Dame Software Repository for Accounting and Finance) website

cleaned files are then used to measure firms' uncertainty.

3.3. Descriptive Statistics

Table 2.1 presents the average analyst coverage and dispersion in analysts' earnings forecasts for the years from 1984 to 2018. Panel A and Panel B report the summary statistics on analysts' quarterly and annual earnings forecasts, respectively. The first four columns of both panels show that an increasing percentage of firms are covered by analysts over the sample period. The percentage of firms listed on CRSP that have quarterly or annual earnings forecasts available in I/B/E/S increases from 20% in 1984 to over 80% in 2018.

Meanwhile, more than 70% of firms are covered by at least two analysts in 2018.[5] The fifth columns of Panel A and Panel B report, respectively, the average numbers of quarterly and annual earnings forecasts available for each covered firm each month. In early years, most analysts only issue their forecasts of firms' annual earnings. In 1984, on average, the covered firms have only two quarterly earnings forecasts but six annual earnings forecasts available from different analysts. The average number of annual earnings forecasts available for each firm decreases from six to four during the first 13 years of the sample period, and then starts increasing after 1997. From 1984 to 2018, analysts not only cover more firms but also provide more quarterly earnings forecasts. The mean dispersion in quarterly earnings forecasts varies around 0.25 over time and peaks at 0.49 in 2009 due to the increased disagreement around the financial crisis. In contrast, the mean dispersion in analysts' annual earnings forecasts fluctuates around 0.18.

One potential reason why the mean annual earnings forecast dispersion is less than the mean quarterly earnings forecast dispersion is that annual earnings forecast dispersion, which is scaled by the mean forecast, decreases from the beginning to the end of the fiscal year mechan-

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https://sraf.nd.edu/data/. The resulting parsed text files are also available on the website.

[5]If a firm has quarterly or annual earnings forecasts from at least two analysts in some months during the year, but has only one or no forecast available in other months, it will still be counted as a firm covered by at least two analysts in Table 2.1.

ically. However, even at the beginning of a fiscal year, the cross-sectional mean dispersion in annual earnings forecasts is lower than the dispersion in quarterly earnings forecasts. In spite of this inconsistency between analysts' quarterly and annual earnings forecasts, the two dispersion measures exhibit similar patterns in the long run and both increase around the three recession periods (i.e., 1991, 2001, and 2008), when the stock market is highly volatile.

4. Evolution of Investor Disagreement

As discussed in the previous sections, changes in disagreement have direct effects on stock prices and the relation between the level of disagreement and subsequent stock returns. Therefore, to study the effects of disagreement on asset prices, it is essential to examine how investor disagreement evolves over time. In this section, I examine the changes in quarterly earnings forecast dispersion over a period of 1 to 12 months and also around quarterly earnings announcements. For comparison, results based on annual earnings forecasts are also presented.

4.1. Dispersion over 12 Months

One disadvantage of using annual earnings forecasts is that those forecasts contain not only the estimates of future-quarter earnings but also the realized earnings for the past quarters in the current fiscal year. As a result, dispersion in analysts' annual earnings forecasts is likely to decline mechanically toward the end of each year, even when analysts' earnings forecasts for future quarters further diverge. Figure 2.1 shows the average dispersion over a 12-month period from the end of 12 months to the end of one month before the annual earnings announcement. Dispersion in annual earnings forecasts decreases significantly from 0.18 to 0.13 over the 12-month period, whereas dispersion in quarterly earnings forecasts fluctuate around 0.24 over time. This suggests that a decrease in annual earnings forecast dispersion does not necessarily mean a decrease in investors' disagreement about the investment value of the stock. Using quarterly earnings forecasts rather than annual earnings forecasts allows us to better capture the evolution of investor disagreement.

I then examine the changes in stocks' dispersion rankings over a 1-month, 3-month, or 12-month period. To control for the potential effects of firm size and analyst coverage, stocks are first sorted into size quintile portfolios based on their market capitalizations measured at the end of last June and the corresponding NYSE breakpoints each month from January 1984 to January 2019.[6] Then, within each size quintile, stocks are further sorted into dispersion quintile portfolios (D1-D5) based on their dispersion in quarterly earnings forecasts measured at the end of the month. Quintile D1 contains stocks with the lowest earnings forecast dispersion. Stocks with a mean forecast of zero are assigned to Quintile D1 (D5) if the standard deviation of the forecasts is zero (nonzero). Quintile portfolios based on dispersion in annual earnings forecasts are constructed in a similar manner.

Panel A of Table 2.2 presents the time-series average probabilities of stocks' remaining in the same dispersion quintile portfolio or transitioning from one dispersion quintile to another over time. Columns 3-7 and 8-12 report the results based on analysts' quarterly and annual earnings forecasts, respectively. The results show that dispersion in analysts' quarterly earnings forecasts is highly persistent and dispersion in annual earnings forecasts is even more so. The percentages on the main diagonals of all transition matrices are greater than 20%.

Over a one-month period from the end of Month 0 (M0) to the end of Month 1 (M1), most stocks remain in the same dispersion quintile. For stocks in each dispersion quintile, the probability of a movement of more than one quintile is less than 18%. High dispersion seems to be more persistent than low dispersion. According to the results based on quarterly earnings forecasts, more than 74% of the stocks in the highest dispersion quintile (D5) remain in the quintile, whereas 64% of low-dispersion stocks remain in the lowest dispersion quintile (D1). In fact, dispersion is highly persistent even over a 3-month or 12-month period.

[6]In the monthly full-sample analysis, the observations in February and March 2019 are excluded because there are very few observations in these two months, but they are included in the quarterly analyses performed for pre-EA and EA months.

These findings indicate that investor disagreement about firms' earnings persists and does not completely resolve over time. If investors strongly disagree about the earnings of the firm in one period, their disagreement will persist in their forecasts for future periods.

4.2. Changes in Dispersion around Earnings Announcements

Next, I examine the changes in disagreement around quarterly earnings announcements to verify that investor disagreement changes more dramatically following information events.

I divide all calendar months in the sample period from January 1984 to March 2019 into three groups, pre-earnings announcement (pre-EA), earnings announcement (EA), and post-earnings announcement (post-EA) months.[7] Stocks are first grouped by the calendar quarters of their earnings announcements.[8] Then for the EA-month sample, stocks are sorted into quintile portfolios based on their dispersion at the end of both the pre-EA and EA months each quarter within the corresponding size quintile so that the changes in dispersion rankings over the EA months can be examined. Stocks' size quintile rankings are determined as of the end of last June relative to the corresponding pre-EA or EA months based on their market capitalizations and the NYSE breakpoints. Dispersion quintile portfolios for post-EA and pre-EA months are constructed in a similar manner. For each quarterly earnings announcement (Q0), the quarterly earnings forecast dispersion in the pre-EA or EA month is measured based on analysts' forecasts for that quarter (Q0), and dispersion in the post-EA month is measured based on analysts' forecasts for the following quarter (Q1). Annual earnings forecast dispersion is measured based on forecasts for the closest fiscal year.

Panel B of Table 2.2 presents the changes in dispersion over EA, post-EA, and pre-EA

[7]Some months do not fall into any of the three groups as the interval between two consecutive earnings announcements may be longer than three months. Those observations are not included in the subsample analyses.

[8]If the earnings are announced on a non-trading day or after 4 p.m. on a trading day, then the announcement date is set to be the next trading day. The earnings announcement month is determined based on the adjusted earnings announcement date.

months. The results show that dispersion is less persistent over EA months than over other months as expected.[9] According to the results based on quarterly earnings forecasts reported in the top section of Panel B, only 60% (47%) of high-dispersion (low-dispersion) stocks in Quintile D5 (D1) as of the beginning of EA months remain in the same quintile at the end of the months.[10] By contrast, over post-EA and pre-EA months, more than 84% (76%) of high-dispersion (low-dispersion) stocks remain in quintile D5 (D1). As a robustness test, I also compute dispersion based on only the earnings forecasts by analysts whose earnings forecasts are valid at both the beginning and end of the corresponding month, and the results are largely the same. In addition, stocks dispersion rankings are even less persistent following the fourth-quarter (Q4) earnings announcements.

Notice that stocks' earnings forecast dispersions at the end of the pre-EA months are computed based on analysts' forecasts for the current quarter (Q0), whereas those at the end of the EA months are computed based on the forecasts for the following quarter (Q1).[11] The change of the forecast target may be one reason why earnings forecast dispersion is less persistent around earnings announcements. However, changes in dispersion are also driven by the new information, based on which analysts update their beliefs. Additional tests show that even if the dispersion measures before and after the earnings announcement (Q0) are both computed based on the forecasts for the next quarter (Q1), stocks' dispersion rankings are still less persistent over EA months.[12]

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[9]Prior studies suggesting that public news releases such as earnings announcements are likely to induce the development of private information and changes in divergence of opinions (e.g., Morse, Stephan, and Stice, 1991; Kim and Verrecchia, 1994, 1997; Barron, Byard, and Kim, 2002).

[10]For ease of discussion, 'the beginning of month *t*+1' is used interchangeably with 'the end of month *t*', though stocks' earnings forecast dispersion is technically measured on the last day of month *t* and stocks are sorted into dispersion quintile portfolios within size quintiles determined as of month *t*.

[11]There are a few reasons why I measure stocks' earnings forecast dispersion in pre-EA months based on analysts' forecasts for the current quarter (Q0) rather than those for the following quarter (Q1). First, not all analysts issue their earnings forecasts for the following quarter when the current-quarter earnings have not be released yet. Second, if earnings forecast dispersions are comparable across different stocks, then they should also be comparable for the same stock across different quarters. The change of the earnings forecast target itself should not alter stocks' relative dispersion rankings. Third, in the full sample analysis, dispersion is measured based on analysts' forecasts for the closest fiscal quarter. To be consistent, I measure stocks' dispersion based on forecasts for the current quarter at the end of the pre-EA month when the earnings report has not been released yet.

[12]According to the results based on dispersions computed using analysts' quarterly forecasts for the same quarter

Overall, the results in Table 2.2 suggest that investor disagreement is highly persistent and more likely to change following information releases. The main findings in this essay are then presented in the next section.

5. Disagreement, Changes in Disagreement, and Stock Returns

In this section, I examine how the level of disagreement and changes in disagreement are associated with both the contemporaneous and subsequent stock returns. I also study the changes in short-sale constraints and short-selling activity to show whether the changes in short selling explain the relation between investor disagreement and stock returns.

5.1. Portfolios Sorted on Earnings Forecast Dispersion

I compute dispersion in analysts' quarterly earnings forecasts and construct dispersion quintile portfolios (D1-D5) each month as discussed in Section 4.1. Table 2.3 reports the adjusted returns of the resulting portfolios in the current and following two months. Without further specification, the equal-weighted returns of portfolios formed based on quarterly earnings forecasts will be discussed in the following subsections.

Panel A and Panel B present the results based on quarterly and annual earnings forecasts, respectively. Stocks' adjusted returns are computed as the excess returns over the returns of their benchmark portfolios matched on size, book-to-market, and momentum factors following DGTW (1997). The benchmark returns are determined based on stocks contained in the sample over the period when they are covered by at least two financial analysts.[13]

(Q1) before and after the prior-quarter (Q0) earnings announcement, 72% (54%) of stocks with the highest (lowest) dispersion ranking before the quarterly earnings announcements stay in the highest (lowest) dispersion quintile after the announcements.

[13] For each stock, I identify the first and last months in which it is covered by at least two analysts. Stocks are included in the calculation of the benchmark returns during the period between and in their corresponding first and last months. The results based on DGTW benchmark returns computed using all stocks in CRSP with a share code of 10 or 11 are largely the same.

Consistent with Diether, Malloy, and Scherbina (2002), the results in both panels show that earnings forecast dispersion is negatively associated with subsequent stock returns. In Panel A, the equal-weighted portfolio adjusted returns in the following two months (Month1 and Month 2) decrease monotonically with the prior level of dispersion. Low-dispersion portfolios significantly outperform their benchmarks by 13 (11) basis points, whereas high-dispersion portfolios underperform their benchmarks by 22 (17) basis points in Month 1 (Month 2), leading to a significant return difference between high- and low-dispersion portfolios of 35 (28) basis points. These patterns are less significant for large stocks, so the value-weighted results are much weaker. The results based on annual earnings forecasts reported in Panel B are similar.

However, high earnings forecast dispersion is also associated with lower contemporaneous stock returns in Month 0. High-dispersion portfolios earn significantly negative adjusted returns, and underperform low-dispersion portfolio by 121 basis points. The negative return difference between high- and low-dispersion portfolios remain highly significant when the portfolios are value weighted. If stocks in high-dispersion (low-dispersion) portfolios are those associated with increases (decreases) in dispersion over the month, then the results suggest a negative relation between changes in dispersion and contemporaneous stock returns. To understand the mechanism behind the findings in Table 2.3, I examine how the changes in dispersion affect stock returns in the next subsection.

5.2. Portfolios Sorted on Earnings Forecast Dispersion and Changes in Dispersion

Stocks in each dispersion quintile portfolio determined as of Month 0 (M0) are further sorted into two or three portfolios based on whether they have lower, the same, or higher dispersion rankings at the end of Month 1 (M1). Panel A of Table 2.4 reports the adjusted portfolio returns over Month 1 and Month 2. From this section onward, only the results based on quarterly earnings forecasts are reported.

As shown in Panel A, in all dispersion quintile portfolios determined as of the end of

Month 0, portfolios associated with decreases in dispersion rankings over Month 1 achieve highly significant positive adjusted returns, whereas portfolios associated with increases in dispersion rankings have significantly negative adjusted returns. The value-weighted results reported in the right panel are similar, indicating that the observed effects of changes in dispersion on stock returns also hold for large stocks. These results show a negative relation between changes in dispersion and contemporaneous stock returns, consistent with Varian (1985, 1989) and Abel (1989).[14]

In addition, D5D5 portfolios with persistent high dispersion over Month 1 earn a significantly negative adjusted return of -0.42% on average, whereas D5Lower portfolios, whose dispersion rankings decrease over the month, have a positive average adjusted return of 0.33%. In contrast, D1D1 portfolios with persistent low dispersion earn significantly higher returns and the D1Higher portfolios earn lower returns than their corresponding benchmarks. As a result, D5D5 portfolios underperform D1D1 portfolios by 73 basis points, whereas D5Lower portfolios outperform D1Higher portfolios by 66 basis points. Since more than two thirds of the stocks in quintiles D1 and D5 remain in the same quintile over Month 1, high-dispersion (D5) portfolios underperform low-dispersion (D1) portfolios in Month 1, as reported in Table 2.3. This finding shows directly that the negative relation between the level of dispersion and subsequent returns is not driven by the resolution of dispersion, providing no support for Miller (1977).

The effects of changes in dispersion on portfolio returns in Month 2 follow the same direction as in Month 1, but are much weaker. In Month 2, portfolios associated with increases in dispersion over Month 1 continue to earn lower returns than portfolios associated with decreases in dispersion, while most portfolios do not have significant abnormal returns. D5D5 portfolios continue to underperform D1D1 portfolios, but the returns of D5Lower and D1Higher portfolios do not differ significantly. These results suggest that changes in disagreement do not predict subsequent stock returns. As mentioned in Section 2, how changes in dispersion are associated with subse-

[14]A few prior empirical studies also find a negative contemporaneous relation between changes in dispersion and stock returns (e.g., L'Her and Suret, 1996; Rees and Thomas, 2010).

quent returns relies on how dispersion further changes. Therefore, these findings do not contradict the hypothesis by Varian (1985, 1989) and Abel (1989) that increased disagreement is associated with a higher risk premium. The results based on annual earnings forecasts are consistent and reported in Table 2.10 in the appendix.

To further verify the findings, stocks are also sorted into tercile portfolios (C1-C3) based on their changes in dispersion from the end of Month 0 to the end of Month 1 within each size quintile. Tercile C1 portfolio contains stocks associated with significant decreases in dispersion. Panel B of Table 2.4 presents the returns of portfolios double sorted on dispersion rankings at the end of Month 0 and the changes in dispersion from the end of Month 0 to the end of Month 1. The level of dispersion and the subsequent changes in dispersion are negatively correlated according to the average number of stock in each portfolio reported in the last column. Only 8% of the low-dispersion stocks but more than 53% of the high-dispersion stocks experience deceases in dispersion.

Consistent with the results in Panel A, increases (decreases) in dispersion correspond to lower (higher) contemporaneous returns in Month 1, regardless of stocks' dispersion rankings at the end of Month 0. Within each dispersion quintile, portfolio returns in Month 1 decrease monotonically with the contemporaneous changes in dispersion, and there is no clear pattern in portfolio returns in the following month (Month 2). Besides, for stocks associated with the same level of changes in dispersion, those associated with higher dispersion at the end of Month 0 earn lower returns over Month 1, indicating a negative relation between dispersion and contemporaneous stock returns. For example, D1C3 portfolios have an average adjusted return of -0.25% in Month 1, while D5C3 portfolios earn -0.84%.

Consequently, as shown in the bottom part of Panel B, high-dispersion portfolios associated with decreases in dispersion (D5C1 portfolios) over Month 1 earn significantly higher returns contemporaneously than low-dispersion portfolios associated with increases in dispersion (D1C3 portfolios). In contrast, Stocks in D5C3 portfolios underperform those in D1C1 portfolios in Month

1. The changes in dispersion do not have significant impact on stock returns in the subsequent month.

In summary, Table 2.4 suggests that increased disagreement is associated with lower stock returns contemporaneously, supporting the theoretical works by Varian (1985, 1989) and Abel (1989). The underperformance of high-disagreement stocks in subsequent months documented in Table 2.3 is not driven by the correction of overvaluation associated with high disagreement. High-disagreement stocks underperform subsequently because investor disagreement is likely to further increase or remain high, while changes in disagreement have a negative effect on contemporaneous stock returns. The performance of high-disagreement stocks is largely determined by the changes in disagreement. Contradictory to Miller (1977), high-disagreement stocks earn higher returns when disagreement resolves.

5.3. Fama-MacBeth Regressions

To control for other factors that could potentially affect stock returns, I also run Fama and MacBeth (1973) regressions of individual stocks' returns on their earnings forecast dispersion and other firm characteristics. The first-step cross-sectional regressions are run each month *t* from February 1984 to February 2019. The dependent variable is the percentage raw return on each stock in month *t* (Month 1) in Models (1), (2), and (3) and the raw return in month *t*+1 (Month 2) in Models (4), (5), and (6). The three main independent variables are dispersion (*Disp*), the change in dispersion (Δ*Disp*), and the interaction (*Disp*$\times\Delta$*Disp*) between dispersion and change in dispersion. *Disp* is measured at the end of month *t*-1 and winsorized at the 99th percentile over the cross section. Δ*Disp* represents the change in dispersion from the end of month *t*-1 to the end of month *t*.

Following Diether, Malloy, and Scherbina (2002), firm size (ln(*MV*)), book-to-market ratio (ln(1+*B*/*M*)), past stock returns ($Ret_{-12:-2}$, Ret_{-1}, and $Ret_{-36:-13}$), residual analyst coverage (*Resid. Cov.*), turnover, and market β are included as control variables. ln(*MV*) is equal to the natural logarithm of the stock's market capitalization measured at the most recent fiscal quarter-end, which is at least three months preceding month *t*-1 and for which the earnings have been announced as of month *t*-1. ln(1+*B*/*M*) is measured at the end of the same fiscal quarter-end as ln(*MV*) and is defined as the natural logarithm of one plus the firm's book value of equity divided by the market capitalization. $Ret_{-12:-2}$, Ret_{-1}, and $Ret_{-36:-13}$ represent the cumulative percentage returns on each stock from month *t*-12 to month *t*-2, in month *t*-1, and from month *t*-36 to month *t*-13, respectively. *Resid. Cov.* is the residual from the monthly cross-sectional regressions of ln(*Analyst Coverage*) at the end of month *t*-1 on ln(*MV*) and ln(1+*B*/*M*). *Turnover* is the average ratio of the trading volume to the number of shares outstanding from month *t*-12 to month *t*-1. *Market* β is the post-ranking β estimated following the procedure in Fama and French (1992) over the period from July 1983 to June 2019. Stocks' idiosyncratic return volatility (*Idio. Vol.*) is also included as Ang et al. (2006) document a negative association between stocks' idiosyncratic volatility and subsequent returns. *Idio. Vol.* is computed, at the end of month *t*-1, as the standard deviation of the residuals from regressions of the prior 52-week returns on the Fama and French (1993) three factors.

Table 2.5 reports the regression results. Models (1) and (4) examine the effects of the level of dispersion on stock returns in the following two months without controlling for the changes in dispersion. Consistent with the portfolio results documented in Table 2.3, the coefficients on *Disp* for Month 1 (-0.169) and Month 2 (-0.158) are both significantly negative at the 1% level, suggesting that the level of dispersion is negatively associated with stock returns in the following months. The coefficients on other control variables are consistent with prior studies. The positive coefficients on $Ret_{-12:-2}$ are in line with the momentum effect documented in Jegadeesh and Titman (1993). The coefficient on Ret_{-1} is significantly negative for Month 1 but not significant for Month 2, showing a short-term reversal effect in stock returns as documented in Jegadeesh (1990).

Models (2) and (5) include the change in dispersion (Δ*Disp*) as an independent variable. In

Model (2), the coefficient on *Disp* becomes -0.584, which is more significant both statistically and economically compared with the results in Model (1). This is consistent with the finding in Table 2.4 that among stocks associated with the same level of changes in dispersion, those with higher dispersion at the end of the prior month earn significantly lower returns. Moreover, the coefficient on Δ*Disp* is highly negative (-1.233) with a Newey-West *t*-statistic of -9.04, showing a significant impact of changes in dispersion on stock returns contemporaneously. The changes in dispersion have a much weaker effect on stock returns in Month 2 with a coefficient of -0.138, though the coefficient is still statistically significant.

In Models (3) and (6), the interaction ($Disp \times \Delta Disp$) between dispersion and the change in dispersion are included. The coefficient on the interaction term is positive and significant in Model (3), suggesting that the negative effect of changes in disagreement on contemporaneous stock returns is weaker for stocks with higher prior levels of disagreement. The interaction effect is insignificant on subsequent stock returns.

Overall, the regression results in Table 2.5 show a negative effect of the level of dispersion on subsequent stock returns and also a negative effect of changes in dispersion on contemporaneous stock returns, in line with the results in Tables 2.3 and 2.4.

5.4. Short-Sale Constraints

As discussed in Section 2, if investor disagreement leads to overvaluation in the presence of short-sale constraints, then the correction of overvaluation could occur following the relaxation of short-sale contraints, leading to a negative relation between disagreement and subsequent stock returns as documented in Table 2.3. In this subsection, I provide evidence that the lower returns on high-disagreement stocks are not caused by the relaxation of short-sale constraints. Due to data availability, the sample period for these tests is June 2004 to December 2018.

Dispersion quintile portfolios are again formed at the end of each month, and then examine the short-selling activity and returns of the resulting portfolios. The results are reported in Panel

A of Table 2.6. *SIR* is the short interest ratio defined as the open short interest available from Compustat divided by the number of shares outstanding. The other four short-selling measures are calculated based on the data from Markit Data Explorer. *Supply* is defined as the *Lendable Quantity* divided by the number of shares outstanding. *UTIL* represents *Utilization by Quantity* defined as the ratio of stock borrowed from institutional lenders to the stock that they have made available. *DCBS* represents the Daily Cost of Borrowing Score and a higher score indicates a higher cost. *Special* represents the percentage of stocks with a DCBS greater than or equal to 2 in each portfolio. Special stocks are more likely to face binding short-sale constraints.

High dispersion is again associated with lower subsequent returns and more likely to face binding short-sale constraints. High-dispersion stocks are associated with higher outstanding open short interest, higher utilization ratios, higher borrowing costs, higher probability of being special, and lower short-selling supply. These results suggest that high-dispersion stocks are more difficult to short, while the short-sale demand for such stocks is higher.

Panel B of Table 2.6 is analogous to Panel A of Table 2.4. I examine the changes in short-selling measures from the end of Month 0 to the end of Month 1 to see whether short-sale constraints of high-dispersion stocks become less binding. We can see that, during the later sample period, changes in disagreement are again negatively associated with contemporaneous stock returns. However, there are no significant changes in short-sale constraints. The supply of lendable shares tends to increase over time, but the borrowing costs do not seem to change. If the relaxation of short-sale constraints induce the lower returns on high-dispersion stocks, we should see an increase in short interest as more pessimistic investors participate in short selling. The short interest of all dispersion portfolios tend to increase, while the increase in short interest is the lowest for high-dispersion portfolios. These results show that the underperformance of high-dispersion stocks in subsequent months is not driven by the changes in short-sale constraints.

Overall, the findings in Section 5 are in line with the model predictions in Varian (1985, 1989) and Abel (1985) and inconsistent with Miller (1977). I provide further evidence in the next section by examining the effects of disagreement on stock returns around quarterly earnings announcements.

6. Disagreement and Stock Returns based on EA Months

As shown in Section 4.2, high disagreement among investors is more likely to resolve following quarterly earnings announcements. Quarterly earnings announcements provide a nice empirical setting to examine the effect of the resolution of disagreement on stock prices. Therefore, I perform tests based on earnings announcements to further distinguish the predictions in the two strands of theoretical literature.

6.1. Portfolios Sorted on Earnings Forecast Dispersion

I construct dispersion quintile portfolios in pre-EA, EA, and post-EA months separately each quarter from January 1984 to March 2019, as discussed in Section 4.2. I then examine the returns of the resulting portfolios.

Panel A of Table 2.7 reports the time-series average standardized unexpected earnings (SUE) and returns of dispersion portfolios in EA months. SUE is defined as the difference between the actual quarterly earnings per share and the mean analysts' quarterly earnings forecast measured one day before the earnings announcement scaled by the fiscal quarter-end stock price.[15] According to the results in the first two columns, high-dispersion portfolios have lower equal-weighted earnings surprises (SUEs) and contain more stocks associated with negative SUEs. Portfolio returns again decrease with earnings forecast dispersion in general, which is partially due to the negative relation between dispersion and earnings surprises. On average, high-dispersion portfolios earn lower returns than low-dispersion portfolios in the EA months, but the return difference

[15]Only the most recent forecasts by individual analysts that are announced within 105 days before the quarterly earnings announcements are included when computing SUEs. The actual quarterly earnings data of U.S. firms are obtained from I/B/E/S. If the earnings report dates are available in both Compustat and I/B/E/S, then I require that the two dates do not differ by more than one calendar day.

is only marginally significant. The magnitude of the return spread (28 basis points) is also smaller compared with the average return difference of 35 basis points in the full-sample result reported in Table 2.3.

I also examine stocks' 3-day price reactions around earnings announcements from one trading day before to one trading day after the adjusted announcement date. Stocks' 3-day cumulative abnormal returns (CARs) are computed as their cumulative excess daily returns over the corresponding DGTW (1997) benchmark portfolio returns. The results show that high-dispersion portfolios underperform low-dispersion portfolios by 30 basis points during the 3-day event window. In the meantime, the EA-month returns excluding 3-day CARs of high- and low-dispersion stocks do not differ significantly, suggesting that the EA-month return difference between high- and low-dispersion portfolios is mostly driven by the 3-day price reactions to the earnings news. The results based on annual forecast dispersion reported in Table 2.11 in the appendix are similar.

Panel B of Table 2.7 reports the returns of dispersion portfolios in post-EA and pre-EA months.[16] In post-EA months, most portfolios do not earn abnormal returns except for the equal-weighted low-dispersion portfolios. Even though high-dispersion portfolios are associated with significantly larger negative earnings surprises (SUE) announced in the prior month as reported in Column 2, the 'High - Low' return differences are insignificant, in contrast to the full-sample results. This finding suggests that in the post-EA months when the earnings information has been incorporated into stock prices and no new information triggers changes in dispersion or price adjustments, higher dispersion does not lead to lower future stock returns. Erturk (2006) attributes the negative relation between earnings forecast dispersion and subsequent stock returns to analysts' sluggish response to bad news, which leads to higher dispersion, and market underreaction to bad news. According to this argument, we should observe a more significant negative relation between

[16]If the interval between two earnings announcements is less than three months, which is more likely to occur between the last quarter in a fiscal year and the first quarter in the following year, the pre-EA month would overlap with the post-EA month relative to the prior quarter earnings announcement. Excluding such observations do not alter the results.

the earnings forecast dispersion and subsequent stock returns post earnings announcements, but the insignificant return difference in Post-EA months does not support this explanation.

In pre-EA months, all portfolios have lower adjusted returns than they do in other months. Portfolio returns decrease with earnings forecast dispersion monotonically and high-dispersion portfolios significantly underperform their benchmarks. The average return difference between high- and low-dispersion portfolios is 41 basis points, greater than the 35-basis point difference based on the full sample reported in Table 2.3. Overall, the results in Table 2.7 show that the negative relation between dispersion and subsequent stock returns is the most significant in pre-EA months rather than EA months. This finding indicates that the observed negative relation between dispersion and subsequent stock returns is not driven by the subsequent resolution of high disagreement among investors.

6.2. Portfolios Sorted on Earnings Forecast Dispersion and Changes in Dispersion

Next, I examine how the changes in dispersion affect stock returns contemporaneously in EA, post-EA, and pre-EA months separately. Each quarter, stocks in each dispersion quintile portfolio are further divided into two or three portfolios based on whether they have lower, unchanged, or higher dispersion quintile rankings at the end of the corresponding EA, post-EA, or pre-EA month. Table 2.8 reports the returns of the resulting portfolios. The returns of portfolios double sorted on dispersion and changes in dispersion in a similar manner to Panel B of Table 2.4 are reported in Table 2.12 in the appendix.

Consistent with the full-sample results reported in Table 2.4, within each dispersion quintile, stocks with increased dispersion rankings earn lower returns than stocks with unchanged or lower dispersion rankings. The effects of changes in dispersion on stock returns are the strongest in pre-EA and the weakest in post-EA months. For example, the average return differences between D2Higher and D2Lower portfolios in EA, post-EA, and pre-EA months are -1.39%, -0.65%, and -1.45%, respectively.

Moreover, when dispersion indeed resolves following earnings announcements, high dispersion stocks is associated with significantly positive adjusted returns. The average adjusted return of D5Lower portfolios in EA months is 0.82% with a *t*-statistic of 5.24, while the D5D5 portfolios with persistent high dispersion earn a negative adjusted return of -0.30%. This result is consistent with Varian (1985, 1989) and Abel (1989).

As shown in the bottom panel of Table 2.8, high-dispersion portfolios associated with decreases in dispersion (D5Lower portfolios) significantly outperform low-dispersion portfolios associated with increases in dispersion (D1Higher portfolios), especially in EA and Pre-EA months. Meanwhile, portfolios with persistent high dispersion (D5D5 portfolios) significantly underperform portfolios with persistent low dispersion (D1D1 portfolios). According to the number of stocks in each portfolio, more than 80% of the stocks in both high- and low-dispersion portfolios remain in the corresponding dispersion quintile over the pre-EA months, while less than 60% of the stocks do so over EA months. As a result, the negative return difference between high- and low-dispersion portfolios is the most significant in pre-EA months rather than EA months as shown in Table 2.7.

All these return patterns again suggest that increased disagreement leads to lower contemporaneous stock returns, consistent with Varian (1985, 1989) and Abel (1989). Resolution of disagreement leads to higher rather than lower returns on high-disagreement stocks, contrary to Miller (1977).

6.3. Fama-MacBeth Regressions

To further verify the results in Tables 2.7 and 2.8, I then run Fama and MacBeth (1973) regressions of individual stocks' returns in EA, post-EA, and pre-EA months, respectively, on their earnings forecast dispersion and other firm characteristics. The first-step cross-sectional regressions are run each calendar quarter. For the EA-month sample, the dependent variable is the percentage raw return on each stock in the corresponding EA month *t*. The independent variable dispersion (*Disp*) is measured at the end of the pre-EA month t-1 and the change in dispersion (Δ*Disp*) represents the change from the end of month t-1 to the end of month t. SUE represents the earnings surprises in the current quarter. The other control variables are defined as in Table 2.5. For the post-EA and pre-EA months, SUE represents the earnings surprises from the most recent earnings announcements, and all other variables are constructed in a similar manner to the ones for EA months.

The regression results are reported in Table 2.13 in the appendix. Without controlling for the change in dispersion, the coefficient on *Disp* is insignificant for post-EA and pre-EA months, and is significant only at the 10% level for EA months. However, after adding the variable Δ*Disp*, the coefficient on *Disp* becomes insignificant for both EA and Pre-EA months, but highly significant with a Newey-West t-statistic of -4.30 for the pre-EA month sample. Besides, the coefficient on Δ*Disp* is negative for all months and significant at the 1% for pre-EA months. These results are in line with the portfolio results in Table 2.8 that increases in dispersion are associated with lower stock returns contemporaneously and the effects of both the level of and change in dispersion on stock returns are the strongest in pre-EA months.

6.4. Portfolios Sorted Earnings Forecast Dispersion and SUE in EA months

According to Miller (1977), resolution of investor disagreement following information releases should lead to the correction of overvaluation when the information is negative, but not necessarily so when the information is positive. To test this hypothesis, I examine the effects of earnings announcements on the relation between investor disagreement and stock prices by considering whether the announcements deliver positive or negative information.

I sort stocks into SUE tercile portfolios (S1-S3) each quarter, besides constructing dispersion quintile portfolios. The top and bottom SUE tercile portfolios (S1 and S3) have large negative and positive earnings surprises, respectively. Stocks in the middle SUE tercile portfolios (S2) also have positive earnings surprises on average, but the magnitude of the earnings surprises is much smaller in comparison to that of Tercile S3 portfolios.[17]

Table 2.9 reports the time-series average SUEs and returns of portfolios double sorted on dispersion and earnings surprises. I find that stocks with higher earnings forecast dispersion are more likely to be associated with larger absolute earnings surprises. According to the average number of stocks in each portfolio, less than 50% (173 out of 354) of low-dispersion stocks but about 85% (302 out of 357) of high-dispersion stocks fall into Tercile S1 or S3 portfolios. In addition, for portfolios with negative (positive) SUEs, the average SUE decreases (increases) monotonically with dispersion. D5S1 portfolios have greater negative earnings surprises than D1S1 portfolios and the difference between D5S1 and D1S1 portfolios is significant at the 1% level with a *t*-statistic of -8.91 as reported in the bottom panel. Consistently, D5S3 portfolios have significantly higher positive earnings surprises than D1S3 portfolios.

All dispersion portfolios with negative (positive) SUEs earn significantly negative (positive) adjusted EA-month returns and 3-day CARs around earnings announcements. However, the larger earnings surprises associated with high-dispersion portfolios do not translate into larger price reactions around the earnings announcements. In fact, high dispersion is associated with weaker price reactions.

The EA-month returns of the five dispersion portfolios with negative SUEs exhibit a U-shaped pattern. High-dispersion portfolios end up with significantly higher adjusted returns than low-dispersion portfolios, contrary to Miller (1977), while the portfolios with medium forecast dispersion (D3 portfolios) earn the lowest average adjusted return of -3.59%. According to the results reported in the bottom panel, the average benchmark-adjusted return of high-dispersion portfolios (D5S1) is 52 basis points higher than that of low-dispersion portfolios (D1S1), though high dispersion portfolios have larger negative earnings surprises. Meanwhile, the difference in the 3-day CARs between high- and low-dispersion portfolios is 29 basis points, which is also significant at

[17] For eash of discussion, Tercile S1 (S3) portfolios are referred to as negative-SUE (positive-SUE) portfolios or portfolios with negative (positive) SUEs.

the 1% level. This shows that the return differences between high-dispersion and low-dispersion portfolios are largely driven by the 3-day price reactions around earnings announcements. One explanation for the results is that when the actual earnings are below the consensus expectation, the stock price decreases following the earnings announcement as investors update their beliefs about the value of the stock. If there was strong agreement about the firm's earnings among investors prior to the earnings announcement, most of them adjust their views on the stock, pushing the stock price downward. However, if there was strong disagreement before the earnings announcement and the disagreement remains, the actual below-consensus earnings might not be surprising to some investors. The price reactions to earnings announcements would thus be smaller.

On the other hand, the returns of dispersion portfolios with positive SUEs decrease monotonically with earnings forecast dispersion, though the mean SUEs increase with dispersion. Consequently, high-dispersion portfolios earn significantly lower returns than the low-dispersion portfolios, while all portfolios earn highly positive adjusted returns. The average EA-month benchmark-adjusted return of high-dispersion portfolios is 58 basis points lower than that of low dispersion portfolios, and the average 3-day CAR of high-dispersion portfolios is 56 basis points lower. High-dispersion stocks react less to the earnings news and the positive returns of high-dispersion stocks are smaller in magnitude, possibly because the SUEs measured against the consensus forecast are not surprising to some investors. The results for stocks belonging to Tercile S2 portfolios are similar as they have positive earnings surprises on average. Since more than 50% of the stocks have positive SUEs, we observe a negative relation between earnings forecast dispersion and stock returns in EA months as shown in Panel A of Table 2.7.

I also examine the post earnings announcement drift (PEAD) of all dispersion portfolios to see whether the return difference between high- and low-dispersion portfolios continues or reverses in the following months. PEAD is defined as the post earnings announcement adjusted return of each portfolio accumulated from two days after the current-quarter earnings announcement to two days before the next-quarter announcement. The results show that all dispersion portfolios with negative (positive) SUEs continue to have significantly negative (positive) adjusted returns following the earnings announcements, consistent with a large body of literature on post earnings announcement drift (e.g., Ball and Brown, 1968; Bernard and Thomas, 1989). However, the difference in PEAD between high- and low-dispersion portfolios is not significant in most specifications.

These results suggest that cash flow news affects the relation between the level of dispersion and subsequent stock returns. However, the results do not provide support for Miller (1977). The findings are also opposite to the predictions in Atmaz and Basak (2018) that disagreement among investors leads to further increases (decreases) in stock prices following good (bad) news. In EA months, high dispersion is in fact associated with higher subsequent returns for stocks with negative SUEs, but lower returns for stocks with positive SUEs. In another word, higher dispersion is associated with weaker price reactions following earnings news. The insignificant difference in PEAD between high- and low-dispersion portfolios also suggests that the weaker price reactions to earnings announcements of high-dispersion stocks are not driven by underreaction to new information when uncertainty is high as documented in Zhang (2006).

In addition, I run Fama-MacBeth Regressions of stocks' EA-month raw returns and 3-day cumulative raw returns around earnings announcements on dispersion and changes in dispersion for each SUE tercile portfolio.[18] The first-step cross-sectional regression are again run each quarter and the dependent variable is the percentage raw return on each stock over the EA months or the 3-day cumulative raw return around earnings announcements. All independent variables are defined as in Tables 5 and 8. To conserve space, the results for negative-SUE and positive-SUE tercile portfolios are reported in Table 2.14 in the appendix, and the results for the middle SUE tercile are in line with those for positive-SUE tercile.

[18]Changes in dispersion and the 3-day returns occur contemporaneously, though technically changes in dispersion is measured after the 3-day event window. The logic is that if analysts update their earnings forecasts at the end of EA months, such updates are most likely to be driven by the new information released from the earnings announcements and occur contemporaneously with the 3-day event window. Besides, the results based on changes in dispersion measured one day after the earnings announcements are largely the same.

The coefficient on *Disp* is positive in 3 out 4 models for stocks with negative SUEs, and negative in all four specifications for stocks with positive-SUEs. This suggests that a higher level of dispersion is associated with higher (lower) returns over the EA months and 3-day returns around earnings announcements for stocks with negative (positive) earnings surprises, consistent with the portfolio return patterns reported in Table 2.9. Meanwhile, the coefficients on $\Delta Disp$ are negative and significant at the 1% level in all models, providing additional evidence for Varian (1985, 1989) and Abel (1989).

7. Robustness Tests

7.1. Stocks Covered by at least Five Analysts

In this essay, investor disagreement about a firm is measured as the standard deviation of individual analysts' earnings forecasts pertaining to the firm. The standard deviation measure may not be reliable if only a few analysts cover the firm. Therefore, to test the robustness of the results reported in Tables 3 to 10, I repeat the analyses for the subsample of stocks covered by at least five analysts. Since not many firms are covered by that many analysts in earlier years, the sample period starts in January 1997 for this set of tests.

All results are again robust and consistent with Varian (1985, 1989) and Abel (1989). Table 2.15 in the appendix reports the returns of portfolios sorted on both the level of dispersion and change in dispersion for the sample consisting of all months. Table 2.16 reports the results for difference months divided based on earnings announcements. An interesting finding is that, for stocks covered by at least five analysts, the negative relation between the level of dispersion and subsequent stock returns is no longer significant. The average monthly return difference between high- and low-dispersion portfolios is only -0.08%.

Meanwhile, the negative contemporaneous relation between changes in dispersion and stock returns persists. High-dispersion portfolios associated with decreases (increases) in dispersion outperform (underperform) low-dispersion portfolios associated with increases (decreases) in dispersion by 92 (145) basis points with a t-statistic of 4.58 (4.98). The returns between high- and low-dispersion portfolios without large changes in dispersion do not differ significantly. All these results further verify the argument that changes in dispersion determine the performance of dispersion qunitile portfolios.

7.2. Controlling for Uncertainty

One concern about measuring disagreement based on dispersion in analysts' earnings forecasts is that earning forecast dispersion could reflect both the firm's underlying uncertainty and divergence of opinion (e.g., Johnson, 2004; Doukas, Kim, and Pantzalis, 2006; Barron, Stanford, and Yu, 2009). Therefore, to control for the potential effect of uncertainty, I perform textual analysis on the cleaned 10-Q and 10-K reports filed with SEC during the period from 1997 to 2018, following Loughran and McDonald (2011).

Firms' uncertainty is measured as the number of words signaling uncertainty in each 10-Q or 10-K report based on the financial sentiment dictionary[19] developed by Loughran and McDonald (2011) divided by the total number of words in the report. The uncertainty measure calculated using each 10-K or 10-Q report is used for the stock-month dispersion observations between the filing date of the report and the filing date of the report for the next fiscal quarter. If the filing for the next fiscal quarter is missing, then the measure will be used for three months. After attaching the uncertainty measures, I then keep the stock-month dispersion observations from January 1997 to December 2018, and perform both portfolio and regression analyses controlling for uncertainty.

Overall, the results show that the findings presented in previous sections are robust to controlling for uncertainty, though earnings forecast dispersion is positively correlated with uncertainty. The average cross-sectional correlation between earnings forecast dispersion and uncer-

[19]The most recent version of the uncertainty word list contains 295 words, such as approximate, depend, risky, uncertain, and volatility. The word list is available at https://sraf.nd.edu/textual-analysis/resources/.

tainty is 0.04. This positive correlation between dispersion and uncertainty does not drive the observed relation between dispersion and stock returns.

In the portfolio analysis, stocks are first sorted into size and uncertainty quintile portfolios each month (Month 0), respectively. Then within each of the 25 size$\times$uncertainty portfolios, stocks are further sorted into quintile (D1-D5) portfolios based on dispersion in analysts' quarterly earnings forecasts at the end of Month 0. Next, stocks are sorted into tercile portfolios (C1-C3) within each of the 25 size$\times$uncertainty portfolio based on their changes in dispersion from the end of Month 0 to the end of Month 1. The returns of the resulting portfolios by earnings forecast dispersion and changes in dispersion are reported in Table 2.17 in the appendix.

Consistent with the main results reported in Table 2.4, portfolio returns in Month 1 decrease monotonically with contemporaneous changes in dispersion, regardless of the level of dispersion as of the end of Month 0. This suggests a negative contemporaneous relation between changes in dispersion and stock returns, and changes in dispersion on stock returns do not predict subsequent returns as there is no monotonic pattern in portfolio returns in Month 2.

Meanwhile, the return difference between high- and low-dispersion portfolios is negative. However, how the high-dispersion portfolios perform in Month 1 relative to low-dispersion portfolios is determined by how dispersion changes over Month 1. Again, in Month 1, high-dispersion portfolios associated with decreases in dispersion (D5C1 portfolios) significantly outperform low-dispersion portfolios associated with increases in dispersion (D1C3 portfolios), while D5C3 portfolios underperform D1C1 portfolios. All these results are consistent with Varian (1985, 1989) and Abel (1989).

8. Conclusions

Using earnings forecast dispersion as a measure of disagreement, this essay examines how the level of and change in disagreement affect stock prices in a single framework. Consistent with Varian (1985, 1989) and Abel (1989), increases (decreases) in investor disagreement are associated with lower (higher) stock returns contemporaneously, regardless of the prior levels of disagreement. However, changes in disagreement do not predict subsequent stock returns.

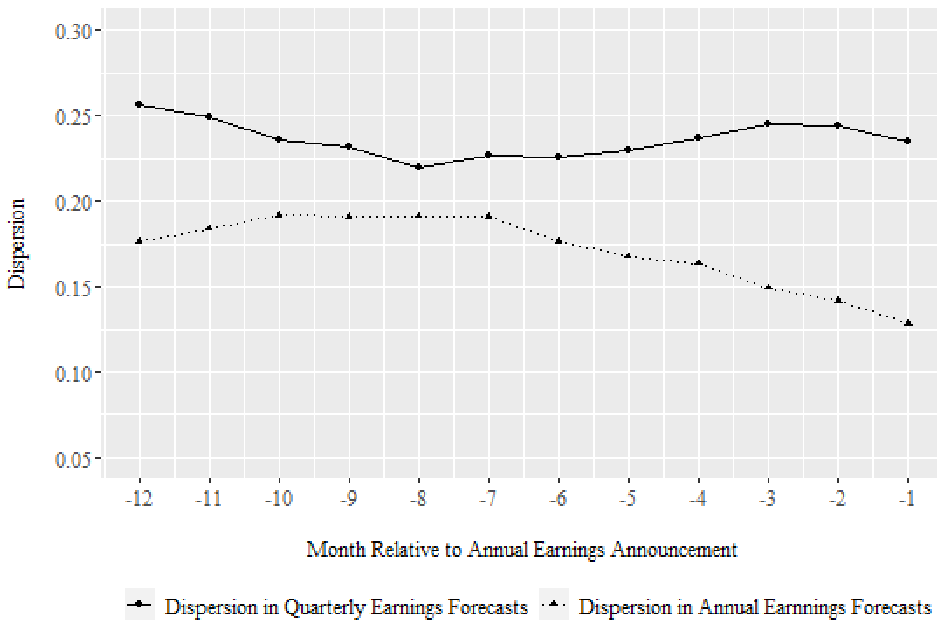
Meanwhile, the level of disagreement is associated with lower subsequent returns, but this result is not driven by the correction of overvaluation. Contradictory to Miller (1977), high-disagreement stocks associated with decreasing (increasing) investor disagreement significantly outperform (underperform) low-disagreement stocks. On average, high-disagreement stocks underperform low-disagreement stocks as disagreements on these stocks tend to remain high or further increase.

Additional tests on short-sale constraints and earnings announcements substantiate the main findings. Compared with low-disagreement stocks, high-disagreement stocks are less likely to experience increases in short-sale supply and increases in short interest in subsequent months. These results suggest that the lower subsequent returns earned by high-disagreement stocks are not driven by the relaxation of short-sale constraints.

Earnings announcements induces changes in investor disagreement. However, the negative relation between the level of disagreement and subsequent stock returns is the strongest in pre-EA months when disagreement builds up rather than in EA months when disagreement revolves. Though more likely to be associated with larger absolute earnings surprises, high-disagreement stocks experience weaker price reactions than low-disagreement stocks. High-disagreement stocks have higher (lower) returns than low-disagreement stocks around negative (poisitive) earnings surprises.

Overall, the findings show that changes in investor disagreement negatively affect asset prices, in line with Varian (1985, 1989) and Abel (1989). This negative effect, rather than Miller's (1977) overvaluation theory, largely explains the negative relation between investor disagreement and subsequent stock returns documented in existing literature.

Figure



This figure presents the average dispersions in analysts' quarterly and annual earnings forecasts over a 12-month period from the end of 12 months to the end of 1 month before the annual earnings announcement.

Figure 2.1: Dispersion over 12 Months

Table 2.1: Descriptive Statistics on Analyst Coverage and Earnings Forecasts

This table presents the descriptive statistics of firms covered by financial analysts from I/B/E/S. Panel A and Panel B report statistics based on analysts' quarterly earnings forecasts and annual earnings forecasts, respectively. Dispersion in analysts' quarterly (annual) earnings forecasts is defined as the ratio of the standard deviation of analysts' earnings per share forecasts for the current fiscal quarter (year) to the absolute value of the mean forecast. Each month, stocks' dispersions are winsorized at the 99th percentile over the cross section. Stocks with a mean forecast of zero are assigned a dispersion value of zero (the 99th percentile) if the standard deviation of the forecasts is zero (nonzero). *No. of Firms with Coverage (No. of Firms Covered by Two)* reports the number of firms covered by at least one (two) analyst(s) each year. *% of Firms with Coverage (% of Firms Covered by Two)* reports the percentage of firms covered by at least one (two) analyst(s) each year out of all firms in CRSP that have a share code of 10 or 11. *Mean No. of Earnings Forecasts* reports the average number of quarterly or annual earnings forecasts available for each firm. *Mean Earnings Forecast Dispersion* reports the average dispersion in analysts' quarterly or annual earnings forecasts pertaining to each firm.

	Panel A: Quarterly Earnings forecasts						Panel B: Annual Earnings Forecasts					
Years	No. of Firms with Coverage	No. of Firms Covered by Two	% of Firms with Coverage	% of Firms Covered by Two	Mean No. of Earnings Forecasts	Mean Earnings Forecast Dispersion	No. of Firms with Coverage	No. of Firms Covered by Two	% of Firms with Coverage	% of Firms Covered by Two	Mean No. of Earnings Forecasts	Mean Earnings Forecast Dispersion
1984	1247	863	19.58%	13.55%	2.08	0.19	1371	1045	21.53%	16.41%	6.54	0.15
1989	2528	1814	38.67%	27.75%	3.58	0.22	3081	2416	47.12%	36.95%	5.42	0.18
1994	4088	3131	56.09%	42.96%	3.40	0.19	4336	3429	59.50%	47.05%	4.37	0.13
1999	4988	3948	64.45%	51.01%	4.10	0.21	5123	4046	66.20%	52.28%	4.72	0.16
2004	3692	3100	68.92%	57.87%	5.61	0.19	3671	3101	68.53%	57.89%	5.99	0.13
2009	3530	3034	77.65%	66.74%	6.30	0.49	3513	3026	77.28%	66.56%	6.47	0.35
2014	3289	2971	81.67%	73.78%	7.82	0.29	3264	2957	81.05%	73.43%	7.70	0.22
2018	3155	2877	81.97%	74.75%	7.52	0.27	3116	2837	80.96%	73.71%	7.34	0.19

Table 2.2: Changes in Earnings Forecast Dispersion

This table presents the probabilities of stocks' remaining in the same dispersion quintile portfolio or transitioning from one dispersion quintile to another over time. Columns 3-7 and Columns 8-12 report the results based on quarterly earnings forecasts and annual earnings forecasts, respectively. Panel A reports the changes in earnings forecast dispersion rankings over a 1-month, 3-month, or 12-month period. Dispersion in analysts' quarterly (annual) earnings forecasts is defined as the ratio of the standard deviation of analysts' earnings per share forecasts for the current fiscal quarter (year) to the absolute value of the mean forecast. Each month from January 1984 to January 2019, stocks are sorted into size quintile portfolios based on their market capitalizations measured at the end of last June and the corresponding NYSE breakpoints. Then within each size quintile, stocks are further sorted into quintile portfolios based on dispersion in analysts' quarterly or annual earnings forecasts measured at the end of the month. Stocks with a mean forecast of zero are assigned to the lowest (highest) dispersion portfolio if the standard deviation of the forecasts is zero (nonzero). Panel B reports the changes in earnings forecast dispersion around quarterly earnings announcements. All calendar months in the sample period from January 1984 to March 2019 are divided into pre-earnings announcement (pre-EA), earnings announcement (EA), and post-earnings announcement (post-EA) months. Stocks are first grouped by the calendar quarters of their earnings announcements. Then for the EA-month sample, stocks are sorted into quintile portfolios based on their dispersions at the end of both the pre-EA and EA months each quarter within each size quintile. Dispersion quintile portfolios for post-EA and pre-EA months are constructed in a similar manner. The three sections in Panel B report the changes in dispersion over EA, post-EA, and pre-EA months, respectively.

Panel A: Changes in Dispersion Over Months

Months	Dispersion Quintile	Quarterly Earnings Forecasts					Annual Earnings Forecasts				
		D1 (Low)	D2	D3	D4	D5 (High)	D1 (Low)	D2	D3	D4	D5 (High)
M0 to M1	D1 (Low)	63.50%	18.69%	9.06%	5.55%	3.20%	71.63%	16.95%	6.25%	3.26%	1.91%
	D2	19.04%	54.55%	16.61%	6.94%	2.86%	18.39%	58.39%	16.01%	5.07%	2.15%
	D3	8.56%	18.15%	52.21%	15.83%	5.25%	5.83%	18.81%	57.16%	14.63%	3.57%
	D4	4.80%	6.69%	17.77%	55.96%	14.79%	2.54%	4.81%	17.34%	63.23%	12.08%
	D5 (High)	2.71%	2.25%	4.78%	16.16%	74.10%	1.57%	1.72%	3.07%	13.67%	79.97%
M0 to M3	D1 (Low)	43.79%	26.60%	15.04%	9.06%	5.51%	48.37%	25.97%	13.95%	7.37%	4.34%
	D2	26.07%	33.12%	22.88%	12.33%	5.60%	28.13%	33.58%	21.96%	11.24%	5.09%
	D3	14.55%	23.84%	29.55%	21.82%	10.24%	13.04%	25.80%	32.02%	20.53%	8.61%
	D4	8.27%	12.27%	23.40%	33.59%	22.48%	5.80%	11.21%	24.59%	38.35%	20.05%
	D5 (High)	4.78%	4.74%	9.86%	23.99%	56.64%	3.44%	4.24%	7.82%	22.62%	61.88%
M0 to M12	D1 (Low)	40.89%	26.23%	16.12%	10.19%	6.58%	43.93%	26.03%	15.09%	9.15%	5.80%
	D2	26.06%	30.23%	22.49%	13.66%	7.56%	25.50%	30.00%	22.88%	13.79%	7.84%
	D3	15.28%	23.61%	26.84%	21.56%	12.72%	14.19%	23.46%	27.76%	21.85%	12.73%
	D4	9.12%	13.92%	22.75%	29.87%	24.34%	7.65%	13.72%	22.83%	31.69%	24.12%
	D5 (High)	5.30%	6.06%	12.06%	26.01%	50.56%	4.63%	6.40%	11.86%	25.49%	51.63%

Panel B: Changes in Dispersion Around Earnings Announcements											
Months	Dispersion Quintile	Quarterly Earnings Forecasts					Annual Earnings Forecasts				
		D1 (Low)	D2	D3	D4	D5 (High)	D1 (Low)	D2	D3	D4	D5 (High)
EA Month	D1 (Low)	46.80%	26.10%	14.26%	8.17%	4.67%	56.88%	23.72%	11.23%	5.48%	2.68%
	D2	26.25%	33.92%	23.39%	11.92%	4.52%	25.96%	41.75%	20.28%	8.78%	3.23%
	D3	13.46%	24.12%	30.55%	22.55%	9.31%	9.67%	24.72%	40.73%	18.80%	6.09%
	D4	7.24%	11.33%	23.05%	35.17%	23.21%	4.11%	7.95%	23.02%	48.19%	16.72%
	D5 (High)	4.21%	4.16%	9.02%	22.85%	59.76%	2.20%	2.69%	4.96%	18.88%	71.27%
Post-EA Month	D1 (Low)	76.26%	16.24%	3.93%	2.21%	1.36%	75.52%	17.15%	3.88%	1.98%	1.47%
	D2	13.34%	65.55%	17.18%	2.80%	1.13%	14.61%	63.09%	18.01%	2.93%	1.37%
	D3	5.44%	13.49%	63.88%	15.31%	1.88%	5.09%	14.31%	62.25%	16.28%	2.07%
	D4	2.75%	4.28%	12.85%	68.85%	11.27%	2.43%	4.11%	13.00%	68.71%	11.76%
	D5 (High)	1.51%	1.08%	2.41%	10.64%	84.35%	1.62%	1.67%	2.70%	10.25%	83.76%
Pre-EA Month	D1 (Low)	80.39%	12.36%	3.61%	2.09%	1.55%	80.76%	11.90%	3.62%	2.00%	1.72%
	D2	11.42%	71.45%	12.45%	3.19%	1.48%	13.67%	69.72%	11.72%	3.12%	1.77%
	D3	3.63%	13.06%	68.85%	11.97%	2.50%	3.16%	15.48%	67.89%	10.90%	2.57%
	D4	1.98%	3.14%	13.41%	71.16%	10.32%	1.53%	2.78%	14.86%	72.00%	8.84%
	D5 (High)	1.09%	0.88%	2.02%	11.57%	84.43%	0.99%	1.11%	1.90%	11.40%	84.60%

Table 2.3: Portfolio Returns by Earnings Forecast Dispersion

This table reports the returns of portfolios sorted on dispersions in analysts' quarterly or annual earnings forecasts measured at the end of each month. Dispersion in analysts' quarterly (annual) earnings forecasts is defined as the ratio of the standard deviation of analysts' earnings per share forecasts for the current fiscal quarter (year) to the absolute value of the mean forecast. Each month from January 1984 to January 2019, stocks are sorted into size quintile portfolios based on their market capitalizations as of the end of last June and the corresponding NYSE breakpoints. Then within each size quintile, stocks are further sorted into quintile portfolios based on dispersion in analysts' quarterly or annual earnings forecasts at the end of the month. Stocks with a mean forecast of zero are assigned to the lowest (highest) dispersion portfolio if the standard deviation of the forecasts is zero (nonzero). Panel A and Panel B present the returns of portfolios sorted on dispersion in analysts' quarterly and annual earnings forecasts over the following months, respectively. In both panels, stocks' dispersion quintile rankings are determined at the end of Month 0, and *Adjusted Returns* in Month 0, Month 1, and Month 2 represent the average portfolio returns in the current and following two months. Stocks' adjusted returns are computed as the excess returns over the returns of their benchmark portfolios matched on size, book-to-market, and momentum factors following DGTW (1997). *t*-statistics are reported in parentheses. *No. of Stocks* presents the average number of stocks in each portfolio.

Dispersion Quintile	Adjusted Returns (%)						No. of Stocks
	Equal-Weighted			Value-Weighted			
	Month 0	Month 1	Month 2	Month 0	Month 1	Month 2	
Panel A: Portfolio Returns by Dispersion in Quarterly Earnings Forecasts							
D1 (Low)	0.37	0.13	0.11	0.21	0.04	0.09	381
	(7.01)	(2.38)	(2.00)	(3.48)	(0.64)	(1.52)	
D2	0.28	0.01	0.01	0.12	0.08	-0.01	381
	(6.27)	(0.25)	(0.21)	(2.73)	(1.88)	(-0.26)	
D3	0.17	-0.03	-0.06	0.13	0.01	0.01	381
	(4.98)	(-0.81)	(-1.77)	(3.21)	(0.35)	(0.26)	
D4	-0.21	-0.10	-0.02	-0.08	-0.02	0.05	381
	(-4.77)	(-2.41)	(-0.53)	(-1.58)	(-0.40)	(1.16)	
D5 (High)	-0.85	-0.22	-0.17	-0.51	-0.11	-0.08	382
	(-11.54)	(-3.19)	(-2.43)	(-6.07)	(-1.37)	(-1.01)	
D5 - D1	-1.21	-0.35	-0.28	-0.72	-0.15	-0.17	
	(-10.61)	(-3.13)	(-2.48)	(-5.44)	(-1.16)	(-1.34)	
Panel B: Portfolio Returns by Dispersion in Annual Earnings Forecasts							
D1 (Low)	0.32	0.07	0.05	0.16	0.07	0.10	403
	(5.31)	(1.18)	(0.90)	(2.52)	(1.09)	(1.64)	
D2	0.25	0.00	0.00	0.11	0.01	-0.03	405
	(6.10)	(0.03)	(-0.10)	(2.59)	(0.19)	(-0.85)	
D3	0.06	-0.09	-0.09	0.04	0.01	-0.01	405
	(1.78)	(-2.58)	(-2.44)	(0.85)	(0.23)	(-0.34)	
D4	-0.27	-0.19	-0.15	-0.11	-0.10	-0.07	405
	(-5.67)	(-4.26)	(-3.51)	(-2.03)	(-1.92)	(-1.44)	
D5 (High)	-0.76	-0.30	-0.31	-0.33	-0.05	-0.01	404
	(-9.69)	(-3.92)	(-4.16)	(-3.79)	(-0.65)	(-0.12)	
D5 - D1	-1.08	-0.37	-0.36	-0.49	-0.12	-0.11	
	(-8.31)	(-2.91)	(-2.93)	(-3.52)	(-0.92)	(-0.87)	

Table 2.4: Portfolio Returns by Earnings Forecast Dispersion and Changes in Dispersion

This table presents the subsequent returns of portfolios double sorted on dispersion in quarterly earnings forecasts measured at the end of the current month (M0) and changes in dispersion from the end of the current month (M0) to the end of the following month (M1). Dispersion in analysts' quarterly earnings forecasts is defined as the ratio of the standard deviation of analysts' earnings per share forecasts for the current fiscal quarter to the absolute value of the mean forecast. Stocks' dispersions are winsorized at the 99th percentile each month over the cross section. Each month from January 1984 to January 2019, stocks are sorted into size quintile portfolios based on their market capitalizations as of the end of last June and the corresponding NYSE breakpoints. Then within each size quintile, stocks are sorted into quintile portfolios based on dispersions in analysts' quarterly earnings forecasts at the end of the month. Stocks with a mean forecast of zero are assigned a dispersion value of zero (the 99th percentile) if the standard deviation of the forecasts is zero (nonzero). In Panel A, stocks are further divided into two or three portfolios based on their dispersion rankings at the end of the following month within each corresponding size quintile. The first two columns represent stocks' dispersion quintile rankings at the end of Month 0 and Month 1, respectively. In Panel B, stocks are further sorted into tercile portfolios within each size quintile based on their changes in dispersion from the end of Month 0 to the end of Month 1. The first two columns represent stocks' dispersion quintile rankings at the end of Month 0 and tercile rankings of their changes in dispersion from the end of Month 0 to the end of Month 1, respectively. *Mean Chg. in Dispersion* presents the time-series average equal-weighted changes in dispersion of the corresponding portfolios. In both panels, *Adjusted Returns* in Month 1 and Month 2 represent the average portfolio returns in the following two months. Stocks' adjusted returns are computed as the excess returns over the returns of their benchmark portfolios matched on size, book-to-market, and momentum factors following DGTW (1997). *t*-statistics are reported in parentheses. *No. of Stocks* presents the average number of stocks in each portfolio.

Panel A: Portfolio Returns by Changes in Dispersion Rankings						
		Adjusted Returns (%)				
Dispersion Quintile: M0	Dispersion Quintile: M1	Equal-Weighted		Value-Weighted		No. of Stocks
		Month 1	Month 2	Month 1	Month 2	
D1 (Low)	D1	0.31	0.17	0.18	0.12	237
		(4.45)	(2.59)	(2.54)	(1.80)	
	Higher Dispersion	-0.32	-0.01	-0.38	0.00	114
		(-4.68)	(-0.20)	(-4.61)	(-0.02)	
D2	Lower Dispersion	0.42	0.12	0.38	-0.06	63
		(5.70)	(1.61)	(3.66)	(-0.65)	
	D2	0.19	-0.01	0.15	0.02	203
		(3.33)	(-0.10)	(2.56)	(0.43)	
	Higher Dispersion	-0.81	-0.10	-0.37	-0.03	90
		(-10.00)	(-1.50)	(-4.11)	(-0.31)	
D3	Lower dispersion	0.37	-0.02	0.15	0.05	90
		(5.91)	(-0.24)	(1.71)	(0.62)	
	D3	0.17	-0.07	0.19	0.06	195
		(3.43)	(-1.39)	(3.03)	(0.94)	
	Higher Dispersion	-1.09	-0.12	-0.63	-0.04	72
		(-11.10)	(-1.47)	(-5.58)	(-0.41)	
D4	Lower dispersion	0.49	0.21	0.35	0.14	96
		(6.91)	(2.98)	(4.48)	(1.58)	
	D4	-0.09	-0.08	0.03	0.01	208
		(-1.60)	(-1.31)	(0.48)	(0.10)	
	Higher dispersion	-1.54	-0.27	-1.04	0.00	51
		(-10.63)	(-2.25)	(-6.82)	(-0.02)	
D5 (High)	Lower dispersion	0.33	-0.07	0.31	-0.09	84
		(3.37)	(-0.84)	(2.69)	(-0.87)	
	D5	-0.42	-0.21	-0.24	-0.11	270
		(-5.12)	(-2.61)	(-2.49)	(-1.14)	
D5D5 - D1D1		-0.73	-0.38	-0.42	-0.23	
		(-5.41)	(-2.93)	(-2.82)	(-1.58)	
D5Lower - D1Higher		0.66	-0.06	0.69	-0.09	
		(5.17)	(-0.55)	(4.51)	(-0.64)	

Panel B: Portfolio Returns by Changes in Dispersion							
Dispersion Quintile: M0	Chg. in Dispersion Tercile: M1	Mean Chg. in Dispersion	Adjusted Returns (%)				No. of Stocks
			Equal-Weighted		Value-Weighted		
			Month 1	Month 2	Month 1	Month 2	
D1 (Low)	C1 (Decrease)	-0.013	0.51	-0.22	0.43	-0.18	28
		(-39.43)	(3.29)	(-1.71)	(2.55)	(-1.22)	
	C2	0.000	0.29	0.21	0.14	0.15	186
		(2.55)	(4.25)	(3.22)	(2.11)	(2.11)	
	C3 (Increase)	0.105	-0.25	0.01	-0.21	-0.02	137
		(41.31)	(-3.94)	(0.16)	(-2.84)	(-0.30)	
D2	C1 (Decrease)	-0.021	0.54	0.08	0.33	0.03	81
		(-47.52)	(7.14)	(1.03)	(3.57)	(0.30)	
	C2	-0.001	0.13	0.03	0.20	0.05	156
		(-5.53)	(2.30)	(0.54)	(3.17)	(0.89)	
	C3 (Increase)	0.089	-0.55	-0.10	-0.30	-0.07	120
		(33.67)	(-8.04)	(-1.66)	(-3.86)	(-1.03)	
D3	C1 (Decrease)	-0.034	0.42	-0.02	0.18	-0.04	123
		(-53.73)	(8.02)	(-0.42)	(2.30)	(-0.62)	
	C2	-0.001	0.08	-0.02	0.23	0.05	124
		(-7.46)	(1.32)	(-0.30)	(3.23)	(0.63)	
	C3 (Increase)	0.134	-0.66	-0.14	-0.43	0.03	110
		(35.89)	(-9.07)	(-1.99)	(-4.50)	(0.41)	
D4	C1 (Decrease)	-0.066	0.32	0.11	0.26	0.10	156
		(-57.66)	(5.34)	(1.86)	(4.17)	(1.56)	
	C2	-0.001	-0.01	-0.09	0.21	-0.17	94
		(-5.94)	(-0.16)	(-1.05)	(2.35)	(-1.64)	
	C3 (Increase)	0.225	-0.89	-0.16	-0.58	0.11	106
		(36.32)	(-10.10)	(-1.84)	(-5.90)	(1.17)	
D5 (High)	C1 (Decrease)	-0.501	0.15	-0.12	0.16	-0.05	191
		(-44.79)	(1.65)	(-1.52)	(1.63)	(-0.54)	
	C2	0.000	-0.37	-0.16	0.17	-0.01	63
		(-3.99)	(-3.81)	(-1.43)	(1.29)	(-0.08)	
	C3 (Increase)	0.563	-0.84	-0.25	-0.71	-0.23	101
		(41.89)	(-8.02)	(-2.38)	(-5.91)	(-1.77)	
D5C1 - D1C3		-0.606	0.40	-0.13	0.37	-0.03	
		(-48.32)	(3.29)	(-1.16)	(2.69)	(-0.21)	
D5C2 - D1C2		-0.001	-0.67	-0.37	0.03	-0.16	
		(-6.23)	(-5.03)	(-2.55)	(0.18)	(-0.89)	
D5C3 - D1C1		0.576	-1.39	-0.02	-1.16	-0.03	
		(42.95)	(-6.56)	(-0.10)	(-5.17)	(-0.11)	

Table 2.5: Fama-MacBeth Regressions of Stock Returns on Earnings Forecast Dispersion and Changes in Dispersion

This table reports the results from Fama and MacBeth (1973) regressions of stocks' returns on dispersion in analysts' quarterly earnings forecasts and changes in dispersion, controlling for other firm characteristics. The first-step cross-sectional regressions are run each month *t* from February 1984 to February 2019. The dependent variable is the percentage raw return on each stock in month *t* in Models (1), (2), and (3) and the raw return in month *t*+1 in Models (4), (5), and (6). The three main independent variables are dispersion (*Disp*), change in dispersion (Δ*Disp*), and the interaction (*Disp*$\times\Delta$*Disp*) between dispersion and change in dispersion. Disp is measured at the end of month *t* and winsorized at the 99th percentile over the cross section; it is defined as the ratio of the standard deviation of analysts' earnings per share forecasts for the current fiscal quarter to the absolute value of the mean forecast. Δ*Disp* represents the change in dispersion from the end of month *t*-1 to the end of month *t*. Size (ln(*MV*)), book-to-market ratio (ln(1+*B*/*M*)), past stock returns ($Ret_{-12:-2}$, Ret_{-1}, and $Ret_{-36:-13}$), residual coverage (*Resid. Cov.*), turnover, idiosyncratic volatility (*Idio. Vol.*), and market β are included as control variables. ln(*MV*) is equal to the natural logarithm of the stock's market capitalization measured at the most recent fiscal quarter-end, which is at least three months preceding month *t*-1 and for which the earnings have been announced as of month *t*-1. ln(1+*B*/*M*) is measured at the end of the same fiscal quarter-end as ln(*MV*) and is defined as the natural logarithm of one plus the firm's book value of equity divided by the market capitalization. $Ret_{-12:-2}$, Ret_{-1}, and $Ret_{-36:-13}$ represent the cumulative percentage returns on each stock from month *t*-12 to month *t*-2, in month *t*-1, and from month *t*-36 to month *t*-13, respectively. *Resid. Cov.* is the residual from the monthly cross-sectional regressions of ln(*Analyst Coverage*) at the end of month *t*-1 on ln(*MV*) and ln(1+*B*/*M*). *Turnover* is the average ratio of the trading volume to the number of shares outstanding from month *t*-12 to month *t*-1. *Market* β is the post-ranking β estimated following the procedure in Fama and French (1992) over the period from July 1983 to June 2019. *Idio. Vol.* is the standard deviation of the residuals from regressions of the prior 52-week returns on the Fama and French (1993) three factors measured at the end of month *t*-1. Newey-West *t*-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Variables	Month 1			Month 2		
	(1)	(2)	(3)	(4)	(5)	(6)
Disp	-0.169***	-0.584***	-0.322***	-0.158***	-0.185***	-0.142*
	(-2.88)	(-6.75)	(-3.79)	(-2.94)	(-2.77)	(-1.88)
Δ*Disp*		-1.233***	-2.057***		-0.138**	-0.204**
		(-9.04)	(-8.93)		(-2.07)	(-2.30)
Disp$\times\Delta$*Disp*			0.659***			0.054
			(4.63)			(0.85)
ln(*MV*)	-0.059*	-0.049	-0.051	-0.042	-0.042	-0.042
	(-1.94)	(-1.57)	(-1.62)	(-1.37)	(-1.38)	(-1.37)
ln(1+*B/M*)	0.044	0.109	0.111	0.032	0.056	0.055
	(0.24)	(0.61)	(0.62)	(0.15)	(0.26)	(0.26)
$Ret_{-12:-2}$	0.005**	0.004*	0.004*	0.004**	0.005**	0.005**
	(2.28)	(1.94)	(1.92)	(1.99)	(2.37)	(2.36)
Ret_{-1}	-0.027***	-0.026***	-0.027***	-0.000	-0.001	-0.001
	(-5.97)	(-6.00)	(-6.04)	(-0.04)	(-0.26)	(-0.28)
$Ret_{-36:-13}$	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(-0.26)	(-0.48)	(-0.48)	(-0.98)	(-0.77)	(-0.77)
Resid. Cov.	0.125**	0.092	0.084	0.143***	0.108*	0.102*
	(2.15)	(1.55)	(1.42)	(2.62)	(1.95)	(1.84)
Turnover	-0.633	-0.426	-0.452	-0.856*	-0.882	-0.861
	(-1.14)	(-0.69)	(-0.72)	(-1.71)	(-1.57)	(-1.55)
Market β	-0.071	-0.064	-0.062	-0.035	-0.087	-0.083
	(-0.35)	(-0.32)	(-0.31)	(-0.18)	(-0.44)	(-0.42)
Idio. Vol.	-0.032	-0.016	-0.019	-0.013	-0.003	-0.004
	(-0.98)	(-0.48)	(-0.55)	(-0.39)	(-0.10)	(-0.13)
Intercept	1.658***	1.538***	1.541***	1.413***	1.423***	1.418***
	(4.35)	(3.90)	(3.90)	(3.90)	(3.84)	(3.82)
Observations	734,671	684,546	684,546	733,557	684,152	684,152
Adj. R^2	0.076	0.081	0.081	0.072	0.076	0.075
Groups	421	420	420	421	420	420

Table 2.6: Portfolio Short-Selling Activities and Returns by Earnings Forecast Dispersion and Changes in Dispersion

Panel A reports the short-selling measures and returns of portfolios sorted on dispersions in analysts' quarterly forecasts measured at the end of each month (M0). Dispersion in analysts' quarterly earnings forecasts is defined as the ratio of the standard deviation of analysts' earnings per share forecasts for the current fiscal quarter to the absolute value of the mean forecast. Each month from June 2004 to December 2018, stocks are sorted into size quintile portfolios based on their market capitalizations as of the end of last June and the corresponding NYSE breakpoints. Then within each size quintile, stocks are further sorted into quintile portfolios based on dispersion in analysts' quarterly or annual earnings forecasts at the end of the month. Stocks with a mean forecast of zero are assigned to the lowest (highest) dispersion portfolio if the standard deviation of the forecasts is zero (nonzero). *SIR* is the short interest ratio defined as the open short interest available from Compustat divided by the number of shares outstanding. *Supply* is defined as *Lendable Quantity* from Markit Data Explorer divided by the number of shares outstanding. *UTIL* is the *Utilization by Quantity* obtained from Markit Data Explorer. *DCBS* represents the Daily Cost of Borrowing Score obtained from Markit Data Explorer. *Special* represents the percentage of stocks with a DCBS greater than or equal to 2 in each portfolio. *Adjusted Returns* in Month 1, and Month 2 represent the average portfolio returns in the following two months. Stocks' adjusted returns are computed as the excess returns over the returns of their benchmark portfolios matched on size, book-to-market, and momentum factors following DGTW (1997). *No. of Stocks* reports the time-series average number of stocks in each portfolio. In panel B, stocks are further divided into two or three portfolios based on their dispersion rankings at the end of Month 1 within each corresponding size quintile. This panel reports the changes in the short-selling measures from the end of Month 0 to the end of Month 1 and returns of the resulting portfolios in Month 1 and Month 2. *t*-statistics are reported in parentheses.

Panel A: Portfolios by Earnings Forecast Dispersion

Dispersion Quintile	Short-Selling Activity					Adjusted Returns (%)				No. of Stocks
	SIR (%)	Supply (%)	UTIL (%)	DCBS	Special (%)	Equal-Weighted Month 1	Equal-Weighted Month 2	Value-Weighted Month 1	Value-Weighted Month 2	
D1 (Low)	4.82	22.99	14.40	1.19	6.71	0.12	0.14	-0.01	0.06	474
						(1.72)	(2.07)	(-0.15)	(0.76)	
D2	5.36	22.85	15.96	1.22	7.67	0.03	0.09	0.06	0.03	474
						(0.58)	(1.58)	(1.11)	(0.62)	
D3	5.81	22.24	17.69	1.29	9.93	-0.03	-0.12	0.10	0.09	474
						(-0.67)	(-2.59)	(2.08)	(1.67)	
D4	6.26	21.35	19.44	1.37	11.99	-0.14	-0.06	0.01	0.08	474
						(-2.69)	(-1.11)	(0.23)	(1.14)	
D5 (High)	7.07	20.52	22.04	1.40	13.62	-0.33	-0.27	-0.18	-0.20	476
						(-3.17)	(-2.52)	(-1.39)	(-1.62)	
D5 - D1	2.25	-2.47	7.65	0.21	6.91	-0.44	-0.40	-0.17	-0.26	
	(37.00)	(-28.62)	(42.49)	(22.50)	(24.88)	(-2.82)	(-2.53)	(-0.89)	(-1.40)	

Panel B: Portfolio by Dispersion and Changes in Dispersion Rankings											
		Changes in Short-Selling Activity					Adjusted Returns (%)				
Dispersion Quintile: M0	Dispersion Quintile: M1	SIR (%)	Supply (%)	UTIL (%)	DCBS	Special (%)	Equal-Weighted		Value-Weighted		No. of Stocks
							Month 1	Month 2	Month 1	Month 2	
D1 (Low)	D1	0.022	0.196	-0.015	0.001	-0.019	0.23	0.19	0.14	0.05	327
		(1.19)	(3.57)	(-0.12)	(0.24)	(-0.19)	(2.81)	(2.38)	(1.73)	(0.59)	
	Higher Dispersion	0.029	0.138	-0.079	-0.002	0.017	-0.25	0.02	-0.50	0.07	130
		(1.39)	(2.29)	(-0.59)	(-0.38)	(0.11)	(-2.57)	(0.19)	(-4.40)	(0.62)	
D2	Lower Dispersion	0.014	0.196	-0.037	-0.003	-0.184	0.51	0.04	0.37	-0.11	78
		(0.73)	(3.25)	(-0.32)	(-0.65)	(-1.16)	(5.04)	(0.36)	(2.66)	(-0.90)	
	D2	0.012	0.223	-0.065	-0.002	-0.050	0.11	0.08	0.13	0.06	278
		(0.63)	(3.90)	(-0.45)	(-0.32)	(-0.36)	(1.43)	(1.11)	(1.87)	(0.71)	
	Higher Dispersion	0.012	0.121	-0.100	0.001	-0.016	-0.68	0.06	-0.36	0.04	106
		(0.48)	(2.08)	(-0.68)	(0.12)	(-0.10)	(-5.76)	(0.64)	(-2.85)	(0.37)	
D3	Lower dispersion	0.027	0.205	-0.068	0.006	-0.019	0.40	-0.07	0.18	0.11	108
		(1.25)	(3.37)	(-0.51)	(0.83)	(-0.11)	(4.74)	(-0.70)	(1.68)	(0.99)	
	D3	0.005	0.216	-0.118	-0.005	-0.097	0.07	-0.09	0.18	0.08	269
		(0.28)	(3.87)	(-0.81)	(-0.60)	(-0.58)	(1.07)	(-1.57)	(2.73)	(1.19)	
	Higher Dispersion	0.003	0.127	-0.048	0.009	0.193	-1.03	-0.35	-0.30	-0.02	85
		(0.12)	(2.08)	(-0.30)	(1.75)	(1.28)	(-8.11)	(-3.30)	(-2.33)	(-0.12)	
D4	Lower dispersion	0.005	0.171	-0.071	0.003	-0.004	0.34	0.16	0.23	0.13	113
		(0.21)	(3.07)	(-0.50)	(0.53)	(-0.02)	(3.59)	(1.80)	(2.25)	(1.14)	
	D4	0.002	0.176	-0.163	0.001	-0.021	-0.07	-0.12	0.12	0.03	284
		(0.09)	(3.24)	(-1.13)	(0.07)	(-0.12)	(-0.98)	(-1.63)	(1.67)	(0.36)	
	Higher dispersion	0.050	0.097	-0.030	0.018	0.354	-1.45	-0.32	-0.86	0.07	61
		(2.02)	(1.68)	(-0.16)	(1.97)	(1.45)	(-8.21)	(-1.84)	(-3.80)	(0.35)	
D5 (High)	Lower dispersion	0.000	0.110	-0.096	0.002	-0.006	0.37	-0.12	0.36	-0.13	99
		(0.01)	(1.95)	(-0.49)	(0.20)	(-0.03)	(2.49)	(-0.95)	(2.36)	(-0.82)	
	D5	0.006	0.155	-0.115	0.002	-0.020	-0.55	-0.30	-0.36	-0.25	361
		(0.28)	(2.95)	(-0.68)	(0.16)	(-0.10)	(-4.91)	(-2.57)	(-2.33)	(-1.74)	

Panel B: Portfolio by Dispersion and Changes in Dispersion Rankings											
		Changes in Short-Selling Activity					Adjusted Returns (%)				
Dispersion Quintile: M0	Dispersion Quintile: M1	SIR (%)	Supply (%)	UTIL (%)	DCBS	Special (%)	Equal-Weighted		Value-Weighted		No. of Stocks
							Month 1	Month 2	Month 1	Month 2	
D5D5 - D1D1		-0.028	-0.028	-0.017	0.003	-0.024	-0.78	-0.49	-0.50	-0.30	
		(-1.75)	(-1.24)	(-0.18)	(0.59)	(-0.14)	(-4.44)	(-2.74)	(-2.28)	(-1.42)	
D5Lower - D1Higher		-0.016	-0.040	-0.100	0.001	-0.001	0.62	-0.14	0.86	-0.20	
		(-1.31)	(-2.63)	(-1.49)	(0.10)	(-0.01)	(3.30)	(-0.81)	(4.16)	(-0.97)	

Table 2.7: Portfolio Returns in Different Months by Earnings Forecast Dispersion

This table presents the EA, post-EA, and pre-EA month returns of portfolios sorted on dispersion in analysts' quarterly earnings forecasts measured at the end of the prior months, respectively. Dispersion in analysts' quarterly earnings forecasts is defined as the ratio of the standard deviation of analysts' earnings per share forecasts for the current fiscal quarter to the absolute value of the mean forecast. All calendar months in the sample period from January 1984 to March 2019 are divided into pre-earnings announcement (pre-EA), earnings announcement (EA), and post-earnings announcement (post-EA) months. Stocks are first grouped by the calendar quarters of their earnings announcements. Then for the EA-month sample, stocks are sorted into quintile portfolios based on their dispersions at the end of the pre-EA months each quarter within each size quintile. Stocks' size quintile rankings are determined as of the end of last June relative to the pre-EA months based on stocks' market capitalizations and the corresponding NYSE size breakpoints. Stocks with a mean forecast of zero are assigned to the lowest (highest) dispersion portfolio if the standard deviation of the forecasts is zero (nonzero). Dispersion quintile portfolios for post-EA and pre-EA months are constructed in a similar manner. Panels A reports portfolio returns over EA months. The left and right half of Panel B reports portfolio returns over post-EA and pre-EA months, respectively. *Mean SUE* presents the time-series average equal-weighted portfolio SUEs, and SUE represents the standardized unexpected earnings defined as the difference between the actual quarterly earnings per share figure and the mean analysts' quarterly earnings forecast measured one day before the earnings announcement scaled by the fiscal quarter-end stock price. *% of Positive SUEs* presents the average percentage of stocks associated with positive SUEs in each dispersion quintile. *Adjusted Return* reports average portfolio returns over the corresponding months. Stocks' adjusted returns are computed as the excess returns over the returns of their benchmark portfolios matched on size, book-to-market, and momentum factors following DGTW (1997). *3-Day CAR* reports stocks' 3-day excess cumulative returns over their corresponding DGTW (1977) benchmarks from one day before to one day after the quarterly earnings announcement. *Adjusted Return Excluding 3-Day CAR* reports stocks' EA-month adjusted returns excluding the 3-day abnormal returns around quarterly earnings announcements. *t*-statistics are reported in parentheses. *No. of Stocks* presents the average number of stocks in each portfolio.

Panel A: Portfolio Returns in EA Months

			Equal-Weighted (%)			Value-Weighted (%)			
Dispersion Quintile	Mean SUE	% of Positive SUEs	Adjusted Return	3-Day CAR [-1, 1]	Adjusted Return Excluding 3-Day CAR	Adjusted Return	3-Day CAR [-1, 1]	Adjusted Return Excluding 3-Day CAR	No. of Stocks
D1 (Low)	-0.0002	62.29%	0.36	0.24	0.12	0.07	0.07	0.00	360
	(-1.00)		(4.43)	(5.99)	(1.70)	(0.68)	(1.67)	(-0.01)	
D2	-0.0011	63.25%	0.36	0.16	0.19	0.16	0.16	0.01	361
	(-2.34)		(4.39)	(4.42)	(2.55)	(2.00)	(3.51)	(0.20)	
D3	-0.0024	60.22%	0.29	0.06	0.22	0.30	0.09	0.20	360
	(-2.43)		(4.52)	(1.41)	(3.86)	(3.54)	(1.72)	(2.97)	
D4	-0.0050	56.16%	0.21	0.03	0.18	0.21	0.07	0.14	360
	(-3.39)		(2.60)	(0.59)	(2.63)	(2.38)	(1.39)	(1.92)	
D5 (High)	-0.0101	48.41%	0.08	-0.07	0.14	0.25	0.02	0.24	360
	(-7.11)		(0.68)	(-1.30)	(1.32)	(1.91)	(0.24)	(2.04)	
D5 - D1	-0.0099	-13.88%	-0.28	-0.30	0.01	0.19	-0.05	0.24	
	(-7.28)	(-25.73)	(-1.65)	(-4.50)	(0.09)	(0.92)	(-0.64)	(1.40)	

Dispersion Quintile	Post-EA Months				Pre-EA months			
	Mean SUE	Adjusted Returns (%)		No. of Stocks	Mean SUE	Adjusted Returns (%)		No. of Stocks
		Equal-Weighted	Value-Weighted			Equal-Weighted	Value-Weighted	
D1 (Low)	0.0001	0.16	0.07	346	-0.0005	-0.02	0.04	355
	(0.24)	(2.09)	(0.91)		(-1.71)	(-0.25)	(0.57)	
D2	-0.0002	0.09	0.02	345	-0.0017	-0.22	0.04	356
	(-0.74)	(1.23)	(0.30)		(-3.12)	(-2.97)	(0.64)	
D3	-0.0010	-0.07	-0.11	345	-0.0020	-0.22	-0.13	356
	(-1.89)	(-1.02)	(-1.38)		(-2.48)	(-3.79)	(-1.55)	
D4	-0.0033	-0.01	0.01	345	-0.0059	-0.28	-0.18	356
	(-4.29)	(-0.10)	(0.13)		(-3.93)	(-3.87)	(-2.35)	
D5 (High)	-0.0073	-0.01	-0.09	345	-0.0104	-0.43	-0.30	356
	(-7.65)	(-0.13)	(-0.72)		(-6.49)	(-4.18)	(-2.37)	
D5 - D1	-0.0074	-0.15	-0.13		-0.0099	-0.41	-0.35	
	(-8.42)	(-0.96)	(-0.75)		(-6.42)	(-2.71)	(-1.98)	

Panel B: Portfolio Returns in Post-EA and Pre-EA Months

Table 2.8: Portfolio Returns in Different Months by Earnings Forecast Dispersion and Changes in Dispersion Rankings

This table presents the EA, post-EA, and pre-EA month returns of portfolios double sorted on dispersion in analysts' quarterly earnings forecasts measured at the end of both the prior (M0) and current (M1) months, respectively.Dispersion in analysts' quarterly earnings forecasts is defined as the ratio of the standard deviation of analysts' earnings per share forecasts for the current fiscal quarter to the absolute value of the mean forecast. All calendar months in the sample period from January 1984 to March 2019 are divided into pre-earnings announcement (pre-EA), earnings announcement (EA), and post-earnings announcement (post-EA) months. Stocks are first grouped by the calendar quarters of their earnings announcements. Then for the EA-month sample, stocks are sorted into quintile portfolios based on their dispersions at the end of the pre-EA months (M0) each quarter within each size quintile. Stocks' size quintile rankings are determined as of the end of last June relative to the pre-EA months based on stocks' market capitalizations and the corresponding NYSE size breakpoints. Stocks with a mean forecast of zero are assigned to the lowest (highest) dispersion portfolio if the standard deviation of the forecasts is zero (nonzero). Stocks are further divided into two or three portfolios based on their dispersion rankings at the end of the EA (M1) months. Dispersion quintile portfolios for post-EA and pre-EA months are constructed in a similar manner. The left, middle, and right panels report the portfolio returns over EA, post-EA, and pre-EA months, respectively. *Adjusted Returns* report average portfolio returns over the corresponding months (M1). Stocks' adjusted returns are computed as the excess returns over the returns of their benchmark portfolios matched on size, book-to-market, and momentum factors following DGTW (1997). *t*-statistics are reported in parentheses. *No. of Stocks* presents the average number of stocks in each portfolio.

Dispersion Quintile: M0	Dispersion Quintile: M1	EA Months			Post-EA Months			Pre-EA Months		
		Adjusted Returns (%)		No. of Stocks	Adjusted Returns (%)		No. of Stocks	Adjusted Returns (%)		No. of Stocks
		Equal-Weighted	Value-Weighted		Equal-Weighted	Value-Weighted		Equal-Weighted	Value-Weighted	
D1 (Low)	D1	0.74	0.32	145	0.28	0.23	248	0.25	0.24	269
		(5.54)	(2.63)		(2.98)	(2.37)		(2.54)	(2.65)	
	Higher Dispersion	0.02	-0.18	163	-0.19	-0.32	77	-1.02	-0.86	66
		(0.19)	(-1.35)		(-1.73)	(-2.70)		(-7.40)	(-5.22)	
D2	Lower Dispersion	0.99	0.69	84	0.24	0.07	44	-0.07	0.02	39
		(8.17)	(4.24)		(1.77)	(0.40)		(-0.46)	(0.11)	
	D2	0.77	0.31	108	0.22	0.21	218	0.10	0.24	243
		(5.48)	(1.95)		(2.34)	(2.19)		(1.20)	(2.70)	
	Higher Dispersion	-0.40	-0.12	127	-0.41	-0.37	70	-1.52	-0.82	58
		(-2.91)	(-0.76)		(-3.03)	(-2.78)		(-8.77)	(-4.14)	

Dispersion Quintile: M0	Dispersion Quintile: M1	EA Months			Post-EA Months			Pre-EA Months		
		Adjusted Returns (%)		No. of Stocks	Adjusted Returns (%)		No. of Stocks	Adjusted Returns (%)		No. of Stocks
		Equal-Weighted	Value-Weighted		Equal-Weighted	Value-Weighted		Equal-Weighted	Value-Weighted	
D3	Lower dispersion	0.88	0.48	119	0.10	0.06	63	-0.08	-0.03	57
		(8.42)	(2.99)		(0.84)	(0.42)		(-0.57)	(-0.23)	
	D3	0.60	0.73	97	0.08	-0.04	213	0.05	0.12	234
		(4.31)	(4.31)		(1.03)	(-0.36)		(0.79)	(1.29)	
	Higher Dispersion	-0.72	-0.46	101	-0.60	-0.39	57	-1.55	-1.28	50
		(-4.42)	(-2.54)		(-4.39)	(-2.38)		(-7.29)	(-5.31)	
D4	Lower dispersion	0.94	0.66	130	0.35	0.38	66	0.14	0.01	62
		(7.64)	(5.35)		(2.58)	(2.78)		(1.14)	(0.06)	
	D4	0.07	0.22	110	0.02	0.04	229	-0.05	0.04	241
		(0.51)	(1.36)		(0.17)	(0.34)		(-0.53)	(0.38)	
	Higher dispersion	-1.14	-0.72	73	-0.86	-0.90	37	-2.48	-1.75	35
		(-5.18)	(-3.11)		(-4.34)	(-3.94)		(-9.17)	(-6.13)	
D5 (High)	Lower dispersion	0.82	0.71	126	0.32	0.07	51	-0.01	0.17	52
		(5.24)	(4.07)		(1.81)	(0.34)		(-0.06)	(0.78)	
	D5	-0.30	0.02	187	-0.07	-0.07	282	-0.51	-0.42	286
		(-1.89)	(0.13)		(-0.63)	(-0.50)		(-4.60)	(-2.98)	
D5D5 - D1D1		-1.05	-0.32		-0.35	-0.30		-0.76	-0.66	
		(-4.37)	(-1.20)		(-2.08)	(-1.53)		(-4.35)	(-3.36)	
D5Lower - D1Higher		0.81	0.92		0.53	0.42		1.00	1.04	
		(4.23)	(3.78)		(2.61)	(1.64)		(4.03)	(4.14)	

Table 2.9: Portfolio Returns in EA Months by Earnings Forecast Dispersion and SUE

This table presents the EA-month returns of portfolios double sorted on stocks' dispersions in analysts' quarterly earnings forecasts measured at the end of the pre-EA months and standardized unexpected earnings (SUEs) released during the EA months. SUE represents the standardized unexpected earnings defined as the difference between the actual quarterly earnings per share figure and the mean analysts' quarterly earnings forecast measured one day before the earnings announcement scaled by the fiscal quarter-end stock price. Dispersion in analysts' quarterly earnings forecasts is defined as the ratio of the standard deviation of analysts' earnings per share forecasts for the current fiscal quarter to the absolute value of the mean forecast. All calendar months in the sample period from January 1984 to March 2019 are divided into pre-earnings announcement (pre-EA), earnings announcement (EA), and post-earnings announcement (post-EA) months. Stocks are first grouped by the calendar quarters of their earnings announcements. Then each quarter, stocks are sorted into dispersion quintile portfolios each quarter within each size quintile based on their dispersions in analysts' quarterly forecasts at the end of the pre-EA months. Stocks' size quintile rankings are determined as of the end of last June relative to the pre-EA months based on stocks' market capitalizations and the corresponding NYSE size breakpoints. Stocks with a mean forecast of zero are assigned to the lowest (highest) dispersion portfolio if the standard deviation of the forecasts is zero (nonzero). Stocks are also sorted into tercile portfolios based on their SUEs. *No. of Stocks* presents the average number of stocks in each portfolio. *Mean SUE* presents the time-series average equal-weighted portfolio SUEs. *Adjusted Return* reports average portfolio returns over the EA months. Stocks' adjusted returns are computed as the excess returns over the returns of their benchmark portfolios matched on size, book-to-market, and momentum factors following DGTW (1997). *3-Day CAR* reports stocks' 3-day excess cumulative returns over their corresponding DGTW (1977) benchmarks from one day before to one day after the earnings announcement date. *Adjusted Return Excluding 3-Day CAR* reports stocks' EA-month adjusted returns excluding the 3-day abnormal returns around earnings announcements. *PEAD* reports stocks' adjusted returns cumulated from two days after the current-quarter earnings announcement to two days before the next-quarter announcement. *t*-statistics are reported in parentheses.

				Equal-Weighted (%)				Value-Weighted (%)			
Dispersion Quintile	SUE Tercile	No. of Stocks	Mean SUE	Adjusted Return	3-Day CAR [-1, 1]	Adjusted Return Excluding 3-Day CAR	PEAD	Adjusted Return	3-Day CAR [-1, 1]	Adjusted Return Excluding 3-Day CAR	PEAD
D1 (Low)	S1 (Negative)	86	-0.0091	-3.18	-2.28	-0.92	-1.10	-2.04	-1.60	-0.45	-0.42
			(-7.60)	(-18.28)	(-19.50)	(-6.76)	(-5.07)	(-9.45)	(-12.07)	(-2.55)	(-1.58)
	S2	181	0.0003	0.21	0.22	-0.02	-0.25	0.11	0.15	-0.03	0.04
			(7.96)	(1.72)	(3.82)	(-0.16)	(-1.60)	(0.92)	(2.35)	(-0.36)	(0.23)
	S3 (Positive)	87	0.0063	4.05	2.78	1.28	1.10	3.07	2.30	0.79	0.77
			(8.39)	(26.14)	(23.86)	(10.59)	(4.88)	(14.76)	(16.99)	(4.93)	(2.97)
D2	S1 (Negative)	95	-0.0123	-3.34	-2.55	-0.84	-1.15	-2.49	-1.67	-0.82	-1.00
			(-5.70)	(-19.65)	(-20.59)	(-6.23)	(-5.18)	(-12.54)	(-12.43)	(-4.77)	(-3.20)
	S2	155	0.0003	0.17	0.23	-0.06	-0.42	0.22	0.24	-0.01	-0.20
			(7.35)	(1.65)	(4.97)	(-0.65)	(-2.92)	(2.15)	(4.54)	(-0.06)	(-1.44)
	S3 (Positive)	106	0.0060	3.94	2.52	1.43	1.05	2.99	1.84	1.15	0.96
			(15.68)	(23.86)	(24.10)	(11.38)	(5.43)	(16.48)	(17.16)	(7.44)	(3.19)

Dispersion Quintile	SUE Tercile	No. of Stocks	Mean SUE	Equal-Weighted (%) Adjusted Return	Equal-Weighted (%) 3-Day CAR [-1, 1]	Equal-Weighted (%) Adjusted Return Excluding 3-Day CAR	Equal-Weighted (%) PEAD	Value-Weighted (%) Adjusted Return	Value-Weighted (%) 3-Day CAR [-1, 1]	Value-Weighted (%) Adjusted Return Excluding 3-Day CAR	Value-Weighted (%) PEAD
D3	S1 (Negative)	112	-0.0153	-3.59	-2.59	-1.04	-1.20	-2.38	-1.83	-0.58	-0.63
			(-5.10)	(-23.32)	(-20.79)	(-8.82)	(-6.08)	(-13.84)	(-15.07)	(-4.03)	(-2.85)
	S2	118	0.0003	0.25	0.13	0.12	-0.69	0.30	0.13	0.17	-0.30
			(6.27)	(2.63)	(2.37)	(1.38)	(-4.48)	(2.55)	(1.76)	(1.92)	(-1.64)
	S3 (Positive)	126	0.0069	3.75	2.39	1.37	0.76	2.70	1.71	0.98	0.56
			(18.34)	(22.35)	(22.28)	(10.89)	(4.01)	(18.07)	(16.89)	(8.14)	(2.52)
D4	S1 (Negative)	133	-0.0225	-3.29	-2.36	-0.95	-0.92	-2.01	-1.56	-0.44	-0.46
			(-5.72)	(-23.63)	(-20.47)	(-9.09)	(-3.98)	(-14.01)	(-16.07)	(-3.57)	(-2.12)
	S2	85	0.0003	0.19	0.02	0.16	-0.17	0.23	0.08	0.15	0.16
			(5.38)	(1.56)	(0.33)	(1.43)	(-0.86)	(1.75)	(0.98)	(1.32)	(0.71)
	S3 (Positive)	139	0.0092	3.59	2.35	1.27	0.90	1.85	1.30	0.58	0.11
			(14.54)	(22.86)	(21.37)	(10.73)	(5.42)	(10.27)	(12.69)	(4.44)	(0.47)
D5 (High)	S1 (Negative)	167	-0.0295	-2.66	-1.99	-0.72	-0.97	-1.52	-1.21	-0.33	-0.43
			(-11.06)	(-16.52)	(-16.69)	(-6.09)	(-3.20)	(-9.06)	(-10.99)	(-2.40)	(-1.22)
	S2	55	0.0003	-0.02	-0.06	0.04	-0.22	0.13	0.06	0.07	-0.09
			(5.04)	(-0.11)	(-0.70)	(0.21)	(-0.79)	(0.68)	(0.49)	(0.43)	(-0.24)
	S3 (Positive)	135	0.0120	3.46	2.22	1.25	0.57	2.23	1.37	0.87	0.29
			(16.19)	(16.91)	(21.89)	(7.79)	(2.74)	(10.31)	(16.41)	(4.81)	(1.04)
D5S1 - D1S1			-0.0204	0.52	0.29	0.20	0.13	0.52	0.39	0.12	-0.02
			(-8.91)	(2.37)	(2.77)	(1.09)	(0.34)	(2.00)	(2.44)	(0.57)	(-0.04)
D5S2 - D1S2			0.0000	-0.23	-0.28	0.05	0.03	0.02	-0.09	0.11	-0.13
			(-0.55)	(-0.96)	(-2.76)	(0.25)	(0.08)	(0.06)	(-0.73)	(0.51)	(-0.29)
D5S3 - D1S3			0.0057	-0.58	-0.56	-0.03	-0.53	-0.84	-0.92	0.08	-0.48
			(5.64)	(-2.77)	(-5.60)	(-0.18)	(-1.70)	(-3.12)	(-6.49)	(0.36)	(-1.16)

Appendix

Table 2.10: Portfolio Returns by Annual Earnings Forecast Dispersion and Changes in Dispersion

This table reports the subsequent returns of portfolios double sorted on dispersions in analysts' annual earnings forecasts measured at the end of both the current (M0) and following (M1) months. Dispersion in analysts' annual earnings forecasts is defined as the ratio of the standard deviation of analysts' earnings per share forecasts for the current fiscal year to the absolute value of the mean forecast. Each month from January 1984 to January 2019, stocks are sorted into size quintile portfolios based on their market capitalizations as of the end of last June and the corresponding NYSE breakpoints. Then within each size quintile, stocks are sorted into quintile portfolios based on dispersions in analysts' quarterly earnings forecasts at the end of the month. Stocks with a mean forecast of zero are assigned to the lowest (highest) dispersion portfolio if the standard deviation of the forecasts is zero (nonzero). Stocks are further divided into two or three portfolios based on their dispersion rankings at the end of the following month within each corresponding size quintile. The first two columns represent stocks' dispersion quintile rankings at the end of Month 0 and Month 1, respectively.*Adjusted Returns* in Month 1 and Month 2 represent the average portfolio returns in the following two months. Stocks' adjusted returns are computed as the excess returns over the returns of their benchmark portfolios matched on size, book-to-market, and momentum factors following DGTW (1997). *t*-statistics are reported in parentheses. *No. of Stocks* presents the average number of stocks in each portfolio.

Dispersion Quintile: M0	Dispersion Quintile: M1	Adjusted Returns (%)				No. of Stocks
		Equal-Weighted		Value-Weighted		
		Month 1	Month 2	Month 1	Month 2	
D1 (Low)	D1	0.23	0.10	0.15	0.12	264
		(3.20)	(1.52)	(2.12)	(1.75)	
	Higher Dispersion	-0.42	-0.04	-0.25	0.05	106
		(-5.94)	(-0.58)	(-2.83)	(0.57)	
D2	Lower Dispersion	0.33	-0.04	0.20	-0.17	70
		(3.78)	(-0.56)	(2.22)	(-1.78)	
	D2	0.18	0.02	0.07	-0.02	223
		(3.55)	(0.33)	(1.18)	(-0.45)	
	Higher Dispersion	-0.81	-0.07	-0.42	0.10	89
		(-9.96)	(-1.06)	(-4.74)	(1.01)	
D3	Lower dispersion	0.42	0.03	0.31	-0.03	94
		(6.32)	(0.43)	(3.76)	(-0.37)	
	D3	0.09	-0.12	0.12	-0.02	219
		(2.18)	(-2.61)	(2.24)	(-0.42)	
	Higher Dispersion	-1.12	-0.15	-0.81	0.01	70
		(-10.33)	(-1.71)	(-6.28)	(0.09)	
D4	Lower dispersion	0.36	-0.02	0.26	0.07	95
		(4.76)	(-0.27)	(2.73)	(0.88)	
	D4	-0.10	-0.18	-0.05	-0.14	243
		(-1.89)	(-3.34)	(-0.88)	(-2.20)	
	Higher dispersion	-1.77	-0.23	-0.98	-0.23	47
		(-12.60)	(-2.04)	(-5.71)	(-1.68)	
D5 (High)	Lower dispersion	0.28	-0.23	0.50	-0.01	76
		(2.66)	(-2.54)	(4.22)	(-0.11)	
	D5	-0.39	-0.32	-0.20	-0.02	306
		(-4.59)	(-3.80)	(-2.12)	(-0.18)	
D5D5 - D1D1		-0.63	-0.43	-0.35	-0.14	
		(-4.31)	(-3.02)	(-2.33)	(-0.97)	
D5Lower - D1Higher		0.69	-0.19	0.75	-0.06	
		(5.09)	(-1.63)	(4.71)	(-0.39)	

Table 2.11: Portfolio Returns in EA Months by Annual Earnings Forecast Dispersion

This table presents the EA-month returns of portfolios sorted on dispersion in analysts' annual earnings forecasts measured at the end of the pre-EA months. Dispersion in analysts' annual earnings forecasts is defined as the ratio of the standard deviation of analysts' earnings per share forecasts for the current fiscal year to the absolute value of the mean forecast. All calendar months in the sample period from January 1984 to March 2019 are divided into pre-earnings announcement (pre-EA), earnings announcement (EA), and post-earnings announcement (post-EA) months. Stocks are first grouped by the calendar quarters of their earnings announcements. Then each quarter within each size quintile, stocks are sorted into dispersion quintile portfolios based on their dispersions in earnings forecasts as of the end of the pre-EA months. Stocks' size quintile rankings are determined as of the end of last June relative to the pre-EA months based on stocks' market capitalizations and the corresponding NYSE size breakpoints. Stocks with a mean forecast of zero are assigned to the lowest (highest) dispersion portfolio if the standard deviation of the forecasts is zero (nonzero). *Mean SUE* presents the time-series average equal-weighted portfolio SUEs. *% of Positive SUEs* presents the average percentage of stocks associated with positive SUEs in each dispersion quintile. *Adjusted Return* reports average monthly portfolio returns. Stocks' adjusted returns are computed as the excess returns over the returns of their benchmark portfolios matched on size, book-to-market, and momentum factors following DGTW (1997). *3-Day CAR* reports stocks' 3-day excess cumulative returns over their corresponding DGTW (1977) benchmarks from one day before to one day after the quarterly earnings announcement. *Adjusted Return Excluding 3-Day CAR* reports stocks' EA-month adjusted returns excluding the 3-day abnormal returns around quarterly earnings announcements. *t*-statistics are reported in parentheses. *No. of Stocks* presents the average number of stocks in each portfolio.

			Equal-Weighted (%)			Value-Weighted (%)			
Dispersion Quintile	Mean SUE	% of Positive SUEs	Adjusted Return	3-Day CAR [-1, 1]	Adjusted Return Excluding 3-Day CAR	Adjusted Return	3-Day CAR [-1, 1]	Adjusted Return Excluding 3-Day CAR	No. of Stocks
D1 (Low)	-0.0003	62.35%	0.31	0.23	0.08	-0.06	0.10	-0.15	379
	(-0.99)		(3.29)	(6.03)	(0.85)	(-0.50)	(2.15)	(-1.64)	
D2	-0.0011	61.52%	0.19	0.13	0.04	0.08	0.11	-0.04	381
	(-2.10)		(2.60)	(3.89)	(0.63)	(0.89)	(2.40)	(-0.54)	
D3	-0.0023	58.72%	0.23	0.05	0.18	0.24	0.06	0.17	381
	(-2.65)		(3.48)	(1.22)	(3.19)	(2.94)	(1.18)	(2.35)	
D4	-0.0039	55.47%	0.16	-0.01	0.21	0.25	0.05	0.20	381
	(-5.72)		(1.88)	(-0.32)	(2.74)	(2.65)	(1.05)	(2.51)	
D5 (High)	-0.0103	50.27%	-0.06	-0.12	0.10	0.25	0.08	0.17	380
	(-4.79)		(-0.49)	(-2.32)	(0.94)	(2.02)	(1.27)	(1.56)	
D5 - D1	-0.0101	-12.08%	-0.37	-0.35	0.02	0.30	-0.02	0.33	
	(-4.69)		(-1.97)	(-5.43)	(0.09)	(1.52)	(-0.20)	(1.84)	

Table 2.12: Portfolio Returns in Different Months by Earnings Forecast Dispersion and Changes in Dispersion

This table presents the EA, post-EA, and pre-EA month returns of portfolios double sorted on dispersion in analysts' quarterly earnings forecasts measured at the end of the prior month (M0) and changes in dispersion from the end of the prior month to the end of the current month (M1), respectively. Dispersion in analysts' quarterly earnings forecasts is defined as the ratio of the standard deviation of analysts' earnings per share forecasts for the current fiscal quarter to the absolute value of the mean forecast. Stocks' dispersions are winsorized at the 99th percentile each month over the cross section. All calendar months in the sample period from January 1984 to March 2019 are divided into pre-earnings announcement (pre-EA), earnings announcement (EA), and post-earnings announcement (post-EA) months. Stocks are first grouped by the calendar quarters of their earnings announcements. Then for the EA-month sample, stocks are sorted into quintile portfolios based on their dispersions at the end of the pre-EA months (M0) each quarter within each size quintile. Stocks' size quintile rankings are determined as of the end of last June relative to the pre-EA months based on stocks' market capitalizations and the corresponding NYSE size breakpoints. Stocks with a mean forecast of zero are assigned to the lowest (highest) dispersion portfolio if the standard deviation of the forecasts is zero (nonzero). Stocks are further sorted into tercile portfolios within each size quintile based on their changes in dispersion from the end of the pre-EA month to the end of the EA month. Dispersion quintile portfolios for post-EA and pre-EA months are constructed in a similar manner. The left, middle, and right panels report the portfolio returns over EA, post-EA, and pre-EA months, respectively. *Adjusted Returns* report average portfolio returns over the corresponding months (M1). Stocks' adjusted returns are computed as the excess returns over the returns of their benchmark portfolios matched on size, book-to-market, and momentum factors following DGTW (1997). t-statistics are reported in parentheses. *No. of Stocks* presents the average number of stocks in each portfolio.

Dispersion Quintile: M0	Change in Disperison Tercile: M1	EA Months			Post-EA Months			Pre-EA Months		
		Adjusted Returns (%)		No. of Stocks	Adjusted Returns (%)		No. of Stocks	Adjusted Returns (%)		No. of Stocks
		Equal-Weighted	Value-Weighted		Equal-Weighted	Value-Weighted		Equal-Weighted	Value-Weighted	
D1 (Low)	C1 (Decrease)	0.72	0.61	11	0.21	0.15	35	0.19	0.40	35
		(2.11)	(1.72)		(1.00)	(0.66)		(0.89)	(1.81)	
	C2	0.71	0.20	185	0.27	0.11	178	0.29	0.24	193
		(5.94)	(1.69)		(2.75)	(1.02)		(2.90)	(2.38)	
	C3 (Increase)	-0.28	-0.25	114	-0.02	0.03	114	-0.69	-0.39	107
		(-2.09)	(-1.67)		(-0.25)	(0.30)		(-6.36)	(-3.26)	
D2	C1 (Decrease)	0.91	0.57	49	0.28	0.01	80	0.15	0.17	84
		(5.01)	(2.36)		(1.99)	(0.07)		(1.35)	(1.45)	
	C2	0.80	0.49	171	0.16	0.16	145	0.03	0.24	150
		(6.95)	(3.49)		(1.70)	(1.33)		(0.34)	(2.27)	
	C3 (Increase)	-0.71	-0.35	99	-0.19	-0.18	107	-0.89	-0.39	106
		(-4.51)	(-1.82)		(-1.72)	(-1.50)		(-7.09)	(-3.21)	

Dispersion Quintile: M0	Change in Dispersion Tercile: M1	EA Months			Post-EA Months			Pre-EA Months		
		Adjusted Returns (%)		No. of Stocks	Adjusted Returns (%)		No. of Stocks	Adjusted Returns (%)		No. of Stocks
		Equal-Weighted	Value-Weighted		Equal-Weighted	Value-Weighted		Equal-Weighted	Value-Weighted	
D3	C1 (Decrease)	0.79	0.39	107	0.25	0.15	117	0.15	-0.07	114
		(6.99)	(2.30)		(2.71)	(1.32)		(1.47)	(-0.68)	
	C2	0.72	0.88	104	-0.11	-0.05	121	-0.06	0.34	126
		(6.11)	(6.29)		(-1.13)	(-0.42)		(-0.66)	(2.50)	
	C3 (Increase)	-0.64	-0.36	106	-0.30	-0.37	95	-0.80	-0.65	101
		(-4.21)	(-2.01)		(-2.78)	(-2.81)		(-5.15)	(-3.57)	
D4	C1 (Decrease)	0.83	0.55	151	0.18	0.23	144	0.08	0.02	140
		(6.54)	(4.40)		(1.61)	(2.15)		(0.84)	(0.19)	
	C2	0.11	0.33	52	0.27	0.32	96	0.04	0.23	101
		(0.64)	(1.58)		(1.67)	(1.87)		(0.37)	(1.53)	
	C3 (Increase)	-0.81	-0.34	110	-0.45	-0.46	92	-1.14	-0.70	96
		(-4.26)	(-1.90)		(-3.48)	(-3.30)		(-7.74)	(-3.89)	
D5 (High)	C1 (Decrease)	0.61	0.58	205	0.25	0.14	169	-0.19	-0.04	164
		(4.12)	(3.43)		(1.98)	(0.93)		(-1.33)	(-0.31)	
	C2	0.25	0.36	15	-0.13	0.03	68	-0.39	-0.11	75
		(0.69)	(0.94)		(-0.78)	(0.14)		(-2.56)	(-0.49)	
	C3 (Increase)	-0.86	-0.52	93	-0.33	-0.54	95	-0.85	-0.80	100
		(-4.39)	(-2.48)		(-2.18)	(-2.83)		(-5.45)	(-4.47)	
D5C1 - D1C3		0.86	0.82		0.27	0.11		0.53	0.38	
		(4.42)	(3.35)		(1.49)	(0.51)		(2.85)	(2.06)	
D5C2 - D1C2		-0.45	0.17		-0.39	-0.05		-0.68	-0.36	
		(-1.18)	(0.39)		(-1.91)	(-0.17)		(-3.56)	(-1.36)	
D5C3 - D1C1		-1.89	-1.36		-0.65	-0.75		-1.07	-1.21	
		(-4.35)	(-3.22)		(-2.34)	(-2.42)		(-3.90)	(-4.00)	

Table 2.13: Fama-MacBeth Regressions of Stock Returns on Earnings Forecast Dispersion and Changes in Dispersion in Different Months

This table reports the results from Fama and MacBeth (1973) regressions of stocks' returns on dispersion in analysts' quarterly earnings forecasts and changes in dispersion in different months based on earnings announcements, controlling for other firm characteristics. All calendar months in the sample period from January 1984 to March 2019 are divided into pre-earnings announcement (pre-EA), earnings announcement (EA), and post-earnings announcement (post-EA) months. Stocks are grouped by the calendar quarters of their earnings announcements and the first-step cross-sectional regressions are run each calendar quarter for EA, pre-EA, and post-EA months separately. For the EA-month sample, the dependent variable is the percentage raw return on each stock in the corresponding EA month *t*. The two main independent variables are dispersion (*Disp*) and change in dispersion (Δ*Disp*). *Disp* is measured at the end of the pre-EA month *t*-1 and winsorized at the 99th percentile over the cross section; it is defined as the ratio of the standard deviation of analysts' earnings per share forecasts for the current fiscal quarter to the absolute value of the mean forecast. Δ*Disp* represents the change in dispersion from the end of the pre-EA month *t*-1 to the end of the EA month *t*. SUE, Size (ln(*MV*)), book-to-market ratio (ln(1+*B*/*M*)), past stock returns ($Ret_{-12:-2}$, Ret_{-1}, and $Ret_{-36:-13}$), residual coverage (*Resid. Cov.*), turnover, idiosyncratic volatility (*Idio. Vol.*), and market β are included as control variables. *SUE* represents the current-quarter standardized unexpected earnings defined as the difference between the actual quarterly earnings per share figure and the mean analysts' quarterly earnings forecast measured one day before earnings announcement scaled by the fiscal quarter-end stock price. ln(*MV*) is equal to the natural logarithm of the stock's market capitalization measured at the most recent fiscal quarter-end, which is at least three months preceding month *t*-1 and for which the earnings have been announced as of month *t*-1. ln(1+*B*/*M*) is measured at the end of the same fiscal quarter-end as ln(*MV*) and is defined as the natural logarithm of one plus the firm's book value of equity divided by the market capitalization. $Ret_{-12:-2}$, Ret_{-1}, and $Ret_{-36:-13}$ represent the cumulative percentage returns on each stock from month *t*-12 to month *t*-2, in month *t*-1, and from month *t*-36 to month *t*-13, respectively. *Resid. Cov.* is the residual from the quarterly cross-sectional regressions of ln(*Analyst Coverage*) at the end of month *t*-1 on ln(*MV*) and ln(1+*B*/*M*). *Turnover* is the average ratio of the trading volume to the number of shares outstanding from month *t*-12 to month *t*-1. *Market* β is the post-ranking β estimated following the procedure in Fama and French (1992) over the period from July 1983 to June 2019. *Idio. Vol.* is the standard deviation of the residuals from regressions of the prior 52-week returns on the Fama and French (1993) three factors measured at the end of month *t*-1. The variables for the post-EA and pre-EA months are constructed in a similar manner and SUE represents the earnings surprises for the prior quarter. Newey-West *t*-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Variables	EA Months		Post-EA Months		Pre-EA Months	
	(1)	(2)	(3)	(4)	(5)	(6)
Disp	-0.158*	-0.231	0.584	-0.142	-0.015	-0.613***
	(-1.92)	(-0.31)	(0.88)	(-0.84)	(-0.05)	(-4.30)
Δ*Disp*		-0.766		-0.502		-1.482***
		(-1.35)		(-1.53)		(-6.48)
SUE	44.639***	66.039***	18.263*	7.121**	2.787	5.903*
	(7.36)	(9.33)	(1.67)	(2.10)	(0.62)	(1.81)
ln(*MV*)	0.002	0.104	-0.131**	-0.087	-0.113**	-0.117**
	(0.05)	(1.00)	(-2.33)	(-1.61)	(-2.42)	(-2.59)
ln(1+*B*/*M*)	0.394	0.423	0.197	-0.004	0.217	0.335
	(1.37)	(1.34)	(0.59)	(-0.01)	(0.78)	(1.27)
$Ret_{-12:-2}$	-0.000	-0.003	-0.002	-0.002	0.005*	0.005*
	(-0.01)	(-0.64)	(-0.69)	(-0.78)	(1.85)	(1.73)
Ret_{-1}	-0.093***	-0.106***	-0.031***	-0.041***	-0.057***	-0.061***
	(-9.51)	(-6.28)	(-3.37)	(-3.72)	(-6.33)	(-6.94)
$Ret_{-36:-13}$	-0.001	-0.001	0.000	0.000	0.001	0.001
	(-0.98)	(-0.50)	(0.01)	(0.09)	(0.66)	(0.78)
Resid. Cov.	0.234**	0.176	0.192	0.134	-0.114	0.015
	(2.30)	(1.35)	(1.16)	(0.94)	(-0.61)	(0.13)
Turnover	0.367	-3.659	-0.772	0.794	-0.996	-0.383
	(0.46)	(-0.72)	(-0.47)	(0.93)	(-0.97)	(-0.30)
Market β	0.036	0.407	-0.181	-0.153	-0.304	-0.294
	(0.14)	(1.17)	(-0.63)	(-0.52)	(-1.27)	(-1.21)
Idio. Vol.	0.052	0.156	-0.068	0.001	-0.077	-0.065
	(1.06)	(1.28)	(-1.38)	(0.01)	(-0.98)	(-1.04)
Intercept	0.790	-0.557	2.579***	2.060***	2.138***	2.055***
	(1.50)	(-0.43)	(4.00)	(2.80)	(3.61)	(4.06)
Observations	231,260	200,215	214,364	205,616	215,931	206,136
Adj. R^2	0.066	0.087	0.072	0.081	0.069	0.079
Groups	141	140	140	140	140	140

Table 2.14: Fama-MacBeth Regressions of Stock Returns on Earnings Forecast Dispersion and Changes in Dispersion in EA Months by SUE

This table reports the results from Fama and MacBeth (1973) regressions of stocks' returns on dispersion in analysts' quarterly earnings forecasts and changes in dispersion in EA months by SUE, controlling for other firm characteristics. SUE represents the standardized unexpected earnings defined as the difference between the actual quarterly earnings per share figure and the mean analysts' quarterly earnings forecast measured one day before the earnings announcement scaled by the fiscal quarter-end stock price. All calendar months in the sample period from January 1984 to March 2019 are divided into pre-earnings announcement (pre-EA), earnings announcement (EA), and post-earnings announcement (post-EA) months. Stocks are grouped by the calendar quarters of their earnings announcements. Then each quarter, stocks are sorted into tercile portfolios based on their SUEs. The first-step cross-sectional regressions are run each calendar quarter for each SUE tercile separately. To conserve space, only the results for SUE Tercile 1 (Negative) and Tercile 3 (Positive) are reported. The dependent variable is the percentage raw return on each stock in the corresponding EA month *t* in Models (1) and (2) and the 3-day cumulative raw return around earnings announcements in Models (3) and (4). The two main independent variables are dispersion (*Disp*) and change in dispersion (Δ*Disp*). *Disp* is measured at the end of the pre-EA month *t*-1 and winsorized at the 99th percentile over the cross section; it is defined as the ratio of the standard deviation of analysts' earnings per share forecasts for the current fiscal quarter to the absolute value of the mean forecast. Δ*Disp* represents the change in dispersion from the end of the pre-EA month *t*-1 to the end of the EA month *t*. SUE, Size (ln(*MV*)), book-to-market ratio (ln(1+*B*/*M*)), past stock returns ($Ret_{-12:-2}$, Ret_{-1}, and $Ret_{-36:-13}$), residual coverage (*Resid. Cov.*), turnover, idiosyncratic volatility (*Idio. Vol.*), and market β are included as control variables. ln(*MV*) is equal to the natural logarithm of the stock's market capitalization measured at the most recent fiscal quarter-end, which is at least three months preceding month *t*-1 and for which the earnings have been announced as of month *t*-1. ln(1+*B*/*M*) is measured at the end of the same fiscal quarter-end as ln(*MV*) and is defined as the natural logarithm of one plus the firm's book value of equity divided by the market capitalization. $Ret_{-12:-2}$, Ret_{-1}, and $Ret_{-36:-13}$ represent the cumulative percentage returns on each stock from month *t*-12 to month *t*-2, in month *t*-1, and from month *t*-36 to month *t*-13, respectively. *Resid. Cov.* is the residual from the quarterly cross-sectional regressions of ln(*Analyst Coverage*) at the end of month *t*-1 on ln(*MV*) and ln(1+*B*/*M*). *Turnover* is the average ratio of the trading volume to the number of shares outstanding from month *t*-12 to month *t*-1. *Market* β is the post-ranking β estimated following the procedure in Fama and French (1992) over the period from July 1983 to June 2019. *Idio. Vol.* is the standard deviation of the residuals from regressions of the prior 52-week returns on the Fama and French (1993) three factors measured at the end of month *t*-1. Newey-West *t*-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Variables	SUE Tercile 1 (Negative)				SUE Tercile 3 (Positive)			
	Monthly Return		3-Day Return		Monthly Return		3-Day Return	
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Disp	0.441***	-0.080	0.432***	0.315**	-0.418**	-1.217***	-0.147	-0.562***
	(3.38)	(-0.53)	(4.78)	(2.32)	(-2.55)	(-3.73)	(-1.61)	(-3.67)
Δ*Disp*		-0.994***		-0.371***		-0.924***		-0.432***
		(-6.81)		(-3.64)		(-2.94)		(-2.83)
SUE	21.138***	33.455***	12.321***	18.903***	51.775***	86.746***	23.222***	38.672***
	(5.18)	(4.97)	(5.18)	(5.47)	(4.85)	(5.52)	(4.09)	(5.35)
ln(*MV*)	0.205***	0.218***	0.139***	0.161***	-0.277***	-0.287***	-0.189***	-0.206***
	(3.36)	(2.72)	(4.07)	(3.92)	(-4.79)	(-4.46)	(-6.23)	(-5.89)
ln(1+*B*/*M*)	1.013**	1.089**	0.435***	0.560***	-0.674**	-1.032***	-0.640***	-0.705***
	(2.58)	(2.58)	(2.75)	(3.56)	(-2.16)	(-2.98)	(-3.57)	(-3.40)
$Ret_{-12:-2}$	-0.010**	-0.008	-0.006***	-0.006***	0.001	-0.002	0.002	0.001
	(-2.20)	(-1.64)	(-2.76)	(-3.83)	(0.13)	(-0.43)	(1.40)	(0.61)
Ret_{-1}	-0.101***	-0.099***	-0.012***	-0.021***	-0.124***	-0.136***	-0.026***	-0.037***
	(-8.46)	(-9.62)	(-3.22)	(-5.07)	(-11.04)	(-7.95)	(-5.70)	(-2.63)
$Ret_{-36:-13}$	-0.002	-0.002	-0.000	-0.001	-0.001	-0.000	0.000	0.001
	(-1.54)	(-1.31)	(-0.59)	(-1.00)	(-0.50)	(-0.32)	(0.91)	(1.65)
Resid. Cov.	-0.048	-0.060	-0.041	0.139	0.450***	0.354*	0.176**	0.140
	(-0.31)	(-0.42)	(-0.42)	(1.26)	(2.63)	(1.94)	(2.08)	(1.40)
Turnover	-3.782	-0.430	-3.804***	-1.851**	3.783***	3.892***	0.355	0.436
	(-1.63)	(-0.28)	(-2.67)	(-2.43)	(2.62)	(3.07)	(0.59)	(0.68)
Market β	-0.914**	-0.654*	-0.395***	-0.366**	0.463	0.806**	0.395***	0.316**
	(-2.07)	(-1.94)	(-2.85)	(-2.51)	(1.53)	(2.35)	(3.04)	(2.49)
Idio. Vol.	-0.115	-0.221***	-0.106***	-0.125***	0.204***	0.119	-0.005	0.020
	(-1.30)	(-3.15)	(-2.62)	(-3.18)	(3.14)	(1.58)	(-0.14)	(0.51)
Intercept	-2.152***	-2.364***	-1.912***	-2.251***	5.117***	5.260***	3.681***	3.813***
	(-2.63)	(-2.75)	(-4.65)	(-4.61)	(8.90)	(7.30)	(9.08)	(8.41)
Observations	76,782	65,036	76,738	65,003	76,251	65,131	76,247	65,117
Adj. R^2	0.070	0.096	0.033	0.047	0.084	0.111	0.035	0.056
Groups	141	140	141	140	141	140	141	140

Table 2.15: Portfolio Returns by Earnings Forecast Dispersion and Changes in Dispersion (Covered by at Least Five Analysts)

This table presents the results for the subsample of stocks covered by at least five analysts for the period from January 1997 to January 2019. It reports the subsequent returns of portfolios double sorted on dispersion in quarterly earnings forecasts measured at the end of the current month (M0) and changes in dispersion from the end of the current month (M0) to the end of the following month (M1). Dispersion in analysts' quarterly earnings forecasts is defined as the ratio of the standard deviation of analysts' earnings per share forecasts for the current fiscal quarter to the absolute value of the mean forecast. Stocks' dispersions are winsorized at the 99th percentile each month over the cross section. Each month, stocks are sorted into size quintile portfolios based their market capitalizations as of the end of last June and the corresponding NYSE breakpoints. Then within each size quintile portfolio, stocks are sorted into quintile portfolios based on dispersions in analysts' quarterly earnings forecasts at the end of the month. Stocks with a mean forecast of zero are assigned a dispersion value of zero (the 99th percentile) if the standard deviation of the forecasts is zero (nonzero). Next, stocks are also sorted into tercile portfolios within each size quintile based on their changes in dispersion from the end of Month 0 to the end of Month 1. The first two columns represent stocks' dispersion quintile rankings at the end of Month 0 and tercile rankings of their changes in dispersion from the end of Month 0 to the end of Month 1, respectively. *Mean Chg. in Dispersion* presents the time-series average equal-weighted changes in dispersion of the corresponding portfolios. *Adjusted Returns* in Month 1 and Month 2 represent the average portfolio returns in the following two months. Stocks' adjusted returns are computed as the excess returns over the returns of their benchmark portfolios matched on size, book-to-market, and momentum factors following DGTW (1997). *t*-statistics are reported in parentheses. *No. of Stocks* presents the average number of stocks in each portfolio.

Dispersion Quintile: M0	Chg. in Dispersion Tercile: M1	Mean Chg. in Dispersion	Adjusted Returns (%)				No. of Stocks
			Equal-Weighted		Value-Weighted		
			Month 1	Month 2	Month 1	Month 2	
D1 (Low)	C1 (Decrease)	-0.010	0.61	-0.03	0.36	-0.26	24
		(-33.20)	(3.26)	(-0.16)	(1.83)	(-1.05)	
	C2	0.000	0.20	0.08	0.14	0.08	138
		(-1.38)	(1.87)	(0.80)	(1.43)	(0.79)	
	C3 (Increase)	0.052	-0.59	0.08	-0.29	-0.02	94
		(24.97)	(-5.34)	(0.86)	(-2.52)	(-0.21)	
D2	C1 (Decrease)	-0.016	0.41	-0.08	0.25	-0.07	58
		(-37.97)	(3.77)	(-0.76)	(1.91)	(-0.57)	
	C2	-0.001	0.25	0.02	0.24	0.08	114
		(-6.56)	(2.73)	(0.30)	(2.47)	(0.91)	
	C3 (Increase)	0.071	-0.80	0.00	-0.38	-0.03	87
		(22.40)	(-7.42)	(-0.03)	(-3.08)	(-0.29)	
D3	C1 (Decrease)	-0.025	0.56	-0.04	0.17	-0.01	89
		(-40.77)	(6.06)	(-0.42)	(1.44)	(-0.14)	
	C2	-0.001	0.03	-0.14	0.18	0.02	89
		(-6.69)	(0.39)	(-1.50)	(1.83)	(0.17)	
	C3 (Increase)	0.105	-0.75	-0.10	-0.54	-0.01	83
		(21.46)	(-6.49)	(-0.93)	(-3.88)	(-0.06)	
D4	C1 (Decrease)	-0.049	0.59	0.08	0.26	0.06	116
		(-41.36)	(5.48)	(0.87)	(3.02)	(0.66)	
	C2	-0.001	0.43	-0.04	0.42	-0.25	61
		(-5.48)	(3.48)	(-0.33)	(2.83)	(-1.67)	
	C3 (Increase)	0.190	-0.86	-0.03	-0.48	0.22	84
		(23.66)	(-5.97)	(-0.19)	(-3.17)	(1.72)	
D5 (High)	C1 (Decrease)	-0.460	0.32	0.09	0.18	-0.04	144
		(-31.61)	(2.29)	(0.64)	(1.26)	(-0.28)	
	C2	0.000	0.00	-0.06	0.35	0.30	35
		(-3.19)	(0.01)	(-0.27)	(1.61)	(1.21)	
	C3 (Increase)	0.527	-0.84	-0.12	-0.80	-0.31	82
		(29.12)	(-5.00)	(-0.70)	(-4.62)	(-1.63)	
D5C1 - D1C3		-0.511	0.92	0.01	0.47	-0.02	
		(-32.84)	(4.58)	(0.06)	(2.33)	(-0.08)	
D5C2 - D1C2		0.000	-0.20	-0.14	0.21	0.23	
		(-2.78)	(-0.85)	(-0.52)	(0.81)	(0.75)	
D5C3 - D1C1		0.537	-1.45	-0.08	-1.16	-0.05	
		(29.42)	(-4.98)	(-0.29)	(-4.08)	(-0.16)	
D5All - D1All		-0.094	-0.08	-0.05	-0.19	-0.13	
		(-12.62)	(-0.40)	(-0.29)	(-1.01)	(-0.66)	

Table 2.16: Portfolio Returns in Different Months by Earnings Forecast Dispersion and Changes in Dispersion (Covered by at Least Five Analysts)

This table presents the results for the subsample of stocks covered by at least five analysts for the period from January 1997 to March 2019. It reports the EA, post-EA, and pre-EA month returns of portfolios double sorted on dispersion in analysts' quarterly earnings forecasts measured at the end of the prior month (M0) and changes in dispersion from the end of the prior month to the end of the current month (M1), respectively. Dispersion in analysts' quarterly earnings forecasts is defined as the ratio of the standard deviation of analysts' earnings per share forecasts for the current fiscal quarter to the absolute value of the mean forecast. Stocks' dispersions are winsorized at the 99th percentile each month over the cross section. All calendar months in the sample period are divided into pre-earnings announcement (pre-EA), earnings announcement (EA), and post-earnings announcement (post-EA) months. Stocks are first grouped by the calendar quarters of their earnings announcements. Then for the EA-month sample, stocks are sorted into quintile portfolios based on their dispersions at the end of the pre-EA months (M0) each quarter within each size quintile. Stocks' size quintile rankings are determined as of the end of last June relative to the pre-EA months based on stocks' market capitalizations and the corresponding NYSE size breakpoints. Stocks with a mean forecast of zero are assigned to the lowest (highest) dispersion portfolio if the standard deviation of the forecasts is zero (nonzero). Stocks are further sorted into tercile portfolios within each size quintile based on their changes in dispersion from the end of the pre-EA month to the end of the EA month. Dispersion quintile portfolios for post-EA and pre-EA months are constructed in a similar manner. The left, middle, and right panels report the portfolio returns over EA, post-EA, and pre-EA months, respectively. *Adjusted Returns* report average portfolio returns over the corresponding months (M1). Stocks' adjusted returns are computed as the excess returns over the returns of their benchmark portfolios matched on size, book-to-market, and momentum factors following DGTW (1997). *t*-statistics are reported in parentheses. *No. of Stocks* presents the average number of stocks in each portfolio.

Dispersion Quintile: M0	Change in Disperison Tercile: M1	EA Months			Post-EA Months			Pre-EA Months		
		Adjusted Returns (%)		No. of Stocks	Adjusted Returns (%)		No. of Stocks	Adjusted Returns (%)		No. of Stocks
		Equal-Weighted	Value-Weighted		Equal-Weighted	Value-Weighted		Equal-Weighted	Value-Weighted	
D1 (Low)	C1 (Decrease)	0.66	-0.06	12	0.21	0.02	25	0.31	0.50	29
		(1.64)	(-0.13)		(0.97)	(0.07)		(1.10)	(1.97)	
	C2	0.65	0.09	154	0.15	0.18	131	0.21	0.26	134
		(3.83)	(0.56)		(1.08)	(1.17)		(1.39)	(1.68)	
	C3 (Increase)	-0.91	-0.44	73	-0.24	0.10	88	-1.04	-0.66	82
		(-4.46)	(-1.50)		(-1.80)	(0.72)		(-5.08)	(-3.93)	
D2	C1 (Decrease)	0.96	0.16	44	-0.01	0.01	58	-0.02	0.13	60
		(5.57)	(0.55)		(-0.03)	(0.05)		(-0.15)	(0.77)	
	C2	0.77	0.59	121	0.10	0.13	111	0.15	0.24	107
		(4.77)	(2.81)		(0.79)	(0.71)		(1.37)	(1.59)	
	C3 (Increase)	-1.18	-0.75	76	-0.19	-0.31	84	-1.26	-0.44	82
		(-5.23)	(-2.82)		(-1.31)	(-2.01)		(-6.77)	(-2.59)	

Dispersion Quintile: M0	Change in Disperison Tercile: M1	EA Months			Post-EA Months			Pre-EA Months		
		Adjusted Returns (%)		No. of Stocks	Adjusted Returns (%)		No. of Stocks	Adjusted Returns (%)		No. of Stocks
		Equal-Weighted	Value-Weighted		Equal-Weighted	Value-Weighted		Equal-Weighted	Value-Weighted	
D3	C1 (Decrease)	1.20	0.41	83	0.35	0.16	89	-0.05	-0.24	85
		(7.24)	(2.04)		(2.14)	(0.95)		(-0.34)	(-1.77)	
	C2	0.52	0.82	76	0.19	0.09	90	-0.02	0.26	84
		(2.99)	(3.77)		(1.35)	(0.57)		(-0.16)	(1.46)	
	C3 (Increase)	-0.74	-0.51	82	-0.40	-0.39	77	-1.04	-0.60	79
		(-3.55)	(-1.90)		(-2.65)	(-2.12)		(-4.82)	(-2.66)	
D4	C1 (Decrease)	1.27	0.68	109	0.15	0.32	114	0.26	-0.01	109
		(7.51)	(4.62)		(0.87)	(2.17)		(1.61)	(-0.06)	
	C2	0.55	0.47	39	0.33	0.52	66	0.46	0.42	62
		(1.94)	(1.52)		(1.75)	(2.19)		(2.17)	(1.63)	
	C3 (Increase)	-0.75	-0.19	90	-0.59	-0.57	79	-1.14	-0.61	79
		(-2.83)	(-0.89)		(-2.90)	(-2.95)		(-5.02)	(-2.73)	
D5 (High)	C1 (Decrease)	0.99	0.63	149	0.33	-0.03	136	0.04	0.13	128
		(4.00)	(2.59)		(1.54)	(-0.12)		(0.22)	(0.60)	
	C2	0.31	0.61	11	0.08	0.65	40	0.02	-0.25	38
		(0.49)	(0.91)		(0.29)	(1.71)		(0.08)	(-0.68)	
	C3 (Increase)	-1.23	-0.93	78	-0.27	-0.63	82	-0.69	-0.66	82
		(-4.48)	(-3.34)		(-1.29)	(-2.21)		(-2.99)	(-2.63)	
D5C1 - D1C3		1.90	1.07		0.57	-0.13		1.08	0.79	
		(6.08)	(2.55)		(2.03)	(-0.44)		(3.72)	(2.97)	
D5C2 - D1C2		-0.34	0.52		-0.07	0.47		-0.18	-0.51	
		(-0.55)	(0.74)		(-0.19)	(1.15)		(-0.57)	(-1.21)	
D5C3 - D1C1		-1.94	-0.94		-0.49	-0.65		-1.00	-1.16	
		(-3.60)	(-1.57)		(-1.32)	(-1.72)		(-2.39)	(-3.00)	
D5All - D1All		-0.04	0.17		0.09	-0.30		-0.02	-0.19	
		(-0.14)	(0.53)		(0.34)	(-1.16)		(-0.09)	(-0.75)	

Table 2.17: Portfolio Returns by Earnings Forecast Dispersion and Changes in Dispersion (Controlled for Uncertainty)

This table presents the subsequent returns of portfolios double sorted on dispersion in quarterly earnings forecasts measured at the end of the current month (M0) and changes in dispersion from the end of the current month (M0) to the end of the following month (M1). Dispersion in analysts' quarterly earnings forecasts is defined as the ratio of the standard deviation of analysts' earnings per share forecasts for the current fiscal quarter to the absolute value of the mean forecast. Stocks' dispersions are winsorized at the 99th percentile each month over the cross section. Each month from January 1997 to December 2018, stocks are sorted into size quintile portfolios based their market capitalizations as of the end of last June and the corresponding NYSE breakpoints. Stocks are also sorted into uncertainty quintile portfolios based on uncertainty defined as the number of words denoting uncertainty divided by the total number of words in the most recent 10-K or 10-Q report. Then, within each of the 25 size$\times$uncertainty portfolio, stocks are sorted into quintile portfolios based on dispersions in analysts' quarterly earnings forecasts at the end of the month. Stocks with a mean forecast of zero are assigned a dispersion value of zero (the 99th percentile) if the standard deviation of the forecasts is zero (nonzero). Next, stocks are sorted into tercile portfolios within each of the 25 size$\times$uncertainty portfolio based on their changes in dispersion from the end of Month 0 to the end of Month 1. The first two columns represent stocks' dispersion quintile rankings at the end of Month 0 and tercile rankings of their changes in dispersion from the end of Month 0 to the end of Month 1, respectively. *Mean Chg. in Dispersion* presents the time-series average equal-weighted changes in dispersion of the corresponding portfolios. *Adjusted Returns* in Month 1 and Month 2 represent the average portfolio returns in the following two months. Stocks' adjusted returns are computed as the excess returns over the returns of their benchmark portfolios matched on size, book-to-market, and momentum factors following DGTW (1997). *t*-statistics are reported in parentheses. *No. of Stocks* presents the average number of stocks in each portfolio.

Dispersion Quintile: M0	Chg. in Dispersion Tercile: M1	Mean Chg. in Dispersion	Adjusted Returns (%)				No. of Stocks
			Equal-Weighted		Value-Weighted		
			Month 1	Month 2	Month 1	Month 2	
D1 (Low)	C1 (Decrease)	-0.010	0.45	-0.09	-0.01	0.05	35
		(-35.14)	(2.77)	(-0.57)	(-0.09)	(0.24)	
	C2	0.000	0.32	0.17	0.22	0.01	221
		(1.81)	(3.39)	(1.90)	(2.40)	(0.15)	
	C3 (Increase)	0.106	-0.26	0.05	-0.31	0.01	156
		(32.26)	(-2.92)	(0.70)	(-2.59)	(0.07)	
D2	C1 (Decrease)	-0.018	0.47	0.04	0.29	-0.01	96
		(-36.66)	(4.78)	(0.42)	(2.12)	(-0.13)	
	C2	-0.001	0.10	-0.09	0.25	0.00	192
		(-5.18)	(1.33)	(-1.24)	(3.05)	(0.06)	
	C3 (Increase)	0.089	-0.72	-0.07	-0.40	-0.02	141
		(25.01)	(-7.57)	(-1.06)	(-3.48)	(-0.22)	
D3	C1 (Decrease)	-0.032	0.49	-0.06	0.15	0.01	144
		(-40.75)	(6.54)	(-0.82)	(1.45)	(0.08)	
	C2	-0.001	0.06	-0.10	0.27	-0.07	153
		(-6.21)	(0.78)	(-1.36)	(2.80)	(-0.73)	
	C3 (Increase)	0.138	-0.73	-0.12	-0.46	0.15	131
		(26.22)	(-7.80)	(-1.29)	(-3.90)	(1.27)	
D4	C1 (Decrease)	-0.065	0.36	0.03	0.36	0.05	182
		(-42.77)	(4.77)	(0.37)	(4.03)	(0.52)	
	C2	-0.001	0.02	-0.11	0.12	-0.13	118
		(-4.85)	(0.20)	(-1.08)	(1.01)	(-0.96)	
	C3 (Increase)	0.243	-0.82	-0.05	-0.47	0.23	127
		(28.27)	(-6.79)	(-0.45)	(-3.31)	(1.71)	
D5 (High)	C1 (Decrease)	-0.548	0.24	-0.08	0.19	0.02	221
		(-35.02)	(1.94)	(-0.71)	(1.36)	(0.16)	
	C2	0.000	-0.19	-0.17	0.36	0.14	79
		(-2.63)	(-1.60)	(-1.29)	(2.20)	(0.66)	
	C3 (Increase)	0.581	-0.99	-0.20	-0.88	-0.17	118
		(32.49)	(-7.51)	(-1.48)	(-5.44)	(-0.98)	
D5C1 - D1C3		-0.654	0.50	-0.13	0.49	0.01	
		(-36.86)	(2.86)	(-0.86)	(2.39)	(0.07)	
D5C2 - D1C2		0.000	-0.51	-0.34	0.14	0.12	
		(-5.53)	(-3.11)	(-1.82)	(0.72)	(0.48)	
D5C3 - D1C1		0.591	-1.44	-0.11	-0.86	-0.22	
		(32.75)	(-5.89)	(-0.44)	(-3.22)	(-0.70)	
D5All - D1All		-0.174	-0.33	-0.25	-0.12	-0.07	
		(-21.10)	(-2.10)	(-1.58)	(-0.68)	(-0.37)	

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CHAPTER 3: CONCENSUS, DISAGREEMENT, AND STOCK RETURNS

1. Introduction

Financial market participants often disagree about the investment values of financial assets, and such disagreement can have important implications for asset pricing. Both theoretical and empirical studies recognize that differences of investor opinion can predict future asset returns, but substantial disagreements remain on the nature of the relation. Miller (1977) demonstrates that differences of opinion can lead to overvaluation and lower future returns in a market with short-sale constraints. Theoretical works by Varian (1985, 1989), Abel (1989), and David (2008) however suggest that divergence of opinion can be associated with higher risk premium and lower asset valuation. Empirical evidence on the effects of investor disagreement on asset prices is also mixed. For example, Diether, Malloy, and Scherbina (2002), Chen, Hong, and Stein (2002), and Goetzmann and Massa (2005) find empirical evidence supporting Miller's argument. On the other hand, Doukas, Kim, and Pantzalis (2006) and Carlin, Longstaff, and Matoba (2014) find increased disagreement leads to higher expected returns.

In this essay, I study the role of *opinion*, i.e., investors' aggregate or consensus opinion on a stock's investment value, in the relation between heterogeneous investor beliefs and stock prices. I show that investor opinion, while largely overlooked in empirical studies on the effects of differences of opinion on asset prices, is at least as important as the dispersion of opinion in predicting stock returns. The relation between differences of opinion and future stock returns not only depends crucially on investor opinion, but also derives largely from strong agreement rather than disagreement among investors. Because investor opinion and disagreement jointly affect stock prices, my findings can partly resolve the discrepancy in the different relations between investor disagreement and stock returns documented in extant empirical studies.

Investor opinion is an integral component in theoretical works on divergence of opinion and asset prices. Varian (1985) considers an Arrow-Debreu model with agents holding different subjective probabilities, and shows that asset prices depend on the distribution of subjective probabilities, which represents both the aggregate opinion and the differences of opinion. Abel (1989) shows that if there exist different opinions about the future payoff of a risky asset, the equilibrium asset price depends both on the cross-sectional average expectation of the payoff to the risky asset and the cross-sectional variation in investors' expectations. Both Varian's and Abel's predictions about the effects of differences of opinion on future asset returns hold only for a cross-sectional comparison in a fixed equilibrium where the aggregate opinion is constant. Abel (1989) concludes that the sign of the relation between disagreement and future asset returns can depend on the aggregate opinion, but such an effect was not further explored.[1]

Several recent theoretical works provide clarification on the role of the consensus opinion in asset pricing models of heterogeneous investor beliefs. Jouini and Napp (2007) find that belief dispersion and the consensus belief, a risk tolerance weighted average of individual beliefs in their model, jointly affect the asset value in an Arrow-Debreu economy. The relation between belief dispersion and the asset return depends on the "bias" of the consensus belief. Atmaz and Basak (2018) develop a dynamic general equilibrium model with belief dispersion and show that belief dispersion and the average belief, or its "bias", jointly determine the market equilibrium outcome. Specifically, belief dispersion, in addition to representing extra uncertainty, affects the asset price by amplifying the effect of "bias" in investor belief on the asset price. In spite of the importance of investor opinion in asset pricing models of heterogeneous beliefs, few empirical studies have quantified and examined the effects of investor opinion. One possible explanation perhaps is the difficulty of measuring simultaneously investors' opinions regarding the investment values of the assets and their differences.

[1]Even in Miller's (1977) framework, additional assumptions on homogeneous belief regarding the covariance of asset returns are required to deliver the overvaluation results. Jarrow (1980) examines Miller's arguments in a single-period equilibrium model and shows that overvaluation rises only when investors agree on the risk-determined expected returns of the assets.

In this essay, I use financial analysts' stock recommendations to measure their opinions and disagreement. Financial analysts' stock recommendations, such as 'Strong Buy' or 'Sell' ratings, provide analysts' unambiguous views on the investment values of stocks. One crucial advantage of utilizing analysts' stock recommendations is that one can determine simultaneously the aggregate opinion based on the consensus recommendation and the dispersion of opinion. Because the consensus stock recommendation represents analysts' aggregate view regarding the investment value of the underlying stock, one can differentiate these views (i.e., whether they are optimistic or pessimistic) and study the consensus opinion or its "bias" jointly with the divergence of opinion. In contrast, the mean or median of analysts' earnings forecasts, a widely used variable for constructing proxies for differences of investor opinion, is not directly related to the valuation of the stock. It is also difficult to quantify ex ante whether the average forecast is too high or too low relative to the actual earnings.

I measure the aggregate investor opinion based on the consensus (mean or median) stock recommendation and compute the dispersion as the standard deviation of individual analysts' recommendation ratings. Analysts' recommendations yield uniform measures of investor opinion and dispersion of opinion as the possible rating scales are the same and are readily comparable across all stocks. Because recommendation ratings are relative rankings (with values from 1 to 5), I further use fraction, mode, and entropy based dispersion measures, in addition to the standard deviation measure, to ensure the robustness of the results. The different dispersion measures are highly correlated and yield similar results.

I first examine the relation between dispersion in stock recommendations and subsequent stock returns with and without conditioning on the level of consensus recommendations. For each month, I sort stocks into three portfolios based on their recommendation dispersions ('Low', 'Medium', and 'High') and consensus recommendation ratings ('Buy', 'Hold', and 'Sell') respectively.[2] High-dispersion stocks on average do not underperform and even moderately outperform

[2]The portfolios based on consensus recommendation ratings can be more appropriately termed as 'Highly rated',

low-dispersion stocks in the subsequent one-month to one-year periods. More remarkably, different relations between recommendation dispersion and stock returns emerge for stocks with different consensus recommendation ratings. Among stocks with 'Sell' recommendations, high-dispersion stocks earn lower subsequent returns than low-dispersion stocks, thus generating a negative relation between disagreement and stock returns. However, the results for stocks receiving 'Buy' recommendations are the opposite, as high recommendation dispersion is associated with higher subsequent returns. The results show that the relation between dispersion of investors' opinions and future stock returns depends crucially on the opinion of the investors.

Strong investor agreement, more so than investor disagreement, predicts stock returns in combination with the consensus investor opinion. Stocks with 'Buy' recommendations overall do not outperform their benchmarks, but significantly underperform when analysts have strong agreement in their ratings (i.e., when the dispersion of recommendations is low). Stocks with 'Buy' recommendations but with strong disagreement, however, do not exhibit any abnormal returns. Consequently, high-dispersion stocks significantly outperform low-dispersion stocks for stocks with 'Buy' recommendations, but the difference is largely driven by the negative abnormal returns of low-dispersion stocks. Stocks with 'Sell' recommendations on the whole do not underperform the benchmarks, but those with low dispersion tend to have positive returns while those with high dispersion tend to have negative returns. As a result, within the 'Sell' portfolios, high-dispersion stocks significantly underperform low-dispersion stocks.

Overall, these results show that investor opinion and disagreement jointly affect stock prices and investor opinion is at least as important as the dispersion of opinion in predicting stock returns. The return spreads between high-dispersion and low-dispersion stocks not only depend on the consensus opinions, but also are largely driven by the abnormal returns of the low-dispersion stocks. The results further reveal that strong agreement among investors, not just strong disagree-

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'Medium', and 'Lowly rated'. I use the term 'Buy', 'Hold', and 'Sell' for ease of discussion with the understanding that the average ratings of these portfolios are not 'Buy', 'Hold', and 'Sell' based on the I/B/E/S rating scale. In the essay, I include the term 'I/B/E/S' when using the I/B/E/S rating scale in the discussion.

ment, can affect stock prices. The results hold for both equal and value weighted portfolio returns and over different investment horizons. The results are also robust to different measures of level and dispersion of recommendation ratings and to both conditional and independent sorting in portfolio formation.

What might explain the joint effects of investor opinion and opinion dispersion on stock prices? More specifically, why do the relations of opinion dispersion and stock returns differ between optimistic and pessimistic opinions, and why do both investor agreement and to a less degree investor disagreement predict stock returns? The results in this essay are consistent with the general predictions of Jouini and Napp (2007) and Atmaz and Basak (2018) that belief dispersion and average belief jointly determine asset prices. In these models, the "bias" of the average beliefs, or optimistic and pessimistic beliefs, can affect the relation between belief dispersion and stock returns differently. However, the finding of a positive relation between dispersion and return in 'Buy' stocks and a negative relation in 'Sell' stocks is the opposite of Atmaz and Basak's prediction of a negative relation when the view is optimistic and a positive relation otherwise.

Neither Jouini and Napp (2007) nor Atmaz and Basak (2018) consider the effects of market imperfections such as short-sale constraints in their models. A robust result in the literature on heterogenous beliefs is that short-sale constraints can impede the full incorporation of the divergent views in asset prices and generate return predictability.[3] Could short-sale constraints affect stock prices differently when investor consensus opinions differ (optimistic vs. pessimistic), and do short-sale constraints impede the incorporation of opposing views when investors have strong agreement? If investor opinion, investor agreement, or both interact with or affect short-sale constraints, they can affect stock prices through the constraints. I then examine whether and how short-sale constraints can be related to the stock return patterns of the consensus opinion and opinion dispersion portfolios.

Using data on equity lending from Markit, I find that short-sale constraints differ signif-

[3] For more recent work, see, e.g., Gallmeyer and Hollifield (2008) and Nezafat, Schroder, and Wang (2017).

icantly both between 'Buy' and 'Sell' ratings and between high-dispersion and low-dispersion stocks within the recommendation ratings. Short selling activity is higher for stocks with 'Sell' ratings and for high-dispersion stocks at all three recommendation levels. However, relative to high-dispersion stocks, low-dispersion stocks have lower lending supply and are more likely to face binding short-sale constraints as a whole. In the 'Buy' and 'Hold' portfolios, when investors are in strong agreement, lending supply is lower, cost of short-selling is higher, and a greater percentage of stocks are difficult to short (on 'Special'). When investors on aggregate hold pessimistic views about the stocks ('Sell' ratings), strong disagreement is associated with higher cost of short-selling and a greater percentage of stocks that are difficult to short. Thus, strong agreement, particularly when the consensus opinions are optimistic, can potentially impede the incorporation of opposing views into prices.

Most studies identify the effects of investor disagreement on short-selling activities by focusing on the demand side of short-selling.[4] If investors have highly divergent views, the demand of short-selling is higher due to the larger proportion of investors holding highly negative views. Short-sale constraints are more likely to be binding because of the higher demand of these investors. The results in this essay reveal that, the supply side of short-selling is also important in generating binding short-sale constraints. Strong consensus of investor opinions across all three recommendation levels lowers the supply of loanable shares and can restrict short-selling when consensus opinions are optimistic.

The varying likelihood of binding short-sale constraints and their different effects on stock prices generate the stock return patterns of the consensus opinion and dispersion portfolios. The negative returns of the 'Special' stocks, and the large proportion of 'Special' stocks in the 'Buy' and strong agreement portfolio largely explain the underperformance of these stocks. Similar patterns hold for stocks with 'Sell' ratings where the high percentage of 'Special' stocks in the

[4] A few papers consider supply in the models, but the supply is fixed or exogenous. See Duffie, Garleanu, and Pedersen (2002) and Atmaz, Basak, and Ruan (2020). Nezafat and Schroder (2020) consider a rational expectation model with endogenous short-selling demand and supply.

high-dispersion portfolio largely explains the underperformance of the high-dispersion stocks. The relation of the consensus opinion and the differences of opinion with short-sale constraints can help to explain at least partly the relation of the opinion and the differences of opinion with subsequent stock returns.

This essay makes several contributions to the finance literature. I examine the relation between differences of opinion and stock returns based on a new and widely available measure of investor opinions. The measure is more related to investors' assessment of the investment value of the stock and less related to the fundamental uncertainty of the firm. Most important, I directly include consensus opinions in the analysis and show that both investors' opinions and their dispersions matter for stock returns. I provide the first systematic empirical analysis that links investor opinion with dispersion of opinion and shows the joint effects of the two on stock prices. The evidence supports the developing theoretical literature that both investors' opinions and their dispersions matter for stock returns.

This essay also contributes to the literature on short-sale constraints. Most studies on short-sale constraints have emphasized the effects of differences of opinion and the demand for short-selling. I show that supply of loanable shares decreases with investor agreement and strong agreement can impede the incorporation of opposing views in asset prices. The supply effects are stronger when the consensus opinion is optimistic. As a result, both the consensus opinion and the differences of opinion matter for short-sale constraints.

Several recent studies on individual investor opinions, based on textual analysis of online forums or chats, show that aggregate investor opinions predict stock returns, but often in the opposite direction (e.g., Da, Engelberg, and Gao, 2015). I show here that the aggregate opinions of financial analysts, an important and influential group of market participants, also tend to be contrarian signals. My findings are different from studies that show that stock recommendations of financial analysts are informative and can predict stock returns. These studies use more timely individual analyst recommendation changes, not the aggregate opinions of the analysts measured at monthly frequency. In this essay, the expressed aggregate opinions represent prevailing views of and the disagreements among the financial analysts, both of which predict stock returns.

The rest of the essay is organized as follows. Section 2 describes the data sources, sample selection, and the main variables in this essay. Section 3 examines the characteristics and returns of portfolios sorted on recommendation dispersion. Section 4 conducts both portfolio and regression analyses to investigate the joint effects of the consensus opinion and dispersion on stock returns. Section 5 examines short-sale constraints and Section 6 concludes.

2. Data, Sample, and Descriptive Statistics

2.1. Data and Sample Description

The initial sample of financial analyst recommendations consists of all recommendation ratings for U.S. stocks contained in the Institutional Brokers Estimate System (I/B/E/S) Analyst Recommendation Summary History file for the period from January 1994 to December 2018. For each month, the I/B/E/S Summary History file provides the mean, median, and standard deviation of all outstanding individual analyst recommendations for each stock. Individual analysts' recommendations are available from the I/B/E/S Detail History file and I use the individual analyst recommendations to compute additional variables for the empirical analysis. Each analyst's recommendation is assigned a value from 1 to 5, with '1' indicating a 'Strong Buy' recommendation and '5' a 'Sell' recommendation.[5]

For a stock-month observation to be included in the final sample, it must have (1) monthly return data available from the Center for Research in Security Prices (CRSP) database, (2) a share code of 10 or 11, and (3) book equity information along with other firm accounting values in Compustat. The I/B/E/S recommendation data file is matched to the CRSP database using the eight-digit CUSIP numbers. The final sample that satisfies the criteria contains 1,080,293 stock-month

[5]Thomson Reuters maintains a standard set of recommendations, each with an assigned numeric value: 1. Strong Buy, 2. Buy, 3. Hold, 4. Underperform, 5. Sell.

observations from January 1994 to December 2018. In the main empirical analyses, where the dispersions of analysts' recommendations are involved, I require that the stocks must be covered by at least two analysts. This reduces the sample to 817,233 observations.

I also obtain monthly short interest data from Compustat and equity lending data from Markit Data Explorer to examine how short-sale constraints are related to consensus recommendations and recommendation dispersions. Due to data availability, the sample period for this part of analysis is from June 2004 to December 2018.

2.2. Measuring Investor Opinion and Disagreement

I use the mean recommendation rating, reported in the I/B/E/S Summary History file, as the consensus analyst recommendation. The consensus recommendation, or the level of the recommendation, reflects the aggregate analyst opinion on the stock. The dispersion in analysts' recommendations is defined as the standard deviation of all outstanding analysts' recommendations, which indicates the extent of disagreement in analyst opinions. I also compute the two measures based on individual analyst recommendations and use median recommendation rating as well as a large set of alternative recommendation dispersion measures in various robustness tests.

In the prior literature, a widely used proxy for investor disagreement is the dispersion in analysts' earnings forecasts. It is defined as the standard deviation of analysts' earnings forecasts scaled by the absolute value of the mean forecast or stock price. To compare the two dispersion measures and their relation with subsequent stock returns, I construct the earnings forecast dispersion measure using the data from the I/B/E/S Earnings Estimates Unadjusted Summary History file following Diether, Malloy, and Scherbina (2002). The results based on the Summary History file and the Detail History file are similar.[6] Therefore, I only report the results obtained using the Summary file.

[6]See Diether, Malloy, and Scherbina (2002) for detailed discussion on the construction of the disagreement variables.

Different from analysts' earnings forecasts, analysts' stock recommendations are ranked or ordinal variables. If the assumption holds that the distance between each two adjacent recommendation ratings is constant, meaning if the difference between ratings of 1 ('Strong Buy') and 2 ('Buy') and that between 2 ('Buy') and 3 ('Hold') are the same, then the mean and standard deviation of these ranked variables can be valid measures of the aggregate opinion and the dispersion of opinion, respectively. The mean recommendation and the change of the mean recommendation are widely used in existing studies on analyst recommendations (e.g. Barber et al., 2001; Howe, Unlu, and Yan, 2009). To ensure the robustness of the results, I further construct univariate statistics based on median, mode, and fraction of the recommendation variables. In particular, I construct fraction, mode, and entropy based dispersion measures using individual analysts' recommendation ratings for all the empirical analysis.[7] The definitions of the alternative dispersion measures and the corresponding results are discussed in Sections 3.3 and 4.1.

2.3. Descriptive Statistics

Table 3.1 presents the summary statistics on the data sample and the descriptive statistics on analysts' stock recommendations for each year from 1994 to 2018. As shown in Columns 4 and 5, over the sample period, an increasing percentage of firms are covered by financial analysts, and among the covered firms, more firms are covered by at least two analysts. In 1994, only 57% (46%) of firms are covered by at least one (two) analyst(s), and that percentage increases to 83% (77%) in 2018. For the covered firms, the average number of analysts covering each firm also increases from 5 to 9, while the median number increased from 3 to 6. Firms covered by analysts on average are larger than non-covered firms. Within the covered sample, firms with higher levels of coverage also tend to be larger firms. For my analysis, I form portfolios within size quintiles to address the potential concern that coverage level could affect univariate characteristics such as the

[7] Individual analysts' recommendation ratings are from I/B/E/S Analyst Recommendation Detail History file. A recommendation is excluded if it is not updated or confirmed for more than 180 days following the last review date (*revdat*), or if the report date is later than the stop date (*stpdat*).

level and dispersion of stock recommendations.

Panel A also reports, for the sample of firms covered by at least two analysts, the average mean recommendation, recommendation dispersion measured by standard deviation, and the percentage of firms with an average rating at or above 'Buy'. The average ratings stayed slightly above 2 in the first eight years of the sample, which indicates a consensus recommendation slightly below the 'Buy' rating. The average ratings increased to 2.21 in 2002 and peaked at 2.45 in 2003, indicating much less favorable ratings over the middle of the sample period. In the last nine years of the sample period, the average ratings stayed close to 2.2. Meanwhile, the average dispersions in analysts' recommendations are largely stable over the sample period, ranging from 0.64 in 2000 to 0.81 in 2010.

The percentage of firms with at least a 'Buy' consensus recommendation (with a mean rating less than or equal to 2) also changed over the sample period. In the first eight years, over 50% of the firms receive consensus buy recommendations or better. This ratio dropped to 31% in 2003, but it has stayed close to 40% in the later part of the sample period. As documented in various studies, analysts are usually reluctant to issue highly negative recommendations because of the concerns about information access to management or conflicts of interest.[8] In my sample, less than 5% (2%) of stock-month observations have a mean (median) recommendation rating greater than 3, or worse than a 'Hold'. For the full sample period, most firms receive ratings between 'Buy' and 'Hold'.[9]

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[8]See Lin and McNichols, 1998; Michaely and Womack, 1999; Kolasinski and Kothari, 2008 for discussions on biased recommendations, and Francis and Philbrick, 1993; Das, Levine, and Sivaramakrishnan, 1998; Lim, 2001; Cowen, Groysberg, and Healy, 2006; Ljungqvist, et al, 2007 for discussions related to information access.

[9]Kadan et al. (2008) document that the Global Analyst Research Settlement and related regulations, such as NASD Rule 2711, NYSE Rule 472, in 2002 affected both analysts' recommendation ratings and the relative informativeness of the ratings.

3. Recommendation Dispersion and Stock Returns

This section examines how investor disagreement, measured by dispersion in analysts's stock recommendations, is related to subsequent stock returns. Since firm size and analyst coverage are highly correlated (the correlation is 0.76 for my sample), and the number of analysts covering a firm can potentially affect the level and dispersion of the recommendations, it is important to control for such an effect in the analysis. I choose to control for firm size when forming portfolios based on consensus recommendations and recommendation dispersion. I first sort stocks into size quintiles based on their market capitalizations measured at the end of last June and the corresponding NYSE size break points. Then, within each size quintile, I further sort stocks into 'Low', 'Medium', and 'High' recommendation dispersion portfolios. The tercile portfolios based on earnings forecast dispersion are formed in a similar manner. All the resulting portfolios are held for 1, 3, 6, or 12 months.

3.1. Portfolios based on Stock Recommendations

Table 3.2 provides information on the characteristics of the recommendation dispersion sorted portfolios as well as the comparison with the earnings forecast dispersion sorted portfolios. Panel A and Panel B present the time-series averages of the equal-weighted characteristics of portfolios sorted on recommendation dispersion (*Rec Dispersion*) and earnings forecast dispersion (*EF Dispersion*), respectively. *Mean Rec* reports the mean recommendation ratings of the stocks in each portfolio. *Size Ranking*, *BM Ranking*, and *Momentum Ranking* represent, respectively, the quintile rankings of stocks based on the market capitalization measured at the end of last June, the book-to-market ratio measured at the end of last fiscal year, and the past 12-month cumulative returns measured at the end of last June. *Turnover* is defined as the ratio of the stock's current-month trading volume to the number of shares outstanding. *Total Volatility* for each stock is calculated as the standard deviation of its prior 52-week returns measured at the end of the previous month.

Idio. Volatility is defined as the standard deviation of the residuals from the regressions of the prior 52-week returns on the Fama-French three factors. *No. of Stocks* reports the time-series average number of stocks in each portfolio.

Before we discuss the characteristics of portfolios based on the two different dispersion measures, we note that the correlation between the two dispersion variables is low – the correlation is -0.002 and is not significantly different from 0. In the table, stocks in the high recommendation dispersion portfolio on average have higher earnings forecast dispersions than stocks in the low recommendation dispersion portfolio. The same pattern holds for stocks sorted based on earnings forecast dispersion. Both panels also show that stocks with high dispersion tend to have higher (less favorable) mean recommendation ratings than stocks with low dispersion. The relation between recommendation dispersion and mean recommendation is U-shaped, with the medium dispersion portfolio stocks having the highest ratings, but the results for earnings forecast dispersion portfolios in Panel B exhibits a monotonically increasing pattern.

The most striking differences between the two dispersion rankings come from the contrasts in book-to-market rankings, total return volatilities, and idiosyncratic return volatilities. As shown in Panel A, recommendation dispersion rankings are negatively correlated with the book-to-market ratios, but do not seem to be highly correlated with total return volatility or idiosyncratic return volatility. In contrast, in Panel B, stocks with high earnings forecast dispersion have much higher book-to-market ratios than stocks with low earnings forecast dispersion. High-dispersion stocks have an average total (idiosyncratic) return volatility of 7.4% (6.3%), which is 2.1 (1.8) percentage points higher than that of low-dispersion stocks. Note that all three measures, the book-to-market ratio, total volatility, and idiosyncratic volatility are related to the fundamental uncertainty of the firm. The results show earnings forecast dispersion is highly correlated with the underlying uncertainty of the firm and could capture both fundamental uncertainty and investor disagreement.[10]

As discussed earlier, the dispersion portfolios are first sorted within size rankings. The table

[10]See also Doukas, Kim, and Pantzalis (2006) for related evidence and discussions.

shows that, there is still a slight variation in firm size rankings across the dispersion portfolios after controlling for firm size in forming the portfolios. While the difference is significant, the magnitude of the difference is small.[11] Additionally, the high-dispersion portfolios have lower momentum rankings than the corresponding low-dispersion portfolios for both dispersion portfolios, but the pattern is stronger in the earnings forecast dispersion portfolios.

3.2. Recommendation Dispersion and Stock Returns

Table 3.3 and Table 3.4 report the post-formation equal-weighted raw returns and characteristic-adjusted returns of the portfolios formed based on the two dispersion measures respectively. Characteristic-adjusted returns of stocks are calculated as the excess returns over the returns of their benchmark portfolios matched on size, book-to-market, and momentum factors following Daniel, Grinblatt, Titman, and Wermers (DGTW, 1997). Returns of the monthly-rebalanced portfolios are calculated based on the strategy employed in Jegadeesh and Titman (1993) and are reported in Panel A.[12] This methodology mitigates the concerns about the autocorrelations in the time series of portfolio returns. I also calculate the buy-and-hold portfolio returns over different holding horizons without rebalancing. The buy-and-hold returns are reported in Panel B where the t-statistics are calculated based on Newey-West standard errors. In the discussions below, I focus on the DGTW-adjusted returns.

Returns of the portfolios sorted on the two dispersion measures exhibit distinct patterns. In Table 3.3, high recommendation dispersion stocks do not underperform and even outperform low-dispersion stocks over longer horizons. For example, over the one-month horizon, the high-dispersion portfolio outperforms the low-dispersion portfolio by 3.6 basis points and the differ-

[11] I find that recommendation dispersion (earnings forecast dispersion) is positively (negatively) correlated with firm size. After controlling for firm size, the high recommendation (earnings forecast) dispersion portfolio still contains larger (smaller) stocks than the low recommendation (earnings forecast) dispersion portfolio. The persistence in the small difference between the portfolios yields the high statistical significance.

[12] For the rebalancing strategy, if the portfolios are held for 6 months, then for each month *t*, the portfolio return is calculated as the average of the returns of 6 portfolios formed in $t-6$ to $t-1$ during month t.

ence is not significant. Over the longer 3-month horizon, the outperformance is 5 basis points for monthly returns, and the difference again is not significant. But over a 12-month horizon, the high-dispersion portfolio outperforms significantly the low-dispersion portfolio by 10 basis points each month. The buy-and-hold portfolio returns generate similar results. Across all holding horizons, stocks in the low-dispersion portfolio tend to underperform their benchmarks, albeit not significantly so. High-dispersion stocks tend to outperform their benchmarks, though the difference is not statistically significant. The relationship between recommendation dispersion and subsequent stock returns is non-monotonic. Stocks in the medium-dispersion portfolio have the highest returns. The 'Medium' portfolio marginally outperforms the 'Low' portfolio in the holding period, but the return difference between the 'Medium' and 'High' portfolios is not significant.

The results for earnings forecast dispersion portfolios are different. Table 3.4 shows that stocks with higher earnings forecast dispersion earn lower future returns, which is consistent with Diether, Malloy, and Scherbina (2002). Portfolio returns decrease monotonically as earnings forecast dispersion increases. Stocks in the low-dispersion group significantly outperform their benchmarks, whereas the stocks in the high-dispersion group tend to underperform. Consequently, stocks in the high-dispersion portfolio significantly underperform stocks in the low-dispersion portfolio, especially after adjusting for size, book-to-market, and momentum factors. Note that, even for the earnings forecast dispersion portfolios, the abnormal return of the low-dispersion stocks, rather than the abnormal return of high-dispersion stocks, accounts for more of the return difference between the two portfolios, particularly for the longer holding horizons.

The different characteristics of the two dispersion-sorted portfolios can partially explain the different return patterns. The high correlation between earnings forecast dispersion and fundamental uncertainty variables such as total and idiosyncratic volatility poses a significant challenge in empirically distinguishing investor disagreement from fundamental uncertainty. Ang et al. (2006), for example, document that higher idiosyncratic volatility strongly predicts lower future returns, similar to the relation between investor disagreement and stock returns. Doukas, Kim, and Pantzalis (2006) use an earnings forecast based measure of divergence of opinion that is free from the effects of fundamental uncertainty and find that stock returns are positively associated with divergence of opinion, similar to what I document based on recommendation dispersion. In comparison, analysts' stock recommendations present unambiguous views on the investment value of stocks and the dispersion measure is less affected by the fundamental uncertainty of the firms. Dispersion in analysts' stock recommendations thus could serve as a "clean" measure of investor disagreement and allows for better identification and examination of the relation between investor disagreement and asset prices.

3.3. Robustness Checks

3.3.1. Alternative dispersion measures

Stock recommendation ratings are ordinal ranking variables. Means and standard deviations are not univariate statistics that are perfectly suited for these variables. Standard deviation is an appropriate measure of dispersion for ordinal variables if the distance between each two adjacent values is constant. One could argue such an assumption may hold for stock recommendation ratings, but there is no convincing argument or clear evidence that the distance between a 'Buy' and a 'Strong Buy' should or should not be the same as the difference between a 'Buy' and a 'Hold'. To ensure the robustness of the results, I construct three alternative recommendation dispersion measures and repeat the analysis in Table 3.3.

The first alternative recommendation dispersion measure (*MDISP*) is defined based on the mode of analysts' recommendation ratings. The calculation of this measure is straightforward

$$MDISP_{i,t} = 1 - Frac(Mode)_{i,t}, \tag{3.1}$$

where $Frac(Mode)_{i,t}$ denotes the fraction of analysts' recommendations that are the same as the mode for stock *i* in month *t*. If the mode captures the most widely held views of the analysts, *MDISP* is the fraction of recommendations that differ from the prevailing view.

The second alternative recommendation dispersion measure is defined based on the concept of entropy and is calculated as

$$ENTROPY_{i,t} = -(\sum_k Frac(k)_{i,t}[ln(Frac(k)_{i,t})]), \tag{3.2}$$

where $Frac(k)_{i,t}$ represents the fraction of analysts' recommendations with a rating of *k* for stock *i* in month *t*, and *k* could have a value from any of the five ratings.[13] This measure is nonnegative and can attain a value of 0 when the stock receives the same recommendation rating from all analysts covering the stock. A higher value indicates greater disagreement. Rich and Tracy (2010), among others, use this measure to evaluate the disagreement among economic forecasters in their inflation forecasts.

The third alternative recommendation dispersion measure, $FDISP$, is defined as

$$FDISP_{i,t} = \sqrt{Frac(1)_{i,t} + Frac(3,4,5)_{i,t} - (Frac(1)_{i,t} - Frac(3,4,5)_{i,t})^2}, \tag{3.3}$$

where the fractions of individual analysts' recommendations with a rating of 1, and with ratings of 3, 4, or 5, are computed respectively for stock *i* and month *t*. Here, the rating 2 or the 'Buy' rating is excluded as it can be viewed as a neutral or a null rating based the distribution of all recommendation ratings in the sample. This measure captures the deviation from the null rating while overweighting greater deviations from the null. Bachmann, Elstner, and Sims (2013) use a similar measure to capture cross-sectional dispersion of forecasts based on survey responses.

All three measures, *MDISP*, $Entropy$, and $FDISP$, are based on the fractions of recommendation ratings that are better suited for ordinal data and do not rely on the assumption of equal distance between adjacent rankings. The three measures are highly correlated with the main rec-

[13]For example, if a stock has five outstanding recommendations, 2, 2, 3, 3, and 4, then the entropy measure will be $-(0.4 \times ln(0.4) \times 2 + 0.2 \times ln(0.2)) = 1.05$.

ommendation dispersion measure with correlations of 0.58, 0.65, and 0.75, respectively. The three measures are also highly correlated with each other. For example, the correlation between *Entropy* and *MDISP* is 0.92, and the correlation between *Entropy* and *FDISP* is 0.62.[14]

Table 3.5 reports the monthly return results based on the three alternative dispersion measures. Consistent with the results in Table 3.3, stocks with high recommendation dispersion based on the three measures tend to earn higher returns than stocks with low dispersion. While the outperformance is not significantly different from zero for most holding horizons, high-dispersion stocks clearly do not underperform low-dispersion stocks. The one exception is the portfolios sorted on *FDISP*, where the 'High - Low' return spreads are significantly positive. Similar to Table 3.3, high-dispersion stocks tend to slightly outperform their benchmarks and low-dispersion stocks tend to slightly underperform their benchmarks. Again, neither of the two differences is significant. Results based on buy-and-hold returns (not reported) are similar to the monthly return results.

3.3.2. Value-weighted portfolio returns

The results from Tables 3.3 and 3.4 are portfolio returns based on equal weighting within the dispersion portfolios. Diether, Malloy, and Scherbina (2002) find that the underperformance of high-dispersion stocks is much weaker for value-weighted returns, suggesting the underperformance result is largely driven by small stocks. Here, I examine whether the recommendation dispersion portfolios exhibit a similar pattern. I compute valued-weighted returns for the dispersion portfolios for Tables 3.3 and 3.4 respectively. The results are provided in the appendix (Table 3.10).

Consistent with the value-weighted results in Diether, Malloy, and Scherbina (2002), the high-dispersion portfolios based on earnings forecasts do not significantly underperform low-

[14]Note that these measures are not without disadvantages. For example, the measure *MDISP* requires a well-defined mode in the recommendation ratings.

dispersion portfolios for any of the four holding horizons in my sample. The difference between the value-weighted and equal-weighted results highlights the role of small stocks in the underperformance of high-dispersion stocks. In contrast, the value-weighted results based on recommendation dispersions are remarkably similar to the equal-weighted results. For all four dispersion measures, high-dispersion stocks moderately outperform low-dispersion stocks, though the outperformance is not statistically significant for most holding horizons. The unreported results based on the three alternative recommendation dispersion measures are similar.

4. Consensus Opinion, Disagreement, and Stock Returns

Theoretical works by Varian (1985) and Abel (1989) indicate the importance of investor opinion in determining the relation between differences of opinion and asset prices. More recent works by Jouini and Napp (2007) and Atmaz and Basak (2018) show belief dispersion and average belief jointly determine asset prices. Specifically, the "bias" of the average beliefs, or optimistic and pessimistic beliefs can affect the relation between belief dispersion and stock returns differently. In this section, I investigate how investor opinion and disagreement jointly affect stock returns even though disagreement alone does not have strong predictability for subsequent stock returns.

4.1. Portfolio Returns

I use the mean recommendation rating as the main variable for the consensus opinion and later provide evidence based on median recommendation rating. For each month, I sort stocks into size quintile portfolios based on their market capitalizations, and then within each size quintile sort stocks into three portfolios based on recommendation dispersion and mean recommendation rating independently. The independent sorting allows us to examine the distribution of stocks across recommendation levels and recommendation dispersion rankings and investigate the relation between the two measures as well as their relation with subsequent returns. I further verify the findings based on conditional sorting.

Stocks with the lowest (most favorable) mean recommendation ratings are grouped into the 'Buy' portfolio whereas stocks with the highest mean ratings are in the 'Sell' portfolio. The time-series average mean recommendation ratings of the 'Buy', 'Hold', and 'Sell' portfolios are 1.67, 2.22, and 2.84, respectively. As explained earlier, the portfolios based on the recommendation ratings should be more appropriately termed as 'Highly rated', 'Medium', and 'Lowly rated'. I use the term 'Buy', 'Hold', and 'Sell' for ease of discussion. Note that the stocks in the 'Buy' portfolios on average are rated between the I/B/E/S 'Strong buy' rating and the I/B/E/S 'Buy' rating, while stocks in the 'Sell' portfolios are rated slightly better than the I/B/E/S 'Hold' rating. Stocks in the 'Hold' portfolios on average are rated between the I/B/E/S 'Buy' rating and I/B/E/S 'Hold' rating, but are much closer to 'Buy' than to 'Hold'.

Table 3.6 presents the monthly portfolio returns of the mean recommendation and recommendation dispersion portfolios, along with the distribution of stocks across the portfolios. To conserve space, the buy-and-hold portfolio returns are reported in the appendix (Table 3.11). All portfolio returns in Table 3.6 are equal-weighted while the value-weighted results are included in the appendix (Table 3.12).

I first report the relation between the consensus opinion of analysts and subsequent returns. As reported in the rows with the label 'All', the 'Buy' portfolios earn negative benchmark-adjusted returns, whereas the 'Sell' portfolio tends to have positive adjusted returns. The bottom panel of Table 3.6 shows that the 'Buy' portfolio slightly underperforms the 'Sell' portfolio in general. Neither the abnormal returns of the two portfolios nor their difference is statistically significant. The 'Hold' portfolio overall has the highest post-formation adjusted returns among the three portfolios. For example, with the 3-month horizon, the 'Hold' portfolio has a significantly positive monthly adjusted return of 0.08%. The abnormal returns of the the 'Hold' portfolio are statistically significant across all four time horizons, but the magnitude of the outperformance is relatively small. The annualized abnormal return is below 1%.

In this essay, the expressed aggregate opinions represent prevailing views of the financial analysts. My results thus are different from studies that show that stock recommendations of financial analysts are informative and can predict stock returns (Womack, 1996; Barber et al., 2001; Jegadeesh et al., 2004). These studies use more timely individual analyst recommendation changes, not the aggregate opinions of the analysts measured at monthly frequency.

I now examine the returns of the dispersion portfolios across the three recommendation levels. Starting with the high-dispersion stocks, half of these stocks are in the 'Hold' portfolio and the other half are in the 'Buy' and 'Sell' portfolios. It is reasonable that stocks that analysts disagree the most on are more likely to fall into the medium rating group. Within both the 'Buy' and 'Sell' portfolios, the high-dispersion stocks exhibit minimal abnormal returns, though the abnormal returns are slightly negative in the 'Sell' portfolio. The high-dispersion stocks in the 'Hold' portfolio exhibit positive though largely insignificant abnormal returns. The results here show that the high-dispersion stocks do not exhibit abnormal returns when investor opinions are notably optimistic or pessimistic. Note that the performance of the high-dispersion stocks overall in Table 3.3 is largely driven by the stocks with average medium ratings (the 'Hold' portfolio).

Low-dispersion stocks are more likely to be in the 'Buy' or 'Sell' portfolios based on their average ratings. For my sample, 37% of these low-dispersion stocks have highly favorable ratings and 44% have least favorable ratings. The remaining stocks (19%) are in the 'Hold' portfolio. The stocks with strong agreement from financial analysts have distinctive return patterns across the consensus opinion portfolios. In the 'Buy' portfolio, low-dispersion stocks significantly underperform their benchmarks over three of the four holding periods. The low-dispersion stocks in the 'Sell' portfolio perform better than their benchmarks, but the differences are not statistically significant. Low-dispersion stocks in the 'Hold' portfolio exhibit no abnormal returns. For the 3-month holding period, the monthly adjusted returns of the low-dispersion stocks in the 'Buy', 'Hold', and 'Sell' portfolios, are -0.20%, -0.01%, and 0.07%, respectively. The negative abnormal returns of the low-dispersion stocks in the overall sample in Table 3.3 are driven by the stocks favored by the analysts.

Most strikingly, Table 3.6 shows that the relation between disagreement and future stock returns depends crucially on the consensus opinions. Comparing the dispersion portfolio returns within the three recommendation levels reveals the difference in the relations between disagreement and stock returns. Within the 'Buy' portfolio, high-dispersion stocks significantly outperform low-dispersion stocks, resulting in the positive and significant 'High-Low' return spreads between the two portfolios. These positive return spreads are also driven largely by the low-dispersion stocks rather than the high-dispersion stocks. Stocks in the 'Sell' portfolio exhibit the opposite relation. High-dispersion stocks tend to underperform their benchmarks while low-dispersion stocks slightly outperform. Thus, the 'High-Low' return spreads are negative and the differences are significant for the 3- to 6-month holding horizons. For example, the average monthly benchmark-adjusted return of the 'High' portfolio over the 3-month holding period is -0.12%, which is 0.19% lower than the return of the 'Low' portfolio, and the 'High-Low' return discrepancy is statistically significant. In the 'Hold' portfolio, high-dispersion stocks do not perform significantly differently from low-dispersion stocks.

The results based on alternative sorting and portfolio construction methodologies are reported in the appendix. The buy-and-hold results (Table 3.11) on average exhibit a stronger pattern within the recommendation portfolios than in Table 3.6. The high-dispersion and low-dispersion return spreads are statistically positive for the 'Buy' portfolio and significantly negative for the 'Sell' portfolio for holding horizons from 3 months to 12 months. For conditional sorting, I first sort stocks into recommendation portfolios and then within each recommendation portfolio I further sort the stocks into three equal-sized dispersion portfolios. The results (Table 3.13) are largely similar to those in Table 3.6, though the underperformance of the high-dispersion stocks in the 'Sell' portfolio is somewhat weaker. I also use the median instead of the mean rating to classify the recommendation portfolios. The results (Table 3.14) are again similar to those in Table 3.6. In addition, I use *MDISP*, *Entropy*, and *FDISP* as dispersion measures along with the median to form recommendation and recommendation portfolios. The results are largely in line with the main results. In untabluated results, I confirm that the evidence based on value-weighted portfolio returns is consistent with the findings based on equal-weighted returns in the reported tables.

4.2. Regression Results

I run time series regressions of monthly equal-weighted portfolio returns using the Carhart (1997) four factor model to provide further robustness checks. The portfolios include the recommendation portfolios and the recommendation-dispersion double sorted portfolios. I also include the return differences between the high-dispersion and low-dispersion stocks within the recommendation portfolios and the return differences between the 'Buy' and 'Sell' stocks within the dispersion portfolios.

The portfolio alphas are reported in Table 3.7. The format of the table largely parallels Table 3.6 and the results can be easily compared between the two tables. The overall results from the time-series regressions are similar to those based on characteristics benchmark-adjusted returns but with a few notable exceptions. For the recommendation portfolios, the 'Sell' portfolios have significantly positive alphas based on the regression whereas the positive benchmark-adjusted returns are generally not significant (Table 3.6). The outperformance of the 'Hold' portfolio is also stronger in the regression result. 'Buy' portfolio results are similar between the two tables.

The regression results also show a clearer and stronger pattern of performance difference between the high- and low-dispersion stocks within the recommendation portfolios. For example, based on the four-factor model, low-dispersion stocks in the 'Buy' portfolio have significantly negative alphas and the 'High-Low' return spread is significantly positive. The opposite is true for the 'Sell' portfolio. Low-dispersion stocks in the portfolio have significantly positive alphas and the 'High-Low' return spread is significantly negative. Furthermore, as revealed in the bottom panel, the 'Buy-Sell' return spread is negative for the full sample of stocks, and the difference is stronger between the low-dispersion stocks.

I now summarize the results in this section and discuss the potential explanations for the findings. Overall, the results based on the recommendation-dispersion portfolios reveal a richer and more dynamic picture on the relation between investor opinion and stock returns than results solely based on investor disagreement. First, the relation between investor disagreement and subsequent stock returns depends on the consensus opinions of the investors. Compared with low-dispersion stocks, high-dispersion stocks are followed by lower returns for stocks with 'Sell' recommendations, but higher returns for stocks with 'Buy' recommendations. The 'High-Low' dispersion return spread has the opposite sign in the 'Buy' and 'Sell' portfolios.

Second, investor opinion matters as much for subsequent stock returns as investor disagreement. 'Buy' ('Sell') recommendations with low disagreement are associated with negative (positive) subsequent returns. Stocks with 'Buy' recommendations significantly underperform stocks with 'Sell' recommendations for the overall sample and particularly when disagreement over their investment values is low. For the full sample, investor disagreement is not significantly associated with subsequent stock returns, but the relation between disagreement and stock return holds significantly though differently conditioning on investor opinions.

Third, and perhaps most surprisingly, strong agreement among investors rather than strong disagreement is more likely to be associated with subsequent abnormal returns. Strong agreement in the 'Buy' portfolio leads to lower returns while strong agreement in the 'Sell' portfolio leads to higher returns. Stock returns are opposite to the opinions, and consequently, the 'Buy-Sell' spread is highly negative. In comparison, strong disagreement on stocks with either optimistic or pessimistic views does not lead to significant abnormal returns and the 'Buy-Sell' spread is not different from zero. Notably, the 'High-Low' dispersion return spreads within the 'Buy' and 'Sell' portfolios are driven by the low-dispersion stocks.

The results are consistent with the general predictions of Jouini and Napp (2007) and Atmaz and Basak (2018) that belief dispersion and average belief jointly determine asset prices. Specifically, the "bias" of the average beliefs, or optimistic and pessimistic beliefs can affect the relation between belief dispersion and stock returns differently. However, the finding of a positive relation between dispersion and return in 'Buy' stocks and a negative relation in 'Sell' stocks is the opposite of Atmaz and Basak's prediction of a negative relation when the view is optimistic and a positive relation otherwise.

Neither Jouini and Napp (2007) nor Atmaz and Basak (2018) consider the effects of market imperfections such as short-sale constraints in their models. A robust result in the literature on heterogenous beliefs is that short-sale constraints can impede the full incorporation of the divergent views in asset price and generate return predictability. Could short-sale constraints affect stock prices differently when investor consensus opinions differ (optimistic vs. pessimistic)? Do short-sale constraints impede the incorporation of opposing views when investors have strong agreement? I then examine whether and how short-sale constraints can be related to the stock return patterns of consensus opinion and dispersion portfolios.

5. Consensus, Disagreement, and Short-Sale Constraints

Miller (1977) argues that short-sale constraints can affect prices of stocks with great differences of opinion because they are likely to impede the full incorporation of the negative views. However, short-sale constraints may as well impede the incorporation of opposing views when investors have strong agreement, which could potentially explain the divergent return patterns documented in the proceeding sections. In this section, I examine how consensus recommendations and recommendation dispersion are related to short-sale constraints and whether short-sale constraints can help to explain the abnormal returns of the recommendation-dispersion portfolios.

5.1. Short-Selling Activities and Constraints

I obtain short-selling data from Compustat and equity lending data from Markit Data Explorer. The Markit database provides detailed information on the costs and equity lending activities for the vast majority of CRSP firms from June 2004.[15] To investigate short-selling activities and the short-sale constraints associated with analysts' stock recommendations, I construct the following variables. Short Interest Ratio (SIR) is defined as the stock's current-month open short interest from Compustat divided by the number of shares outstanding.[16] All other monthly variables are from the Markit data. Short-selling supply (Supply) is defined as the 'Lendable Quantity' (total lendable inventory available) divided by the number of shares outstanding. The utilization ratio (UTIL) is the number of shares borrowed divided by shares available for lending. The Daily Cost of Borrowing Score (DCBS) is assigned by Markit to indicate the overall cost of borrowing whose values range from 1 (cheap to borrow) to 10 (expensive to borrow). I designate a 'Special' dummy variable that equals one if the borrowing cost (DCBS) is equal to or greater than 2.

Table 3.8 reports the average short-selling activity, supply, utilization ratio, borrowing cost, and the percentage of stocks on 'Special' for all portfolios sorted on the consensus opinion and opinion dispersion for the period from June 2004 to 2018. It shows that stocks with 'Sell' recommendations are associated with higher short-selling activity. The average SIR is 6.3% for the 'Sell' portfolio, a full percentage point higher than that of the stocks in the 'Buy' portfolio. The 'Hold' portfolio has a SIR value of 5.6%. The supply of loanable shares is slightly lower for stocks in the 'Sell' portfolio (0.9%). Consequently, the utilization ratio, shorted shares relative to all loanable shares, is higher for the 'Sell' stocks. For the full sample, the utilization ratio is 20% for 'Sell' stocks, and 17% for the 'Buy' stocks. Even though the short-selling activities are higher for the

[15] See Beneish, Lee, and Nichols (2015) for more detailed description of the data.

[16] Markit Data Explorer also provides short-selling information, but its short interest data are compiled based on reports from lenders and borrowers covered by the database. Compustat data are from exchange reports. I compared the short interest information from the two databases and find small though persistent differences. I choose to use the more comprehensive Compustat short-selling data in the analysis but the results hold true based on the Markit data.

'Sell' stocks, based on the utilization ratio, on average the supply of loanable shares is adequate in the equity lending market.

Short-selling activities and lending supply differ substantially across the dispersion portfolios within each recommendation group. The results show that, within the 'Buy', 'Hold', or 'Sell' portfolio, stocks with higher recommendation dispersion always have higher short interest ratios. The average SIR is 7.7%, 5.8%, and 5.4% for the high-dispersion stocks in the 'Sell', 'Hold', and 'Buy' portfolio respectively. In comparison, the average SIR is 5.3%, 4.9%, and 5.2% for the low-dispersion stocks in the three portfolios. Notice that the difference between the high- and low-dispersion portfolios is 2.4% and highly significant for the 'Sell' portfolio, while the difference (0.23%) is much smaller in the 'Buy' portfolio.

The supply of loanable shares, however, is always lower when analysts have strong agreement. In all three recommendation portfolios, the supply is the lowest for the low-dispersion stocks. The difference in 'Supply' between the high- and low-dispersion stocks is 1.75% in the 'Sell' portfolio and 2.17% in the 'Buy' portfolio. Short-selling activities (SIR), which represent the realized demand, are always higher for the high-dispersion stocks. While lending supply is also higher for these stock, its relation with short-selling demand drives the different patterns of utilization ratio across the recommendation portfolios. The results show that utilization ratios exhibit different patterns in the recommendation groups. In the 'Sell' portfolio, high-dispersion stocks have the highest utilization ratio, at 23.33%, much higher than 17.26% for the low-dispersion stocks. In the 'Buy' portfolio, low-dispersion stocks have the highest utilization ratio, at 16.91%, also significantly higher than 15.68% for the high-dispersion stocks.

I now examine two direct measures of short-sale constraints based on the overall borrowing costs and lending availability. I compute the average DCBS, the daily cost of borrowing score, for all the portfolios and further compute the percentage of stocks within each portfolio that are designated as 'Special' based on the score. The average borrowing cost score is higher for the 'Sell' stocks (1.40) than for the 'Buy' stocks (1.30). Within the 'Sell' portfolio, high-dispersion stocks have a higher average score (1.48) than the low-dispersion stocks (1.30). The opposite is true for the 'Buy' portfolio. Within this portfolio, low-dispersion stocks have a higher average score (1.32) than the low-dispersion stocks (1.19). Consistent with the supply results, within the 'Hold' portfolio, low-dispersion stocks also have a higher average score (1.62) than the high-dispersion stocks (1.28).

The distribution of the 'Special' stocks across the portfolios mirrors that of the average borrowing cost scores (DCBS). We could interpret these 'Special' stocks, or difficult to short stocks, as those facing binding short-sale constraints. Across the recommendation levels, there are a higher percentage of 'Special' stocks in the 'Sell' portfolio than in the 'Buy' portfolio. The percentages of 'Special' stocks are 12.85%, 10.15%, and 10.32% for the 'Sell', 'Hold' and 'Buy' portfolios, respectively. The distribution of 'Special' stocks also varies across the dispersion portfolios. The percentages of 'Special' stocks are 11.85%, 10.63%, and 10.37% for the 'Low', 'Medium', and 'High' portfolios, respectively. Notably, for the full sample, the high-dispersion portfolio has the lowest percentage of 'Special' stocks, while the low-dispersion portfolio has the highest percentage of 'Special' stocks.

Within the recommendation portfolios, a much clearer pattern of 'Special' stocks emerges across the dispersion levels. In the 'Sell' portfolio, a higher percentage of high-dispersion stocks (14.85%) are 'Special' than the percentage of low-dispersion stocks (10.74%). In the 'Buy' portfolio, compared with the high-dispersion stocks (6.85%), a greater percentage of low-dispersion stocks are 'Special' (11.29%). The 'Hold' portfolio also exhibits a dramatic difference between the low-dispersion stocks (16.01%) and the high-dispersion stocks (9.59%).

The results in this section illustrate that both investor opinion and the differences are associated with short-selling activities and binding short-sale constraints. Short-selling activity is higher when investor opinion is more pessimistic, and the stocks in the 'Sell' portfolio are more likely to face binding short-sale constraints. There also exists a general pattern of increasing short-selling with increasing disagreement and such a pattern holds within each recommendation level.

However, relative to high-dispersion stocks, low-dispersion stocks are more likely to face binding short-sale constraints as a whole. Even though among the 'Sell' rated stocks high-dispersion stocks are more likely to face binding short-sale constraints than low-dispersion stocks, we see a clear pattern that low-dispersion stocks are more likely to face binding short-sale constraints than high-dispersion stocks in the two other portfolios.

The main driver of this diverging pattern between short-selling and the likelihood of short-sale constraints seems to lie in the supply side of short-selling activity. When investors have strong agreement, supply of loanable shares is lower. This holds true for the full sample and for each of the three recommendation portfolios. The results suggest, when investors have strong agreement of non-negative views, due to the reduced supply of shares, it could be difficult even for a small number of pessimistic investors to short. Thus strong agreement of investor opinions could impede the incorporation of negative views into prices.

Most studies identify the effects of investor disagreement on short-selling activities by focusing on the demand side of short-selling. If the divergence of investor opinion is greater, the demand of short-selling is higher due to the larger proportion of investors holding pessimistic views. Short-selling is more likely to be binding because of the higher demand of these investors. My results show that, the supply side of short-selling is also important in generating short-sale constraints. Strong agreement of investor opinions, particularly when the consensus opinion is not negative, lowers the supply of loanable shares and restricts short-selling. The supply-side effect is related to both the consensus opinion and the dispersion of these opinions.

In summary, the results in this subsection show that both investor opinions and the levels of disagreements are associated with short-sale constraints. The findings in this subsection suggest investor opinions and their (dis)agreement can affect asset prices jointly because both are related to the incorporation of divergent views in stock prices. Specifically, the effects of strong agreement on short-sale constraints imply that strong agreement can affect asset pricing. In the next subsection, I examine whether short-sale constraints can help to clarify the joint effects of investor opinion and differences of opinion on stock returns.

5.2. Recommendation, Short-sale Constraints, and Stock returns

In this subsection, I examine how investor opinion and disagreement are separately and jointly related to subsequent returns through the channel of short-sale constraints. For each month, I form portfolios sorted on consensus recommendations and recommendation dispersion independently as I did in Table 3.6. I identify the binding short-sale constraint based on the 'Special' status of a stock at the end of the month and further split each of the recommendation-dispersion portfolios into 'Special' and 'Non-special' sub-groups.

Table 3.9 reports the monthly benchmark-adjusted returns of all portfolios for varying holding periods as well as the number of 'Special' and 'Non-special' stocks in each portfolio. I also separately report short interest ratio, supply, and utilization ratio for the 'Special' and 'Non-special' stocks. Because the sample used for Tables 8 and 9 includes short selling information from Markit, the sample period is from June 2004 to 2018. I reproduce the results in Table 3.6 for recommendation-dispersion portfolios over this shorter sample period and report the results in the appendix (Table 3.15). The results based on this shorter time period are qualitatively similar to those in Table 3.6. One notable exception is that the return spreads between high-dispersion and low-dispersion stocks in the 'Sell' portfolio are not statistically significant.

For the full sample, 'Special' stocks consistently have negative benchmark-adjusted returns and significantly underperform the 'Non-special' stocks. The short interest ratio of 'Special' stocks more than doubles that of the 'Non-special' stocks, and the supply of loanable shares for the 'Special' stocks is only half of the supply of the 'Non-special' stocks.

The underperformance of 'Special' stocks differs across the recommendation levels. Within the 'Buy' portfolio, all 'Special' stocks have similar and highly negative returns across the three dispersion levels. Within the 'Sell' portfolio, 'Special' stocks have negative returns but the magnitude and the significance of the underperformance are lower for the low-dispersion stocks. 'Special' stocks in the 'Hold' portfolio exhibit abnormal return patterns that are weaker than those in 'Buy' and 'Sell' portfolios. The supply of loanable shares for the 'Special' stocks decreases with greater investor agreement, and this pattern holds true for all three recommendation levels. The lending supply is also lower in the more optimistic portfolios for all 'Special' stocks across the dispersion levels.

'Non-special' stocks exhibit drastically different return patterns across the recommendation levels. When the consensus opinion is negative (the 'Sell' portfolio), stocks without binding short-selling constraints do not perform differently from their benchmarks for all three dispersion levels. But in the 'Buy' and 'Hold' portfolios, stocks with substantial investor disagreement but not facing short-sale constraints, experience significantly positive abnormal returns. In all three portfolios, low-dispersion stocks without binding constraints exhibit no abnormal returns. The results seem to suggest, while strong agreement of optimistic views can impede the incorporation of negative views, disagreement can affect the stock prices differently with and without short-sale constraints.

As documented earlier, investor agreement tends to be higher in the most and least favored stocks. A larger proportion of stocks have low-dispersion than high-dispersion in the 'Buy' and 'Sell' portfolios. The different distributions of short-sale constraints and the different returns of the constrained and unconstrained stocks across the recommendation-dispersion portfolios drive the performance results in these portfolios. The negative returns of the low-dispersion-'Buy' portfolio are a result of the negative returns of the 'Special' stocks and their greater weight in the portfolio. In comparison, the positive returns of the high-dispersion-'Buy' portfolio are the result of the positive returns of the 'Non-special' stocks and their much larger weight in the portfolio, which more than offset the negative returns of the 'Special' stocks. For the 'Sell' portfolio, the larger weight of the 'Special' stocks in the high-dispersion-'Sell' portfolio and their negative returns are largely responsible for the portfolio's lower returns.

Short-sale constraints seem to be particularly binding when the aggregate investor opinion is non-negative and when the opinions are in high agreement. Not only a larger proportion of those stocks experience binding constraints, but they also experience highly negative returns. Short-sale constraints play a much less important role when investor opinions are negative. When investors agree, a smaller proportion of stocks face constraints and they have insignificantly negative returns when they do. A larger proportion of stocks face constraints when investors have substantial disagreement, but even in this case, the underperformance is only marginally significant. The results reveal the asymmetric effects of short-sale constraints on stock valuation. Because short-selling is largely concerned with the incorporation of negative opinions in the stock prices, when the aggregate opinion is negative, stock prices have largely incorporated the negative information.

In summary, results in Table 3.9 show that short-sale constraints influence subsequent returns of the constrained stocks, but the effects differ with respect to investor opinion. The relation of the consensus opinion and the differences of opinion with short-sale constraints can partly explain the relation of the consensus opinion and the differences of opinion with subsequent stock returns.

6. Conclusions

I measure investors' opinions and their disagreement based on financial analysts' stock recommendations and study how investor opinion and their differences affect stock prices. I find that investor disagreement by itself does not predict future stock returns and the relation between dispersion of opinion and future stock returns depends crucially on the consensus opinion.

I provide the first systematic empirical analysis that links investor opinion with dispersion of opinion and shows the joint effects of the two on stock prices. The evidence supports the developing theoretical literature that both investors' opinions and their dispersions matter for stock returns.

The analysis provides some surprising results on short-sale constraints and their link with investor disagreement. Not only are short-sale constraints related to investor opinion, but they are also more affected by strong investor agreement than disagreement. Strong investor agreement can impede the incorporation of opposing views in asset prices due to the supply effect. The role of lending supply in short-sale constraints has not been emphasized in the theoretical literature. Future theoretical work can potentially examine how both investor agreement and disagreement could affect short-sale constraints through the demand and supply channels of short-selling.

Tables

Table 3.1: Descriptive Statistics on Analyst Coverage and Stock Recommendation

Panel A presents the descriptive statistics of firms covered by financial analysts from I/B/E/S, including the mean and standard deviation of recommendation ratings, and the percentage of firms with consensus 'buy' ratings, by year. Panel B presents the distribution of analyst coverage for the covered firms. *No. of Firms with Coverage (No. of Firms Covered by Two)* reports the number of firms covered by at least one (two) analyst(s). *% of Firms with Coverage (% of Firms Covered by Two)* reports the percentage of firms covered by at least one (two) analyst(s) out of all firms in the monthly CRSP data file that have a share code of 10 or 11. *Mean Rec* represents the average recommendation rating. *Rec Dispersion* represents the average of the standard deviations of analysts' ratings for each firm. *% of Buys* represents the percentage of the firms that received a consensus rating less than or equal to 2.

Year	Panel A. Firms with Analyst Coverage							Panel B. No. of Analysts per Firm				
	No. of Firms with Coverage	No. of Firms Covered by Two	% of Firms with Coverage	% of Firms Covered by Two	Mean Rec	Rec Dispersion	% of Buys	Mean	Median	Min	Max	Std.
1994	4187	3334	57.45	45.75	2.15	0.75	51.63	5.44	3	1	36	5.58
1995	4626	3700	60.53	48.42	2.15	0.73	51.07	5.63	3	1	39	5.81
1996	5239	4230	64.54	52.11	2.10	0.69	54.10	5.31	3	1	40	5.40
1997	5520	4511	66.89	54.67	2.05	0.66	58.04	5.18	3	1	42	5.14
1998	5559	4556	69.15	56.67	2.04	0.64	58.71	5.28	4	1	40	5.14
1999	5506	4555	71.15	58.86	2.06	0.65	58.27	5.95	4	1	43	5.85
2000	5260	4312	71.47	58.59	2.01	0.64	62.75	6.15	4	1	42	6.07
2001	4563	3751	68.50	56.31	2.08	0.65	55.60	6.17	4	1	43	5.98
2002	4143	3431	69.41	57.48	2.21	0.72	46.10	6.51	4	1	43	6.14
2003	3793	3092	68.05	55.47	2.45	0.79	31.21	6.62	4	1	49	6.37
2004	3770	3194	70.38	59.62	2.36	0.80	35.80	7.10	5	1	46	6.67
2005	3868	3330	73.34	63.14	2.34	0.79	35.91	7.35	5	1	45	6.64
2006	3907	3412	75.34	65.79	2.32	0.78	36.14	7.54	6	1	47	6.65
2007	3940	3489	76.55	67.79	2.33	0.77	36.28	7.60	6	1	44	6.35
2008	3682	3272	76.37	67.87	2.31	0.77	37.94	7.16	6	1	41	5.78
2009	3385	2963	74.46	65.18	2.38	0.80	33.35	7.67	6	1	44	6.50
2010	3340	2941	76.87	67.69	2.22	0.81	42.07	8.49	6	1	54	7.42
2011	3344	2957	80.42	71.12	2.18	0.80	43.78	9.07	7	1	56	7.95
2012	3288	2938	81.91	73.19	2.19	0.77	42.96	9.22	7	1	57	7.98
2013	3250	2941	81.80	74.02	2.24	0.75	39.81	9.35	7	1	57	7.99
2014	3330	3033	82.69	75.32	2.21	0.74	43.12	9.25	7	1	54	7.92
2015	3367	3076	83.44	76.23	2.22	0.72	43.79	9.15	6	1	52	8.00
2016	3294	3011	83.33	76.17	2.25	0.71	42.22	9.12	6	1	52	8.09
2017	3198	2901	82.49	74.83	2.29	0.71	39.88	8.97	6	1	49	7.90
2018	3211	2948	83.42	76.59	2.23	0.71	43.82	8.84	6	1	51	7.76

Table 3.2: Portfolio Characteristics by Dispersion

Panel A and Panel B present the equal-weighted characteristics of portfolios sorted on recommendation dispersion and earnings forecast dispersion, respectively. *Rec Dispersion* is the standard deviation of analysts' ratings reported in the I/B/E/S Summary History file. *EF Dispersion* is defined as the ratio of the standard deviation of analysts' current-fiscal-year annual earnings per share forecasts reported in the I/B/E/S Summary History file to the absolute value of the mean forecast. Each month, stocks are sorted into size quintiles based on their market capitalization at the end of last June and the corresponding NYSE break points. Within each size quintile, stocks are further sorted into 'Low', 'Medium', and 'High' portfolios based on the corresponding dispersion measure. The 'Low' ('High') portfolio consists of stocks that have the least (most) dispersed recommendation ratings or earnings forecasts. *Mean Rec* represents the mean recommendation ratings of each dispersion portfolio. *Size Ranking*, *BM Ranking*, and *Momentum Ranking* report, respectively, the quintile rankings of stocks based on their market capitalizations measured at the end of last June, book-to-market ratios measured at the end of last fiscal year, and past 12-month cumulative returns measured at the end of last June. *Turnover* is defined as the ratio of the stock's current-month trading volume to the number of shares outstanding. *Total Volatility* is the standard deviation of the stock's prior 52-week returns measured at the end of last month. *Idio Volatility* is defined as the standard deviation of the residuals from regressions of the prior 52-week returns on the Fama-French three factors. *No. of Stocks* reports the time-series average number of stocks in each portfolio. Newey-West t-statistics are reported in parentheses.

Portfolio	Rec Dispersion	EF Dispersion	Mean Rec	Size Ranking	BM Ranking	Momentum Ranking	Turnover (%)	Total Volatility (%)	Idio. Volatility (%)	No. of Stocks
Panel A: Characteristics of Portfolios Sorted by Recommendation Dispersion										
Low	0.40	0.18	2.26	2.50	2.95	3.04	17.31	6.34	5.40	899
Medium	0.76	0.18	2.18	2.48	2.90	3.00	19.09	6.40	5.45	917
High	1.07	0.19	2.29	2.52	2.92	2.90	18.58	6.30	5.37	888
High - Low	0.67	0.02	0.03	0.02	-0.03	-0.13	1.27	-0.04	-0.03	
	(72.04)	(2.79)	(2.51)	(2.91)	(-2.77)	(-10.41)	(5.62)	(-0.71)	(-0.73)	
Panel B: Characteristics of Portfolios Sorted by Earnings Forecast Dispersion										
Low	0.73	0.01	2.16	2.535	2.71	3.23	14.95	5.27	4.46	870
Medium	0.75	0.05	2.23	2.537	2.88	3.01	18.02	6.18	5.25	873
High	0.76	0.49	2.33	2.531	3.15	2.73	22.46	7.38	6.30	875
High - Low	0.04	0.47	0.18	-0.004	0.44	-0.50	7.51	2.11	1.84	
	(8.81)	(26.91)	(9.15)	(-11.01)	(21.35)	(-11.60)	(18.28)	(17.04)	(21.21)	

Table 3.3: Portfolio Returns by Recommendation Dispersion

This table presents post-formation percentage returns of portfolios sorted on recommendation dispersion. *Recommendation Dispersion* is the standard deviation of analysts' ratings reported in the I/B/E/S Summary History file. Each month, stocks are sorted into size quintiles based on their market capitalizations at the end of last June and the corresponding NYSE break points. Within each size quintile, stocks are further sorted into 'Low', 'Medium', and 'High' portfolios based on their recommendation dispersions. The 'Low' ('High') portfolio consists of stocks that have the least (most) dispersed recommendation ratings. Portfolios are held for 1, 3, 6, or 12 months, and portfolio returns are equal-weighted. The left and right panels report the raw and DGTW-Adjusted portfolio returns, respectively. Panel A reports the returns of the monthly-rebalanced portfolios calculated based on the strategy employed in Jegadeesh and Titman (1993), along with *t*-statistics in parentheses. Panel B reports the post-formation buy-and-hold cumulative portfolio returns with Newey-West *t*-statistics in parentheses.

Recommendation Dispersion	Raw Returns				DGTW-Adjusted Returns			
	1-Month	3-Month	6-Month	12-Month	1-Month	3-Month	6-Month	12-Month
Panel A: Post-Formation Monthly Rebalanced Portfolio Returns (%)								
Low	0.954	0.963	0.968	0.978	-0.047	-0.049	-0.043	-0.041
	(2.80)	(2.86)	(2.88)	(2.97)	(-1.26)	(-1.36)	(-1.21)	(-1.17)
Medium	1.104	1.101	1.095	1.104	0.079	0.072	0.063	0.063
	(3.23)	(3.24)	(3.25)	(3.36)	(1.75)	(1.70)	(1.60)	(1.79)
High	0.996	1.022	1.049	1.097	-0.011	0.002	0.024	0.059
	(2.97)	(3.07)	(3.18)	(3.40)	(-0.27)	(0.04)	(0.60)	(1.44)
High - Low	0.042	0.060	0.080	0.119	0.036	0.050	0.067	0.100
	(0.71)	(1.04)	(1.46)	(2.31)	(0.79)	(1.17)	(1.60)	(2.50)
Panel B: Post-Formation Buy-and-Hold Portfolio Returns (%)								
Low	0.954	2.892	5.880	12.116	-0.047	-0.145	-0.262	-0.490
	(2.80)	(3.61)	(4.27)	(4.63)	(-1.26)	(-1.78)	(-1.81)	(-1.89)
Medium	1.104	3.344	6.802	14.088	0.079	0.219	0.389	0.715
	(3.23)	(4.07)	(4.84)	(5.12)	(1.75)	(2.27)	(2.71)	(2.49)
High	0.996	3.078	6.471	13.675	-0.011	0.005	0.156	0.692
	(2.97)	(3.88)	(4.73)	(5.16)	(-0.27)	(0.05)	(0.89)	(1.98)
High - Low	0.042	0.186	0.591	1.559	0.036	0.150	0.418	1.182
	(0.71)	(1.39)	(2.44)	(3.58)	(0.79)	(1.59)	(2.46)	(3.62)

Table 3.4: Portfolio Returns by Earnings Forecast Dispersion

This table presents the post-formation percentage returns of portfolios sorted on earnings forecast dispersion. *Earnings Forecast Dispersion* is defined as the ratio of the standard deviation of analysts' current-fiscal-year annual earnings per share forecasts reported in the I/B/E/S Summary History file to the absolute value of the mean forecast. Each month, stocks are sorted into size quintiles based on their market capitalizations at the end of last June and the corresponding NYSE break points. Within each size quintile, stocks are further sorted into 'Low', 'Medium', and 'High' portfolios based on their earnings forecast dispersions. The 'Low' ('High') portfolio consists of stocks that have the least (most) dispersed earnings forecast. Portfolios are held for 1, 3, 6, or 12 months, and portfolio returns are equal-weighted. The left and right panels report the raw and DGTW-Adjusted portfolio returns, respectively. Panel A reports the returns of the monthly-rebalanced portfolios calculated based on the strategy employed in Jegadeesh and Titman (1993), along with *t*-statistics in parentheses. Panel B reports the post-formation buy-and-hold cumulative portfolio returns with Newey-West *t*-statistics in parentheses.

Earnings Forecast Dispersion	Raw Returns				DGTW-Adjusted Returns			
	1-Month	3-Month	6-Month	12-Month	1-Month	3-Month	6-Month	12-Month
Panel A: Post-Formation Monthly Rebalanced Portfolio Returns (%)								
Low	1.141	1.170	1.152	1.128	0.132	0.155	0.136	0.116
	(4.16)	(4.29)	(4.24)	(4.19)	(1.98)	(2.46)	(2.16)	(1.87)
Medium	1.069	1.039	1.049	1.078	0.062	0.022	0.029	0.052
	(3.21)	(3.16)	(3.20)	(3.38)	(1.43)	(0.56)	(0.78)	(1.41)
High	0.838	0.872	0.905	0.966	-0.147	-0.124	-0.095	-0.067
	(2.02)	(2.11)	(2.20)	(2.42)	(-1.78)	(-1.51)	(-1.18)	(-0.88)
High - Low	-0.303	-0.298	-0.246	-0.162	-0.279	-0.280	-0.231	-0.183
	(-1.54)	(-1.54)	(-1.28)	(-0.88)	(-2.06)	(-2.13)	(-1.79)	(-1.49)
Panel B: Post-Formation Buy-and Hold Portfolio Returns (%)								
Low	1.141	3.491	6.968	13.833	0.132	0.460	0.793	1.302
	(4.16)	(5.44)	(6.37)	(6.43)	(1.98)	(2.78)	(2.47)	(2.03)
Medium	1.069	3.136	6.389	13.345	0.062	0.071	0.197	0.595
	(3.21)	(4.01)	(4.77)	(5.19)	(1.43)	(0.85)	(1.31)	(1.83)
High	0.838	2.678	5.718	12.375	-0.147	-0.367	-0.555	-0.733
	(2.02)	(2.68)	(3.27)	(3.67)	(-1.78)	(-1.93)	(-1.78)	(-1.26)
High - Low	-0.303	-0.813	-1.250	-1.458	-0.279	-0.827	-1.348	-2.034
	(-1.54)	(-1.65)	(-1.34)	(-0.77)	(-2.06)	(-2.55)	(-2.33)	(-1.80)

Table 3.5: Portfolio Returns by Alternative Recommendation Dispersion Measures

This table presents post-formation percentage returns of portfolios sorted on alternative recommendation dispersion measures. In Panel A, the alternative recommendation dispersion measure, ***MDISP***, is calculated as $MDISP = 1 - Frac(Mode)$, where ***Frac(Mode)*** is the ratio of the number of individual analysts' recommendation ratings that are the same as the mode of the ratings to the total number of ratings pertaining to the stock available in I/B/E/S. In Panel B, the recommendation dispersion measure is defined based on the concept of entropy, and is calculated as $ENTROPY = -(\sum_k Frac(k)[ln(Frac(k))])$. For each stock, ***Frac(k)*** represents the fraction of analysts' recommendations with a rating of *k*, and *k* could have a value of 1, 2, 3, 4, or 5. In Panel C, the recommendation dispersion measure is defined as $FDISP = \sqrt{Frac(1) + Frac(3,4,5) - (Frac(1) - Frac(3,4,5))^2}$, where ***Frac(1)*** and ***Frac(3,4,5)*** represent the fractions of individual analysts' recommendations with a rating of 1, and with ratings of 3, 4, or 5, respectively. Each month, stocks are sorted into size quintiles based on their market capitalizations at the end of last June and the corresponding NYSE break points. Within each size quintile, stocks are further sorted into 'Low', 'Medium', and 'High' portfolios based on the alternative measures. The 'Low' ('High') portfolio consists of stocks that have the least (most) dispersed recommendation ratings. Portfolios are held for 1, 3, 6, or 12 months, and portfolio returns are equal-weighted. *No. of Stocks* reports the average number of stocks in each portfolio. The left and right panels report, respectively, the raw and DGTW-Adjusted returns of the monthly-rebalanced portfolios calculated based on the strategy employed in Jegadeesh and Titman (1993). *t*-statistics are reported in parentheses.

Portfolio	Monthly Raw Returns (%)				Monthly DGTW-Adjusted Returns (%)				No. of Stocks
	1-Month	3-Month	6-Month	12-Month	1-Month	3-Month	6-Month	12-Month	
Panel A: $MDISP = 1 - Frac(Mode)$									
Low	0.959	0.984	0.993	1.011	-0.041	-0.027	-0.020	-0.017	710
	(2.96)	(3.06)	(3.10)	(3.22)	(-0.85)	(-0.59)	(-0.47)	(-0.40)	
Medium	1.046	1.032	1.041	1.053	0.035	0.018	0.029	0.032	722
	(3.06)	(3.05)	(3.09)	(3.19)	(0.81)	(0.47)	(0.82)	(0.94)	
High	1.035	1.056	1.065	1.104	0.043	0.054	0.056	0.080	710
	(2.93)	(3.02)	(3.07)	(3.27)	(0.77)	(1.02)	(1.11)	(1.68)	
High - Low	0.076	0.072	0.072	0.093	0.084	0.081	0.076	0.097	
	(0.86)	(0.87)	(0.93)	(1.31)	(1.13)	(1.17)	(1.19)	(1.63)	
Panel B: $ENTROPY = -(\sum_k Frac(k)[ln(Frac(k))])$									
Low	0.932	0.945	0.966	0.980	-0.063	-0.058	-0.038	-0.038	711
	(2.90)	(2.96)	(3.03)	(3.14)	(-1.39)	(-1.34)	(-0.91)	(-0.95)	
Medium	1.042	1.058	1.061	1.077	0.037	0.049	0.049	0.054	723
	(3.07)	(3.15)	(3.16)	(3.27)	(0.88)	(1.33)	(1.38)	(1.57)	
High	1.060	1.065	1.070	1.110	0.058	0.051	0.051	0.079	709
	(2.95)	(3.00)	(3.05)	(3.26)	(0.99)	(0.91)	(0.96)	(1.56)	
High - Low	0.127	0.120	0.105	0.130	0.121	0.109	0.088	0.117	
	(1.35)	(1.34)	(1.26)	(1.72)	(1.68)	(1.62)	(1.38)	(1.94)	
Panel C: $FDISP = \sqrt{Frac(1) + Frac(3,4,5) - (Frac(1) - Frac(3,4,5))^2}$									
Low	0.928	0.938	0.954	0.977	-0.090	-0.083	-0.066	-0.055	707
	(2.74)	(2.80)	(2.86)	(3.00)	(-1.89)	(-1.86)	(-1.52)	(-1.30)	
Medium	1.084	1.074	1.070	1.075	0.088	0.068	0.061	0.056	722
	(3.09)	(3.08)	(3.09)	(3.18)	(1.67)	(1.36)	(1.28)	(1.28)	
High	1.022	1.055	1.072	1.114	0.035	0.056	0.066	0.092	714
	(3.09)	(3.21)	(3.29)	(3.50)	(0.74)	(1.21)	(1.49)	(2.18)	
High - Low	0.094	0.117	0.118	0.138	0.126	0.139	0.132	0.148	
	(1.21)	(1.55)	(1.66)	(2.17)	(1.97)	(2.33)	(2.35)	(2.86)	

Table 3.6: Portfolio Returns by Consensus Recommendation and Recommendation Dispersion

This table presents the post-formation monthly DGTW-adjusted returns of portfolios independently sorted on the mean recommendation rating and recommendation dispersion within each size quintile. Portfolios are formed each month and held for 1, 3, 6, or 12 months. Portfolio returns are equal-weighted and calculated based on the strategy employed in Jegadeesh and Titman (1993). The 'Buy' ('Sell') portfolio contains the stocks with the lowest (highest) mean recommendation ratings. The 'Low' ('High') portfolio consists of stocks that have the least (most) dispersed recommendations. *No. of Stocks* reports the average number of stocks in each portfolio. t-statistics are reported in parentheses.

Mean Recommendation	Recommendation Dispersion	Monthly DGTW-Adjusted Returns (%)				No. of Stocks
		1-Month	3-Month	6-Month	12-Month	
Buy	All	-0.052	-0.073	-0.064	-0.050	891
		(-0.86)	(-1.28)	(-1.19)	(-1.03)	
	Low	-0.136	-0.198	-0.184	-0.156	333
		(-1.71)	(-2.68)	(-2.68)	(-2.46)	
	Medium	0.023	0.008	-0.003	-0.007	361
		(0.33)	(0.12)	(-0.04)	(-0.13)	
	High	-0.048	-0.015	0.024	0.040	198
		(-0.67)	(-0.25)	(0.44)	(0.77)	
	High - Low	0.088	0.183	0.209	0.196	
		(1.03)	(2.33)	(2.93)	(3.09)	
Hold	All	0.086	0.078	0.073	0.078	905
		(2.01)	(1.95)	(1.91)	(2.06)	
	Low	-0.005	-0.006	-0.031	-0.049	167
		(-0.07)	(-0.09)	(-0.48)	(-0.77)	
	Medium	0.172	0.145	0.133	0.125	298
		(2.81)	(2.58)	(2.63)	(2.71)	
	High	0.062	0.067	0.074	0.101	439
		(1.18)	(1.37)	(1.57)	(2.19)	
	High - Low	0.067	0.073	0.105	0.150	
		(0.78)	(0.93)	(1.41)	(2.09)	
Sell	All	-0.014	0.019	0.038	0.055	909
		(-0.21)	(0.29)	(0.62)	(0.95)	
	Low	0.013	0.069	0.084	0.080	400
		(0.16)	(0.87)	(1.14)	(1.13)	
	Medium	0.050	0.098	0.093	0.097	258
		(0.60)	(1.19)	(1.25)	(1.47)	
	High	-0.118	-0.118	-0.073	-0.017	251
		(-1.43)	(-1.48)	(-0.97)	(-0.24)	
	High - Low	-0.131	-0.187	-0.157	-0.096	
		(-1.56)	(-2.36)	(-2.13)	(-1.48)	
Buy - Sell	All	-0.038	-0.092	-0.102	-0.106	
		(-0.35)	(-0.88)	(-1.06)	(-1.21)	
	Low	-0.149	-0.267	-0.268	-0.236	
		(-1.06)	(-1.99)	(-2.19)	(-2.09)	
	Medium	-0.027	-0.090	-0.096	-0.104	
		(-0.23)	(-0.77)	(-0.91)	(-1.12)	
	High	0.070	0.103	0.098	0.057	
		(0.61)	(0.99)	(1.03)	(0.69)	

Table 3.7: Time-Series Regressions of Portfolio Returns on Carhart Four Factors

This table presents the alphas from the time-series regressions of post-formation monthly portfolio raw returns on Carhart four factors. Portfolios are formed each month based on the mean recommendation rating and recommendation dispersion independently, and are held for 1, 3, 6, or 12 months. Portfolio returns are equal-weighted and calculated based on the strategy employed in Jegadeesh and Titman (1993). The 'Buy' ('Sell') portfolio contains the stocks with the lowest (highest) mean recommendation ratings. The 'Low' ('High') portfolio consists of stocks that have the least (most) dispersed recommendations. *t*-statistics are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Mean Recommendation	Recommendation Dispersion	Alphas (%)			
		1-Month	3-Month	6-Month	12-Month
Buy	All	-0.029	-0.036	-0.007	0.010
		(-0.37)	(-0.45)	(-0.10)	(0.14)
	Low	-0.180*	-0.228**	-0.195**	-0.153*
		(-1.83)	(-2.37)	(-2.11)	(-1.78)
	Medium	0.072	0.067	0.081	0.086
		(0.81)	(0.77)	(0.95)	(1.09)
	High	0.032	0.098	0.157**	0.147*
		(0.36)	(1.20)	(2.00)	(1.90)
	High - Low	0.213	0.326***	0.352***	0.300***
		(1.60)	(2.58)	(2.90)	(2.59)
Hold	All	0.202***	0.197***	0.204***	0.210***
		(3.06)	(3.00)	(3.15)	(3.38)
	Low	0.047	0.061	0.040	0.024
		(0.49)	(0.66)	(0.45)	(0.28)
	Medium	0.264***	0.232***	0.240***	0.240***
		(3.22)	(2.84)	(3.06)	(3.27)
	High	0.211***	0.221***	0.238***	0.261***
		(2.87)	(3.12)	(3.44)	(4.00)
	High - Low	0.164	0.160	0.198*	0.236**
		(1.35)	(1.37)	(1.75)	(2.18)
Sell	All	0.229***	0.278***	0.295***	0.307***
		(2.86)	(3.47)	(3.80)	(4.06)
	Low	0.337***	0.401***	0.420***	0.404***
		(3.36)	(4.10)	(4.48)	(4.60)
	Medium	0.301***	0.373***	0.358***	0.341***
		(2.92)	(3.71)	(3.72)	(3.77)
	High	-0.002	0.014	0.065	0.140*
		(-0.02)	(0.16)	(0.75)	(1.66)
	High - Low	-0.339**	-0.387***	-0.355***	-0.264**
		(-2.53)	(-2.93)	(-2.77)	(-2.17)
Buy - Sell	All	-0.258**	-0.314***	-0.303***	-0.297***
		(-2.30)	(-2.80)	(-2.77)	(-2.83)
	Low	-0.518***	-0.629***	-0.616***	-0.557***
		(-3.68)	(-4.59)	(-4.67)	(-4.53)
	Medium	-0.229*	-0.305**	-0.277**	-0.255**
		(-1.68)	(-2.29)	(-2.15)	(-2.13)
	High	0.034	0.084	0.092	0.007
		(0.27)	(0.70)	(0.78)	(0.06)

Table 3.8: Recommendation, Recommendation Dispersion, and Short Selling

This table presents the monthly equal-weighted short-selling measures of portfolios independently sorted on the mean recommendation rating and recommendation dispersion within each size quintile. The 'Buy' ('Sell') portfolio contains stocks with the lowest (highest) mean recommendation ratings. The 'Low' ('High') portfolio consists of stocks that have the least (most) dispersed recommendations. *SIR* is the short interest ratio defined as open short interest available from Compustat divided by the number of shares outstanding. *Supply* is defined as *Lendable Quantity* from Markit Data Explorer divided by the number of shares outstanding. *UTIL* is the *Utilization by Quantity* obtained from Markit Data Explorer. *DCBS* represents the Daily Cost of Borrowing Score obtained from Markit Data Explorer. *Special* represents the percentage of stocks with a DCBS greater than or equal to 2 in each portfolio. *No. of Stocks* reports the time-series average number of stocks in each portfolio. Newey-West *t*-statistics are reported in parentheses.

Mean Recommendation	Recommendation Dispersion	SIR (%)	Supply (%)	UTIL (%)	DCBS	Special (%)	No. of Stocks
Buy	All	5.31	21.69	16.62	1.30	10.32	840
	Low	5.21	21.09	16.91	1.32	11.29	304
	Medium	5.35	21.40	16.84	1.34	11.29	329
	High	5.43	23.26	15.68	1.19	6.85	207
	High - Low	0.22	2.17	-1.24	-0.13	-4.44	
		(1.85)	(8.85)	(-3.55)	(-6.37)	(-8.34)	
Hold	All	5.63	21.80	17.30	1.33	10.15	865
	Low	4.94	19.58	17.70	1.62	16.01	149
	Medium	5.83	22.91	16.94	1.20	7.28	308
	High	5.76	21.97	17.29	1.28	9.59	407
	High - Low	0.82	2.39	-0.41	-0.35	-6.42	
		(5.55)	(3.59)	(-0.60)	(-3.56)	(-3.18)	
Sell	All	6.30	20.83	19.87	1.40	12.85	849
	Low	5.27	20.26	17.26	1.30	10.74	403
	Medium	6.78	20.82	21.14	1.47	14.46	212
	High	7.70	22.00	23.33	1.48	14.85	234
	High - Low	2.43	1.75	6.07	0.18	4.10	
		(26.51)	(8.22)	(19.09)	(9.14)	(10.70)	
Buy - Sell	All	-0.99	0.86	-3.26	-0.10	-2.53	
		(-8.44)	(5.84)	(-6.76)	(-3.94)	(-4.01)	
	Low	-0.06	0.84	-0.35	0.02	0.55	
		(-0.39)	(4.49)	(-0.58)	(0.70)	(0.79)	
	Medium	-1.42	0.58	-4.30	-0.13	-3.17	
		(-8.95)	(4.23)	(-7.49)	(-4.49)	(-4.36)	
	High	-2.27	1.26	-7.65	-0.29	-8.00	
		(-23.35)	(6.15)	(-16.32)	(-9.71)	(-10.34)	

Table 3.9: Portfolio Returns by Consensus Recommendation, Recommendation Dispersion, and Short-Sale Constraints

This table presents the monthly equal-weighted short-selling activities and DGTW-adjusted returns of portfolios independently sorted on the mean recommendation rating, recommendation dispersion, and short-sale constraints. *SIR* is the short interest ratio defined as open short interest available from Compustat divided by the number of shares outstanding. *Supply* is defined as *Lendable Quantity* from Markit Data Explorer divided by the number of shares outstanding. *UTIL* is the *Utilization by Quantity* obtained from Markit Data Explorer. The portfolio returns are equal-weighted and calculated based on the strategy employed in Jegadeesh and Titman (1993). The 'Buy' ('Sell') portfolio contains the stocks with the lowest (highest) mean recommendation ratings. The 'Low' ('High') portfolio consists of stocks that have the least (most) dispersed recommendations. The 'Special' portfolio consists of stocks with a DCBS greater than or equal to 2. The 'Non-special' portfolio consists of stocks with a DCBS of 1. *No. of Stocks* reports the average number of stocks in each portfolio. *t*-statistics are reported in parentheses.

Mean Rec	Rec Dispersion	Special Dummy	SIR (%)	Supply (%)	UTIL (%)	Monthly DGTW-Adjusted Returns (%)				No. of Stocks
						1-Month	3-Month	6-Month	12-Month	
All	All	Non-special	5.089	22.783	14.155	0.105	0.101	0.099	0.096	2244
						(2.88)	(2.78)	(2.76)	(2.68)	
		Special	11.236	11.330	49.149	-0.798	-0.742	-0.676	-0.608	279
						(-4.25)	(-4.29)	(-4.14)	(-4.08)	
		Spec - Non	6.147	-11.452	34.994	-0.903	-0.843	-0.775	-0.704	
			(22.25)	(-15.57)	(26.14)	(-4.68)	(-4.74)	(-4.63)	(-4.54)	
Buy	Low	Non-special	4.740	22.655	13.123	0.032	-0.016	0.008	0.005	267
						(0.39)	(-0.22)	(0.12)	(0.07)	
		Special	8.845	9.201	46.976	-1.261	-1.032	-1.029	-0.935	34
						(-3.37)	(-3.26)	(-3.54)	(-3.39)	
	Medium	Non-special	4.978	23.059	13.591	0.186	0.167	0.162	0.128	288
						(2.39)	(2.30)	(2.53)	(2.29)	
		Special	8.814	9.301	43.767	-0.880	-0.857	-0.732	-0.612	37
						(-2.41)	(-2.70)	(-2.50)	(-2.24)	
	High	Non-special	5.015	24.166	13.366	0.096	0.146	0.202	0.192	190
						(1.37)	(2.26)	(3.36)	(3.39)	
		Special	11.491	11.857	48.884	-0.915	-0.959	-1.023	-0.682	14
						(-1.87)	(-2.56)	(-3.15)	(-2.12)	
	High - Low	Non-special	0.276	1.511	0.243	0.063	0.162	0.194	0.188	
			(2.63)	(8.05)	(0.89)	(0.65)	(1.78)	(2.39)	(2.56)	
		Special	2.646	2.656	1.908	0.346	0.073	0.006	0.254	
			(4.90)	(5.41)	(1.57)	(0.61)	(0.17)	(0.02)	(0.66)	

Mean Rec	Rec Dispersion	Special Dummy	SIR (%)	Supply (%)	UTIL (%)	Monthly DGTW-Adjusted Returns (%)				No. of Stocks
						1-Month	3-Month	6-Month	12-Month	
Hold	Low	Non-special	4.536	22.136	12.561	0.080	0.044	-0.007	-0.030	122
						(1.00)	(0.59)	(-0.10)	(-0.43)	
		Special	8.077	8.099	46.574	-0.540	-0.444	-0.691	-0.864	25
						(-0.93)	(-0.94)	(-1.50)	(-2.70)	
	Medium	Non-special	5.319	23.758	14.235	0.186	0.128	0.104	0.084	282
						(2.79)	(2.09)	(1.85)	(1.65)	
		Special	12.608	12.527	53.015	-0.859	-0.648	-0.844	-0.670	22
						(-2.42)	(-2.48)	(-3.30)	(-2.66)	
	High	Non-special	5.158	23.074	14.106	0.142	0.155	0.143	0.179	364
						(2.28)	(2.72)	(2.74)	(3.60)	
		Special	11.370	11.936	48.383	-0.600	-0.510	-0.255	-0.281	39
						(-2.25)	(-2.22)	(-0.96)	(-1.11)	
	High - Low	Non-special	0.622	0.938	1.545	0.061	0.112	0.151	0.209	
			(6.54)	(3.15)	(7.67)	(0.63)	(1.25)	(1.85)	(2.68)	
		Special	3.234	3.724	1.639	-0.015	-0.066	0.435	0.583	
			(4.83)	(6.08)	(1.16)	(-0.02)	(-0.12)	(0.80)	(1.48)	

Mean Rec	Rec Dispersion	Special Dummy	SIR (%)	Supply (%)	UTIL (%)	Monthly DGTW-Adjusted Returns (%)				No. of Stocks
						1-Month	3-Month	6-Month	12-Month	
Sell	Low	Non-special	4.582	21.293	13.782	0.037	0.052	0.055	0.058	356
						(0.38)	(0.53)	(0.57)	(0.61)	
		Special	10.986	12.015	46.343	-0.266	-0.241	-0.277	-0.282	42
						(-0.67)	(-0.74)	(-1.04)	(-1.24)	
	Medium	Non-special	5.622	22.201	16.065	0.069	0.115	0.085	0.076	178
						(0.81)	(1.37)	(1.07)	(1.02)	
		Special	14.239	13.538	52.082	-0.995	-0.718	-0.607	-0.457	31
						(-2.71)	(-1.96)	(-1.82)	(-1.58)	
	High	Non-special	6.213	23.206	17.276	0.080	0.073	0.087	0.091	197
						(0.92)	(0.84)	(1.06)	(1.22)	
		Special	16.021	15.043	58.579	-0.816	-0.979	-0.798	-0.713	34
						(-1.82)	(-2.25)	(-1.92)	(-2.25)	
	High - Low	Non-special	1.631	1.914	3.494	0.043	0.021	0.032	0.033	
			(23.36)	(8.19)	(14.55)	(0.45)	(0.23)	(0.39)	(0.43)	
		Special	5.035	3.028	12.236	-0.550	-0.738	-0.521	-0.431	
			(14.22)	(7.92)	(14.02)	(-1.05)	(-1.51)	(-1.22)	(-1.33)	

Appendix

Table 3.10: Value-Weighted Portfolio Returns by Dispersion

Panel A and Panel B present the post-formation value-weighted percentage returns of portfolios sorted on recommendation dispersion and earnings forecast dispersion, respectively. Portfolios are formed each month and held for 1, 3, 6, or 12 months. The 'Low' ('High') portfolio consists of stocks that have the least (most) dispersed recommendation ratings or earnings forecasts. The left panel reports the returns of monthly-rebalanced portfolios calculated based on the strategy employed in Jegadeesh and Titman (1993), along with t-statistics in parentheses. The right panel reports the buy-and-hold cumulative portfolio returns with Newey-West t-statistics in parentheses. *No. of Stocks* reports the time-series average number of stocks in each portfolio.

Recommendation Dispersion	Monthly DGTW-Adjusted Returns (%)				Buy-and-Hold DGTW-Adjusted Returns (%)				No. of Stocks
	1-Month	3-Month	6-Month	12-Month	1-Month	3-Month	6-Month	12-Month	
Panel A: Portfolios Sorted by Recommendation Dispersion									
Low	-0.048	-0.056	-0.076	-0.087	-0.049	-0.152	-0.354	-0.785	899
	(-1.32)	(-1.61)	(-2.39)	(-3.04)	(-1.29)	(-1.85)	(-2.77)	(-2.83)	
Medium	0.021	0.032	0.051	0.047	0.021	0.099	0.306	0.613	917
	(0.64)	(1.12)	(2.11)	(2.27)	(0.62)	(1.50)	(2.93)	(3.17)	
High	0.039	0.029	0.039	0.064	0.038	0.085	0.290	0.878	888
	(1.02)	(0.81)	(1.12)	(2.06)	(0.98)	(0.99)	(1.91)	(2.63)	
High - Low	0.086	0.084	0.115	0.150	0.086	0.237	0.644	1.662	
	(1.32)	(1.33)	(1.88)	(2.74)	(1.28)	(1.58)	(2.60)	(3.12)	
Panel B: Portfolios Sorted by Earnings Forecast Dispersion									
Low	0.073	0.091	0.093	0.069	0.076	0.269	0.536	0.786	870
	(1.18)	(1.59)	(1.69)	(1.30)	(1.23)	(1.97)	(2.15)	(1.59)	
Medium	0.008	-0.021	-0.026	0.001	0.010	-0.042	-0.093	0.225	873
	(0.24)	(-0.76)	(-1.04)	(0.05)	(0.29)	(-0.62)	(-0.84)	(1.00)	
High	-0.069	-0.059	-0.046	-0.036	-0.073	-0.162	-0.138	-0.161	875
	(-0.95)	(-0.81)	(-0.64)	(-0.53)	(-1.00)	(-0.95)	(-0.44)	(-0.26)	
High - Low	-0.142	-0.151	-0.139	-0.104	-0.149	-0.431	-0.674	-0.947	
	(-1.09)	(-1.18)	(-1.12)	(-0.88)	(-1.14)	(-1.44)	(-1.24)	(-0.87)	

Table 3.11: Buy-and-Hold Portfolio Returns by Consensus Recommendation and Recommendation Dispersion

This table presents the equal-weighted buy-and-hold DGTW-adjusted returns of portfolios independently sorted on the mean recommendation rating and recommendation dispersion within each size quintile. Portfolios are formed each month and held for 1, 3, 6, or 12 months. The 'Buy' ('Sell') portfolio contains the stocks with the lowest (highest) mean recommendation ratings. The 'Low' ('High') portfolio consists of stocks that have the least (most) dispersed recommendations. *No. of Stocks* reports the average number of stocks in each portfolio. Newey-West t-statistics are reported in parentheses.

Mean Recommendation	Recommendation Dispersion	Monthly DGTW-Adjusted Returns (%)				No. of Stocks
		1-Month	3-Month	6-Month	12-Month	
Buy	All	-0.052	-0.226	-0.389	-0.643	891
		(-0.86)	(-1.81)	(-1.98)	(-1.46)	
	Low	-0.136	-0.606	-1.117	-1.972	333
		(-1.71)	(-3.69)	(-4.40)	(-3.70)	
	Medium	0.023	0.028	-0.007	-0.061	361
		(0.33)	(0.18)	(-0.03)	(-0.12)	
	High	-0.048	-0.065	0.127	0.430	198
		(-0.67)	(-0.56)	(0.56)	(0.82)	
	High - Low	0.088	0.541	1.244	2.402	
		(1.03)	(3.14)	(4.17)	(4.21)	
Hold	All	0.086	0.236	0.440	0.994	905
		(2.01)	(2.82)	(2.89)	(3.22)	
	Low	-0.005	-0.021	-0.237	-0.366	167
		(-0.07)	(-0.13)	(-0.75)	(-0.62)	
	Medium	0.172	0.438	0.825	1.460	298
		(2.81)	(3.66)	(4.03)	(3.43)	
	High	0.062	0.204	0.458	1.251	439
		(1.18)	(1.87)	(2.39)	(3.11)	
	High - Low	0.067	0.225	0.695	1.617	
		(0.78)	(1.18)	(1.86)	(2.17)	
Sell	All	-0.014	0.066	0.239	0.575	909
		(-0.21)	(0.42)	(0.94)	(1.39)	
	Low	0.013	0.217	0.507	0.868	400
		(0.16)	(1.10)	(1.57)	(1.54)	
	Medium	0.050	0.298	0.558	1.020	258
		(0.60)	(1.64)	(1.95)	(2.26)	
	High	-0.118	-0.344	-0.416	-0.256	251
		(-1.43)	(-1.77)	(-1.25)	(-0.45)	
	High - Low	-0.131	-0.561	-0.923	-1.125	
		(-1.56)	(-3.01)	(-2.98)	(-2.03)	
Buy - Sell	All	-0.038	-0.292	-0.628	-1.218	
		(-0.35)	(-1.21)	(-1.64)	(-1.70)	
	Low	-0.149	-0.823	-1.624	-2.840	
		(-1.06)	(-2.59)	(-3.31)	(-3.14)	
	Medium	-0.027	-0.270	-0.565	-1.081	
		(-0.23)	(-1.04)	(-1.37)	(-1.45)	
	High	0.070	0.279	0.543	0.686	
		(0.61)	(1.21)	(1.38)	(0.91)	

Table 3.12: Value-Weighted Portfolio Returns by Consensus Recommendation and Recommendation Dispersion

This table presents the value-weighted returns of portfolios independently sorted on the mean recommendation rating and recommendation dispersion within each size quintile. Portfolios are formed each month and held for 1, 3, 6, or 12 months. The 'Buy' ('Sell') portfolio contains the stocks with the lowest (highest) mean recommendation ratings. The 'Low' ('High') portfolio consists of stocks that have the least (most) dispersed recommendations. Panel A panel reports the monthly rebalanced portfolio returns calculated based on the strategy employed in Jegadeesh and Titman (1993), along with *t*-statistics in parentheses. Panel B reports the buy-and-hold cumulative portfolio returns with Newey-West *t*-statistics in parentheses. *No. of Stocks* reports the average number of stocks in each portfolio.

Mean Recommendation	Recommendation Dispersion	Panel A: Monthly DGTW-Adjusted Returns (%)				Panel B: Buy-and-Hold DGTW-Adjusted Returns (%)				No. of Stocks
		1-Month	3-Month	6-Month	12-Month	1-Month	3-Month	6-Month	12-Month	
Buy	All	-0.023	-0.041	-0.043	-0.035	-0.027	-0.145	-0.289	-0.374	891
		(-0.52)	(-0.94)	(-1.05)	(-0.97)	(-0.59)	(-1.42)	(-1.70)	(-1.05)	
	Low	-0.078	-0.109	-0.133	-0.120	-0.077	-0.342	-0.798	-1.348	333
		(-1.12)	(-1.65)	(-2.19)	(-2.22)	(-1.10)	(-2.26)	(-3.35)	(-2.57)	
	Medium	0.041	0.019	0.032	0.016	0.033	0.028	0.069	0.110	361
		(0.63)	(0.35)	(0.63)	(0.36)	(0.49)	(0.21)	(0.29)	(0.28)	
	High	0.003	-0.007	0.039	0.088	-0.003	-0.031	0.275	1.189	198
		(0.03)	(-0.08)	(0.54)	(1.53)	(-0.04)	(-0.19)	(1.03)	(1.98)	
	High - Low	0.081	0.102	0.172	0.208	0.074	0.311	1.074	2.537	
		(0.72)	(1.03)	(1.89)	(2.69)	(0.65)	(1.41)	(2.87)	(3.24)	
Hold	All	0.007	0.023	0.043	0.044	0.010	0.065	0.265	0.576	905
		(0.21)	(0.74)	(1.55)	(1.89)	(0.29)	(0.95)	(2.31)	(2.75)	
	Low	-0.103	-0.002	0.026	-0.023	-0.106	-0.054	0.092	-0.066	167
		(-1.19)	(-0.03)	(0.37)	(-0.37)	(-1.21)	(-0.31)	(0.32)	(-0.12)	
	Medium	-0.049	-0.008	0.041	0.061	-0.039	-0.005	0.272	0.779	298
		(-0.79)	(-0.15)	(0.99)	(1.87)	(-0.63)	(-0.04)	(1.38)	(2.47)	
	High	0.067	0.035	0.044	0.060	0.065	0.101	0.287	0.816	439
		(1.23)	(0.71)	(0.96)	(1.51)	(1.19)	(0.88)	(1.56)	(2.30)	
	High - Low	0.170	0.038	0.018	0.082	0.171	0.154	0.195	0.882	
		(1.64)	(0.41)	(0.20)	(1.02)	(1.62)	(0.74)	(0.52)	(1.31)	

Mean Recommendation	Recommendation Dispersion	Panel A: Monthly DGTW-Adjusted Returns (%)				Panel B: Buy-and-Hold DGTW-Adjusted Returns (%)				No. of Stocks
		1-Month	3-Month	6-Month	12-Month	1-Month	3-Month	6-Month	12-Month	
Sell	All	0.085	0.093	0.067	0.052	0.076	0.286	0.532	0.890	909
		(1.42)	(1.64)	(1.20)	(0.97)	(1.27)	(2.15)	(2.16)	(1.63)	
	Low	0.126	0.123	0.091	0.049	0.110	0.374	0.727	0.961	400
		(1.38)	(1.49)	(1.18)	(0.73)	(1.19)	(1.95)	(2.14)	(1.27)	
	Medium	0.150	0.173	0.134	0.091	0.140	0.517	0.895	1.326	258
		(1.93)	(2.56)	(2.24)	(1.72)	(1.78)	(3.30)	(2.94)	(2.42)	
	High	0.055	0.067	0.057	0.072	0.054	0.206	0.404	1.002	251
		(0.69)	(0.90)	(0.78)	(1.03)	(0.67)	(1.16)	(1.36)	(1.57)	
	High - Low	-0.071	-0.056	-0.034	0.022	-0.056	-0.168	-0.322	0.041	
		(-0.71)	(-0.60)	(-0.40)	(0.31)	(-0.53)	(-0.82)	(-0.98)	(0.07)	
Buy - Sell	All	-0.109	-0.135	-0.109	-0.087	-0.103	-0.431	-0.821	-1.265	
		(-1.11)	(-1.42)	(-1.21)	(-1.02)	(-1.05)	(-1.97)	(-2.15)	(-1.54)	
	Low	-0.204	-0.232	-0.223	-0.170	-0.187	-0.716	-1.525	-2.310	
		(-1.47)	(-1.79)	(-1.84)	(-1.58)	(-1.35)	(-2.43)	(-2.98)	(-2.02)	
	Medium	-0.109	-0.154	-0.102	-0.075	-0.108	-0.488	-0.826	-1.217	
		(-0.96)	(-1.51)	(-1.13)	(-0.94)	(-0.95)	(-2.10)	(-1.78)	(-1.61)	
	High	-0.052	-0.074	-0.018	0.016	-0.058	-0.237	-0.129	0.186	
		(-0.40)	(-0.62)	(-0.16)	(0.17)	(-0.44)	(-0.85)	(-0.31)	(0.22)	

Table 3.13: Portfolio Returns by Consensus Recommendation and Recommendation Dispersion (Conditional Sorting)

This table presents the post-formation percentage returns of portfolios sorted on the mean recommendation rating and recommendation dispersion. Each month, stocks are sorted into size quintiles based on their market capitalizations at the end of last June and the corresponding NYSE break points. Within each size quintile, stocks are sorted into 'Buy', 'Hold', and 'Sell' portfolios based on their mean recommendation ratings. Then within each mean recommendation portfolio, stocks are further sorted into 'Low', 'Medium', and 'High' portfolios based on their recommendation dispersions. Portfolios are held for 1, 3, 6 or 12 months, and portfolio returns are equal-weighted. Panel A reports the returns of monthly-rebalanced portfolios calculated based on the strategy employed in Jegadeesh and Titman (1993), along with t-statistics in parentheses. Panel B reports the buy-and-hold cumulative portfolio returns with Newey-West t-statistics in parentheses. *No. of Stocks* reports the average number of stocks in each portfolio.

Mean Recommendation	Recommendation Dispersion	Panel A: Monthly DGTW-Adjusted Returns (%)				Panel B: Buy-and-Hold DGTW-Adjusted Returns (%)			No. of Stocks
		1-Month	3-Month	6-Month	12-Month	3-Month	6-Month	12-Month	
Buy	All	-0.052	-0.073	-0.064	-0.050	-0.226	-0.389	-0.643	891
		(-0.86)	(-1.28)	(-1.19)	(-1.03)	(-1.81)	(-1.98)	(-1.46)	
	Low	-0.144	-0.195	-0.179	-0.162	-0.594	-1.074	-2.002	292
		(-1.68)	(-2.45)	(-2.42)	(-2.42)	(-3.44)	(-3.98)	(-3.54)	
	Medium	0.032	0.000	0.003	-0.006	-0.008	0.015	-0.094	299
		(0.45)	(0.00)	(0.05)	(-0.10)	(-0.05)	(0.06)	(-0.18)	
	High	-0.054	-0.032	-0.022	0.013	-0.102	-0.142	0.119	301
		(-0.85)	(-0.57)	(-0.41)	(0.28)	(-0.91)	(-0.67)	(0.26)	
	High - Low	0.090	0.163	0.158	0.175	0.492	0.931	2.121	
		(1.08)	(2.21)	(2.37)	(3.01)	(3.12)	(3.49)	(4.40)	
Hold	All	0.086	0.078	0.073	0.078	0.236	0.440	0.994	905
		(2.01)	(1.95)	(1.91)	(2.06)	(2.82)	(2.89)	(3.22)	
	Low	0.103	0.078	0.052	0.033	0.231	0.293	0.510	299
		(1.68)	(1.44)	(1.05)	(0.65)	(1.84)	(1.24)	(0.99)	
	Medium	0.093	0.098	0.110	0.125	0.294	0.643	1.473	305
		(1.40)	(1.62)	(1.91)	(2.37)	(2.31)	(2.98)	(3.86)	
	High	0.060	0.057	0.057	0.078	0.183	0.390	1.005	301
		(1.15)	(1.20)	(1.27)	(1.77)	(1.63)	(1.91)	(2.26)	
	High - Low	-0.043	-0.021	0.005	0.045	-0.049	0.097	0.495	
		(-0.56)	(-0.30)	(0.08)	(0.73)	(-0.29)	(0.30)	(0.68)	

Mean Recommendation	Recommendation Dispersion	Panel A: Monthly DGTW-Adjusted Returns (%)				Panel B: Buy-and-Hold DGTW-Adjusted Returns (%)			No. of Stocks
		1-Month	3-Month	6-Month	12-Month	3-Month	6-Month	12-Month	
Sell	All	-0.014	0.019	0.038	0.055	0.066	0.239	0.575	909
		(-0.21)	(0.29)	(0.62)	(0.95)	(0.42)	(0.94)	(1.39)	
	Low	-0.004	0.044	0.065	0.069	0.145	0.392	0.729	305
		(-0.04)	(0.54)	(0.87)	(0.94)	(0.70)	(1.17)	(1.29)	
	Medium	0.095	0.129	0.127	0.125	0.391	0.760	1.368	298
		(1.21)	(1.74)	(1.80)	(1.91)	(2.26)	(2.78)	(2.83)	
	High	-0.124	-0.106	-0.069	-0.020	-0.306	-0.389	-0.295	306
		(-1.51)	(-1.30)	(-0.91)	(-0.30)	(-1.62)	(-1.26)	(-0.57)	
	High - Low	-0.120	-0.150	-0.134	-0.089	-0.451	-0.781	-1.024	
		(-1.30)	(-1.75)	(-1.71)	(-1.26)	(-2.18)	(-2.32)	(-1.65)	
Buy - Sell	All	-0.038	-0.092	-0.102	-0.106	-0.292	-0.628	-1.218	
		(-0.35)	(-0.88)	(-1.06)	(-1.21)	(-1.21)	(-1.64)	(-1.70)	
	Low	-0.140	-0.239	-0.245	-0.231	-0.738	-1.466	-2.730	
		(-0.94)	(-1.71)	(-1.93)	(-1.97)	(-2.23)	(-2.90)	(-3.04)	
	Medium	-0.063	-0.129	-0.123	-0.130	-0.398	-0.745	-1.461	
		(-0.53)	(-1.11)	(-1.13)	(-1.33)	(-1.49)	(-1.76)	(-1.76)	
	High	0.070	0.074	0.047	0.033	0.204	0.247	0.415	
		(0.63)	(0.71)	(0.50)	(0.41)	(0.89)	(0.62)	(0.56)	

Table 3.14: Portfolio Returns by Median Recommendation and Recommendation Dispersion

This table presents the equal-weighted post-formation percentage returns of portfolios independently sorted on the median recommendation rating and recommendation dispersion within each size quintile. Portfolios are formed each month and held for 1, 3, 6, or 12 months. The 'Buy' ('Sell') portfolio contains the stocks with the lowest (highest) mean recommendation ratings. The 'Low' ('High') portfolio consists of stocks that have the least (most) dispersed recommendations. The 'Buy' ('Sell') portfolio contains the stocks with the lowest (highest) median recommendation ratings. The 'Low' ('High') portfolio consists of stocks that have the least (most) dispersed recommendations. Panel A reports the returns of monthly-rebalanced portfolios calculated based on the strategy employed in Jegadeesh and Titman (1993), along with t-statistics in parentheses. Panel B reports the buy-and-hold cumulative portfolio returns with Newey-West t-statistics in parentheses. *No. of Stocks* reports the average number of stocks in each portfolio.

Median Recommendation	Recommendation Dispersion	Panel A: Monthly DGTW-Adjusted Returns (%)				Panel B: Buy-and-Hold DGTW-Adjusted Returns (%)			No. of Stocks
		1-Month	3-Month	6-Month	12-Month	3-Month	6-Month	12-Month	
	All	-0.059	-0.068	-0.074	-0.068	-0.209	-0.438	-0.803	896
		(-1.01)	(-1.25)	(-1.46)	(-1.46)	(-1.74)	(-2.19)	(-1.64)	
	Low	-0.154	-0.195	-0.208	-0.180	-0.594	-1.258	-2.207	305
		(-2.01)	(-2.75)	(-3.11)	(-2.85)	(-3.95)	(-4.99)	(-3.69)	
Buy	Medium	0.010	0.000	-0.019	-0.029	-0.001	-0.095	-0.301	347
		(0.14)	(-0.00)	(-0.33)	(-0.56)	(-0.01)	(-0.39)	(-0.55)	
	High	-0.029	0.005	0.033	0.027	0.010	0.204	0.374	245
		(-0.44)	(0.09)	(0.60)	(0.52)	(0.08)	(0.91)	(0.71)	
	High - Low	0.125	0.200	0.242	0.207	0.604	1.462	2.580	
		(1.63)	(2.74)	(3.56)	(3.35)	(3.60)	(5.08)	(4.57)	
	All	0.057	0.025	0.031	0.050	0.071	0.166	0.583	726
		(1.03)	(0.47)	(0.63)	(1.05)	(0.62)	(0.89)	(1.63)	
	Low	0.044	-0.052	-0.091	-0.126	-0.160	-0.589	-1.328	183
		(0.44)	(-0.60)	(-1.13)	(-1.75)	(-0.72)	(-1.61)	(-2.14)	
Hold	Medium	0.122	0.062	0.069	0.105	0.192	0.425	1.133	266
		(1.54)	(0.84)	(0.99)	(1.67)	(1.18)	(1.71)	(2.48)	
	High	0.028	0.058	0.077	0.118	0.167	0.436	1.278	277
		(0.42)	(0.97)	(1.31)	(2.15)	(1.17)	(1.76)	(2.84)	
	High - Low	-0.016	0.110	0.168	0.244	0.327	1.024	2.606	
		(-0.15)	(1.14)	(1.77)	(2.99)	(1.27)	(2.31)	(3.42)	

Median Recommendation	Recommendation Dispersion	Panel A: Monthly DGTW-Adjusted Returns (%)				Panel B: Buy-and-Hold DGTW-Adjusted Returns (%)			No. of Stocks
		1-Month	3-Month	6-Month	12-Month	3-Month	6-Month	12-Month	
Sell	All	0.005	0.032	0.054	0.074	0.107	0.335	0.815	1082
		(0.09)	(0.54)	(0.95)	(1.38)	(0.73)	(1.34)	(1.93)	
	Low	0.016	0.071	0.095	0.084	0.226	0.570	0.909	412
		(0.20)	(0.90)	(1.28)	(1.21)	(1.14)	(1.76)	(1.64)	
	Medium	0.075	0.087	0.089	0.106	0.276	0.543	1.164	304
		(1.03)	(1.27)	(1.42)	(1.87)	(1.69)	(2.18)	(3.03)	
	High	-0.064	-0.056	-0.021	0.035	-0.160	-0.103	0.392	366
		(-1.00)	(-0.91)	(-0.34)	(0.61)	(-1.12)	(-0.37)	(0.76)	
	High - Low	-0.080	-0.127	-0.116	-0.049	-0.386	-0.673	-0.517	
		(-1.13)	(-1.94)	(-1.88)	(-0.89)	(-2.51)	(-2.80)	(-1.29)	
Buy - Sell	All	-0.064	-0.100	-0.128	-0.142	-0.316	-0.772	-1.618	
		(-0.64)	(-1.04)	(-1.44)	(-1.75)	(-1.40)	(-2.04)	(-2.17)	
	Low	-0.170	-0.266	-0.303	-0.263	-0.820	-1.828	-3.116	
		(-1.24)	(-2.04)	(-2.52)	(-2.39)	(-2.68)	(-3.75)	(-3.33)	
	Medium	-0.066	-0.088	-0.109	-0.134	-0.277	-0.639	-1.465	
		(-0.61)	(-0.84)	(-1.15)	(-1.61)	(-1.14)	(-1.59)	(-1.91)	
	High	0.035	0.061	0.054	-0.008	0.171	0.307	-0.018	
		(0.37)	(0.72)	(0.69)	(-0.11)	(0.89)	(0.90)	(-0.03)	

Table 3.15: Portfolio Returns by Consensus Recommendation and Recommendation Dispersion (2004 - 2018)

This table presents, for the subsample period from June 2004 to December 2018, the equal-weighted post-formation percentage returns of portfolios independently sorted on the mean recommendation rating and recommendation dispersion within each size quintile. Portfolios are formed each month and held for 1, 3, 6, or 12 months. The 'Buy' ('Sell') portfolio contains the stocks with the lowest (highest) mean recommendation ratings. The 'Low' ('High') portfolio consists of stocks that have the least (most) dispersed recommendations. Panel A reports the returns of the monthly-rebalanced portfolios calculated based on the strategy employed in Jegadeesh and Titman (1993), along with *t*-statistics in parentheses. Panel B reports the buy-and-hold cumulative portfolio returns with Newey-West *t*-statistics in parentheses. *No. of Stocks* presents the average number of stocks in each portfolio.

Mean Recommendation	Recommendation Dispersion	Panel A: Monthly DGTW-Adjusted Returns (%)				Panel B: Buy-and-Hold DGTW-Adjusted Returns (%)			No. of Stocks
		1-Month	3-Month	6-Month	12-Month	3-Month	6-Month	12-Month	
	All	-0.017	-0.013	0.020	0.026	-0.029	0.154	0.349	840
		(-0.25)	(-0.20)	(0.33)	(0.46)	(-0.20)	(0.84)	(1.15)	
	Low	-0.113	-0.147	-0.118	-0.100	-0.431	-0.665	-1.208	304
		(-1.22)	(-1.72)	(-1.49)	(-1.38)	(-2.20)	(-2.48)	(-2.71)	
Buy	Medium	0.050	0.055	0.077	0.063	0.205	0.534	0.921	329
		(0.56)	(0.64)	(1.00)	(0.94)	(1.09)	(2.23)	(2.02)	
	High	0.019	0.074	0.121	0.139	0.178	0.677	1.579	207
		(0.28)	(1.15)	(1.99)	(2.44)	(1.33)	(2.68)	(3.81)	
	High - Low	0.132	0.221	0.239	0.240	0.609	1.342	2.788	
		(1.35)	(2.36)	(2.77)	(3.10)	(2.84)	(3.75)	(4.37)	
	All	0.060	0.048	0.038	0.043	0.157	0.250	0.685	865
		(1.26)	(1.14)	(0.94)	(1.09)	(1.83)	(1.70)	(2.22)	
	Low	-0.132	-0.131	-0.168	-0.217	-0.376	-1.027	-2.052	149
		(-1.36)	(-1.41)	(-1.95)	(-2.55)	(-1.69)	(-2.33)	(-2.64)	
Hold	Medium	0.126	0.072	0.038	0.038	0.237	0.313	0.523	308
		(1.79)	(1.16)	(0.67)	(0.75)	(1.64)	(1.37)	(1.14)	
	High	0.081	0.095	0.109	0.147	0.289	0.654	1.821	407
		(1.38)	(1.80)	(2.14)	(3.07)	(2.91)	(3.66)	(4.87)	
	High - Low	0.213	0.226	0.276	0.364	0.664	1.680	3.873	
		(1.86)	(2.10)	(2.73)	(3.74)	(2.54)	(3.18)	(4.07)	

Median Recommendation	Recommendation Dispersion	Panel A: Monthly DGTW-Adjusted Returns (%)				Panel B: Buy-and-Hold DGTW-Adjusted Returns (%)			No. of Stocks
		1-Month	3-Month	6-Month	12-Month	3-Month	6-Month	12-Month	
Sell	All	-0.043	-0.029	-0.017	-0.003	-0.064	-0.061	0.015	849
		(-0.50)	(-0.33)	(-0.21)	(-0.04)	(-0.33)	(-0.21)	(0.04)	
	Low	0.000	0.017	0.019	0.024	0.061	0.126	0.297	403
		(0.00)	(0.17)	(0.19)	(0.26)	(0.26)	(0.37)	(0.60)	
	Medium	-0.082	-0.008	-0.023	-0.007	0.004	-0.088	-0.076	212
		(-0.83)	(-0.08)	(-0.25)	(-0.09)	(0.02)	(-0.27)	(-0.17)	
	High	-0.063	-0.099	-0.052	-0.026	-0.261	-0.235	-0.146	234
		(-0.55)	(-0.92)	(-0.52)	(-0.30)	(-0.99)	(-0.56)	(-0.23)	
	High - Low	-0.063	-0.116	-0.071	-0.050	-0.322	-0.360	-0.443	
		(-0.54)	(-1.06)	(-0.69)	(-0.57)	(-1.30)	(-0.88)	(-0.61)	
Buy - Sell	All	0.026	0.015	0.037	0.029	0.036	0.214	0.334	
		(0.19)	(0.12)	(0.31)	(0.26)	(0.12)	(0.54)	(0.60)	
	Low	-0.114	-0.164	-0.136	-0.125	-0.492	-0.791	-1.505	
		(-0.66)	(-0.99)	(-0.89)	(-0.87)	(-1.28)	(-1.49)	(-1.80)	
	Medium	0.132	0.063	0.100	0.071	0.201	0.622	0.997	
		(0.89)	(0.42)	(0.76)	(0.60)	(0.63)	(1.49)	(1.58)	
	High	0.082	0.173	0.174	0.165	0.439	0.912	1.725	
		(0.58)	(1.33)	(1.44)	(1.61)	(1.41)	(1.81)	(2.19)	

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