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ABSTRACT

Dispersion of Opinion and Stock Returns

We use a panel of more than 100,000 investor accounts in US stocks over the period 1991-95 to construct an investor-based measure of dispersion of opinion, unlike the analyst based measure used in the literature. We use this measure to test two competing hypotheses: the sidelined investors hypothesis and the uncertainty/asymmetric information hypothesis. We find evidence that supports the sidelined-investors hypothesis. We show that the dispersion of opinion of the investors in a stock is positively related to the contemporaneous returns and trading volume of the stock and negatively related to its future returns. Moreover, dispersion of opinion aggregates across many stocks and generates factors that have a market-wide effect, affecting the stock equilibrium rate of return and providing additional explanatory power in a standard asset-pricing model. This supports the interpretation of dispersion of opinion as a risk factor. We also show that dispersion of opinion among retail investors Granger causes dispersion of opinion among analysts.

JEL Classification: D10 and G10
Keywords: asset prices, dispersion of opinion and volatility

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Introduction

In this paper, we study how differences of opinion across investors affect the stock market. Starting with Williams (1977), the theoretical literature has extensively analyzed how differences of opinion among investors arise, and how they affect the stock market. Differences of opinion may be due to different information sets, different priors or different ways of updating the beliefs. Their impact on the stock market is also controversial. In a model with sidelined investors or limited market participation due to short sales constraints, differences of opinion should lead to overvaluation (Miller, 1977, Chen *et. al*, 2002). This is because investors with a more pessimistic valuation do not participate in the stock market, and investors with a more optimistic valuation hold the stocks. Prices, by reflecting the upward bias, will be higher. This implies a positive relationship between differences of opinion and current stock prices (Morris, 1996, Viswanathan, 2000).

Alternatively, differences of opinion may reflect information asymmetry or information uncertainty. In this case, an increase in differences of opinion reduces stock prices. This is because both an increase in information asymmetry and a higher volatility contribute to raising the required rate of return on the stock, and therefore to lowering its price (Kraus and Smith, 1989, Wang, 1993, Harris and Raviv, 1993, He and Wang, 1995, Naik, 1997). In both cases, differences of opinion are related to higher trading volume. In the limited market participation case, the increase in trade could be due to the fact that, presumably, optimistic investors trade more, while in the uncertainty approach, it is due to the fact that higher uncertainty increases hedging-motivated trade and dispersion raises information-motivated trade. The overall result is an increase in trading volume.

If we focus on the relationship between dispersion of opinion and stock returns, there are thus two alternative hypotheses that generate different testable restrictions: the sidelined-investors hypothesis and the uncertainty/asymmetric information hypothesis. Surprisingly, while there is an extensive literature that has dealt with this topic, its empirical testing is scarcer. One of the main reasons for this is the availability of data. Where can we find evidence of dispersion of opinion? One could resort to professional forecasts. Recently, Diether, Malloy and Scherbina (2002) directly addressed this issue by focusing on the dispersion of analysts' forecasts. They show that stocks with higher dispersion in analysts' earnings forecasts earn lower future returns than otherwise similar stocks. This effect is most pronounced in small stocks and stocks that have performed poorly over the past year. They argue that this supports the view that dispersion of opinion plays a role because the investors with the lowest valuations do not trade. They reject the hypotheses that dispersion of opinion is a proxy for risk.

However, analysts' forecasts represent the opinions of professional analysts and do not necessarily reflect the expectations of the average investor. The other alternative is to directly focus on investors' actions, measuring the dispersion of opinion on the basis of the trades of the investors. This would allow us to exploit the restrictions that most of the theoretical models have defined in terms of investors' trades. However, the main obstacle to this approach is the lack of disaggregated data.

Information disaggregated at the individual investor level has been very difficult to obtain. Schlarbaum, Lewellen and Lease (1978), Lakonishok and Maberly (1990) and Grinblatt and Kellaharju (1999) use individual investor account data in order to analyze how investors (or investment groups) trade in individual securities. To test behavioral biases, Barber and Odean (2000, 2001, 2002) and Odean (1998, 1999) use data on the trades of a representative sample of small investors holding their accounts with a big brokerage firm. However, none has directly studied how heterogeneity in investors' trading patterns affects stock returns by using disaggregated individual investor data.

In this paper, we empirically bridge this gap. We complement the papers based on dispersion of professional investment advice and directly focus on investors' behavior, inferring differences of opinion from their trades. We rely on a unique dataset to construct an investor-based measure of dispersion of opinion and we use it to test two competing hypotheses: the sidelined-investors hypothesis and the uncertainty/asymmetric information hypothesis. We use a panel of more than 100,000 investor accounts in US stocks over the period 1991-1995 to construct a measure of dispersion of opinion. We then see how this measure affects the stock market.

Investors are categorized according to exogenous characteristics such as age, income and profession. This allows us to link differences in behavior to some non-market related features and to avoid the issue of in-sample identification of different classes of investors. Moreover, this approach ties dispersion of opinion to some interpretable heterogeneity. Indeed, most of the theoretical models trace differences of opinion to either differences of information (e.g., Wang, 1993, He and Wang, 1996, Naik, 1997) or differences in the priors investors have (e.g., Kraus and Smith, 1989, Detemple and Murthy, 1994), or differences in the way investors update their posteriors (e.g., Harris and Raviv, 1993). Our approach allows us to proxy for these different causes of heterogeneity.

Income and profession are two ways to identify differences in information. Investors with higher income are more likely to have access to better information. If we assume that income is a proxy for an investor's wealth – which we do not have information on – we can appeal to standard information theories that posit that higher wealth may relax informational constraints and make it easier to purchase more information. The wealthy investor would be willing to spend more to purchase information on a particular stock than a less wealthy investor, because the relative cost of investing in information decreases with the level of wealth (Peress, 2002). Moreover, it has been shown (Massa and Simonov, 2002) that a less wealthy investor is more likely to rely on free public information, often linked to his proximity or familiarity bias, while a wealthy investor, having the resources to consider a wider menu of assets, would be less dependent on publicly available information. This suggests that differences in income may be a good starting point to identify differences of opinion based on differences in information sets.

At the same time, differences in profession are also indicative of varying choices. Indeed, investors working in different areas are likely to have access to different information about the industry/sector in which they work. Therefore, differences in profession may proxy for differences in information. In both cases, the identification is not perfect, as differences in income and profession may also proxy for variations in income/labor shocks. However, our analysis is based on daily data. This frequency is so high, compared to the standard analysis of income/labor shocks, to suggest that these shocks are more informationally related. Nevertheless, a caveat always applies. If our results are due to a broader source of heterogeneity, they could be interpreted as evidence of how heterogeneity across investors affects stock returns.

Another way of explaining differences of opinion is on the basis of differences in priors or in the way investors update their beliefs. To proxy for this, we consider a classification based on age. It is likely that investors have a different way of looking at the world, either depending on their age, or on the cohort they belong to. For example, people who experienced the Great Depression and the Great Crash of 1929 are likely to interpret and react to new stock information in a way different way from the "baby-boom" generation. Moreover, young people may have a view of the world different from that of the old, simply for biological reasons. Therefore, a classification based on age is a good starting point to identify differences of opinion.

We then relate these measures of dispersion to the stock market and we see how dispersion of opinion affects it. In particular, we show that, at the individual stock level, dispersion of opinion is positively related to contemporaneous stock returns and trading volume and negatively related to future returns, in the way that the sidelined-investors hypothesis posits. Also, dispersion of opinion aggregates across stocks generating factors that affect all the stocks.

In particular, there seems to be a "risk premium" due to dispersion of opinion that helps to explain part of the variance in returns not accounted for by the standard asset pricing factors. Our definition of "risk premium" is more similar to the noise trading risk of De Long *et al*. (1990) than to the standard risk premium in the fundamental sense.

These results not only shed some light on the role played by the dispersion of opinion in the stock market, but they also help to understand the dynamics relationship between analysts and the retail investors. Addressing this issue in more detail, we show that an investor-based measure of dispersion of opinion Granger-leads the standard analyst-based measures. This suggests that, at least at the daily frequency, analyst dispersion simply reflects the market sentiment but does not forecast it. That is, analysts' uncertainty does not affect the market, but simply trails the uncertainty among the individual investors, traceable to "fundamental-related characteristics", such as age, profession and income.

The paper is structured as follows. In Section 1, we lay out the testable restrictions and the approach we follow. In Sections 2 and 3, we describe the data and the way we use it to construct a micro-based index of dispersion of opinion. We report the empirical tests in section 4. A brief conclusion follows.

1 Testable restrictions

The testable restrictions can be represented in terms of stock returns and trading volume. Let us start with trading volume. As we mentioned before, both the theory based on limited market participation and the one based on uncertainty, predict a positive relationship between trading volume (turnover) and dispersion of opinion. For example, the more recent version of the Miller hypothesis has direct implications for trading volume (turnover). Hong, Scheinkman and Xiong (2003), show that stock prices incorporate a speculative component when investors have heterogeneous beliefs about the fundamental value of the stock and when short sales are costly. If investors are overconfident about the precision of their signal, heterogeneity of beliefs induces excessive trading. In other words, dispersion of beliefs should be positively related to turnover.

In the case of information uncertainty, however, higher uncertainty would increase hedging-motivated trade, leading to an increase in trading volume (Wang, 1993). Only in the case where dispersion proxies for information asymmetry, would an increase in dispersion, by increasing adverse selection costs, reduce trade. We can therefore consider the following specification that links stock trading volume to fundaments and dispersion of opinion:

$$V_t = \alpha_V + \beta_V F_t + \gamma_V D_t + \varepsilon_{V,t} \qquad (1)$$

where V_t is stock trading volume and F_t and D_t are the value of the fundamentals and of the dispersion of opinion. This relationship links trading volume to the fundamentals (F_t) and to the heterogeneity of investor opinions (D_t). The sidelined-investors approach would posit $\gamma_V > 0$, and the uncertainty/asymmetric information approach would also, in general, posit that $\gamma_V > 0$.

The test that allows us to discriminate between the two theories is the one based on stock returns. According to the side-lined investors hypothesis, high dispersion of opinion should lead to current overvaluation followed by future low returns. This implies a positive correlation between dispersion of opinion and contemporaneous returns and negative correlation between dispersion of opinion and future (expected) returns.

The information uncertainty hypothesis would predict exactly the opposite: higher current uncertainty would raise the required rate of return and reduce prices leading to current undervaluation to be reversed in the future. This would generate a negative correlation with current returns and positive correlation with future (expected) returns. These two alternative hypotheses can be directly tested against each other by considering a specification that links contemporaneous and future stock returns to fundamentals and dispersion of opinion:

$$R_t = \alpha_{1,R} + \beta_{1,R} F_t + \gamma_{1,R} D_t + \varepsilon_{1,R,t} \qquad (2)$$

$$R_T = \alpha_{2,R} + \beta_{2,R} F_t + \gamma_{2,R} D_t + \varepsilon_{2,R,t} \qquad (3)$$

where R_t and R_T are, respectively, contemporaneous and future stock returns and F_t and D_t are the value of the fundamentals and of the dispersion of opinion. The sidelined-investors approach would posit that $\gamma_{1,R} > 0$ and $\gamma_{2,R} < 0$, while the uncertainty/asymmetric information approach would posit that $\gamma_{1,R} < 0$ and $\gamma_{2,R} > 0$.

This delivers clear, testable restrictions that can be brought to the data. Moreover, it also suggests that if we are able to construct a proper proxy for the dispersion of investors' opinion, this should help us explain stock returns and trading volume. In particular, equations 2 and 3 suggest that dispersion of opinion may help to explain stock returns at the very moment when the explanatory power of the fundamentals declines.

To tests equations 1, 2 and 3, we will proceed as follows. First, we consider dispersion of opinion as a stock-specific characteristic and relate it to stock returns and trading volume. That is, for each stock we relate the dispersion of opinion of the investors about it to the stock return and trading volume. Then, we investigate whether dispersion of opinion aggregates at the market level. That is, we aggregate the dispersion of opinion across different stocks, construct tracking portfolios that mimic it, and see how this aggregate dispersion of opinion factor affects stock returns. This will allow us to assess whether and how stock returns load on the dispersion of opinion factor.

Our study will use as control variables the dispersion of analyst forecasts, trading volume (turnover) and volatility. Diether, Malloy and Scherbina (2002) described the impact of the dispersion of analysts' forecasts on stock returns. Gervais *et al.*, (2001) showed that extreme trading activity contains information about the future evolution of stock prices. Lee and Swaminathan (2000) showed that past trading volume provides an important link between momentum and value strategies. Datar, Naik and Radcliffe (1998) showed that turnover rate (number of shares traded as a fraction of the number of shares outstanding) is a good proxy for liquidity, and helps to explain the cross-sectional variation in stock returns.

We will therefore use these measures as control variables to assess whether our investor-based measure of dispersion of opinion provides additional explanatory power. Then, we will explicitly relate our individual investor-based measure of dispersion of opinion to the one based on analysts' forecasts and study the relationship between them.

2 The data

We use data provided by a nationwide discount brokerage house. The dataset is the one previously used by Barber and Odean (2000, 2001, 2002) and Odean (1998, 1999). These data contain information on over 100,000 accounts for around 80,000 households. Around 78,000 of them have traded in stocks. For each account, we have the position files that contain the end-of-month portfolios of the investors and the daily transactions on all the assets for the period 1/1/1991-31/12/1995. For each transaction in the account, we know the security traded (identified in the case of a stock by the CRSP CUSIP), the direction of the trade, the quantity traded, and the commission paid. Each investor may hold several accounts. We follow Barber and Odean, and concentrate on only their equity holdings. We conduct our analysis at the investor level and consider each single buy and sell order for each account. For a more detailed description of the data, we refer to Barber and Odean (2000, 2001, 2002) and Odean (1998, 1999). For each account, we also know some demographic information about the investor, such as class of income, profession and age.

In terms of representativeness of the sample, we refer to Kumar (2002). He compares this sample to the one reported by the Census Bureau (Survey of Income and Program participation, (SIPP), 1995). and the Federal Reserve (Survey of Consumer Finance (SCF), 1992, 1995). For example, in our sample, the median portfolio size of an investor is US$13,869. This compares to US$16,900 for SCF 1992 and to US$15,300 for SCF 1995. Moreover, as reported by Barber and Odean, this dataset represents a proper sample of the investor population, in terms of location, trading characteristics, income and so on. Given that our analysis is based on daily frequency, the sample is particularly suited to represent the daily trading behavior of an average US investor on the market.

3 Construction of an index of dispersion of opinion

We proceed in two steps. First, we identify different groups of investors. Second, we use the daily trades to construct a measure of dispersion. We use exogenous identification restrictions based on investor characteristics such as age, income and profession. While age is strictly exogenous, income and profession can also be assumed to be exogenous, at least given the high frequency of our analysis. This classification has the advantage of avoiding spurious correlations, problems of reverse causality and endogeneity bias that other classifications, based on in-sample data, may have. In particular, we use: (i) the income of the investor, (ii) the age of the male member of the investor family and (iii) the occupation of the male member of the investor family. We classify investors into eight classes on the basis of income, eight classes on the basis of age, and twelve classes on the basis of the profession of the investor.

For each investor, we identify the daily transactions in the top (defined in terms of market capitalization in the period) 100 stocks. Then, for each characteristic (e.g., age) and class (e.g., under 18 years old), we aggregate all the transactions of the investors who, on the basis of the specific characteristic, fall within that class. This generates, for each class and characteristic (e.g., investors classified on the basis of age and under 18 years old) a time series containing the sum of the daily transactions of all the investors belonging to it. Then, for each *cth* characteristic (i.e., age), we construct the following quantity: $N_c = \sum| X_i - X_j |$, where $i \neq j$. The subscript i refers to the classes in which such a characteristic is divided. It goes from 1 to 8 for income and age and from 1 to 12 for the profession. We report the breakdown in characteristics and classes in Exhibit 1.

Exibit 1: Construction of Dispersion Factors

	Characteristics		
	Income	*Age*	*Profession*
Classes	Y < $20,000,	A < 18years,	Professional/Technical
	$20,000 < Y< $30,000	18 years < A < 24 years	Administrative/Managerial
	$30,000 < Y< $40,000	25 years < A < 35 years	Sales/Service
	$40,000 < Y< $50,000	35 years < A < 44 years	Clerical/White Collar
	$50,000 < Y< $75,000	45 years < A < 54 years	Craftsman/Blue Collar
	$75,000 < Y< $100,000	55 years < A < 64 years	Student
	$100,000 < Y< $125,000	65 years < A < 74 years	Housewife
	$125,000 < Y	75 years < A	Retired
			Farmer
			Military
			Religious
			Self-employed
			Others

N_c is a norm that represents the distance in the transaction space between the different classes of investors according to a specific characteristic. In other words, it says how different the trading patterns of the different groups of investors are. Given that the differences are based on fundamental investors' characteristics that slowly change over time, we do not expect these differences in behavior to be related to short-term characteristics, nor to be affected by short -term considerations such as trend-chasing, momentum and contrarian strategies, and so on. At the same time, the fact that we are aggregating across many investors in order to generate the overall value for a category, allows us to average out idiosyncratic shocks. We expect that the differences in behavior across our investors represent fundamental differences of opinion linked to demographic information and income. For robustness, we will also consider an alternative measure of dispersion of opinion constructed by separately using purchases and sales. Also, we will standardize them on the basis of the number of shares outstanding.

There are alternative measures of dispersion of opinion already used in the literature. These are based on analysts' forecasts. We consider two alternative measures of them: the standard deviation of the forecasts divided by its average value and the difference between high and low forecasts, still standardized by its average value. To construct these measures, we use the

I/B/E/S dataset on analysts' forecasts and recommendations. For each stock, this contains the recommendations of all the different analysts.

4 Empirical estimation

We proceed as follows. First, we consider the dispersion of opinion as a stock-specific characteristic. We start by looking at the relationship between dispersion and trading volume. Then, we analyze its relationship with (contemporaneous and future) stock returns. Second, we aggregate the measures of dispersion of opinion across stocks, generating a market-wide factor, and we then construct a tracking portfolio that mimics such a factor. We then see how stock returns load on this factor. Finally, we study how an aggregated, investor-based measure of dispersion of opinion relates to an aggregated analyst-based measure of dispersion.

4.1 Dispersion as a stock specific characteristic

4.1.1 *Dispersion and contemporaneous stock characteristics*

We now consider the relationship between return and trading volume and dispersion of opinion, assuming that this is a stock-specific characteristic. In particular, we estimate the following pooled regression:

$$V_{i,t} = \alpha_V + \beta_V F_t + \gamma_V C_{it} + \delta_V D_{it} + \varepsilon_{R,it}, \tag{4}$$

$$R_{i,t} = \alpha_{1,R} + \beta_{1,R} F_t + \gamma_{1,R} C_{it} + \delta_{1,R} D_{it} + \varepsilon_{1,R,it}, \tag{5}$$

where, for the *i*th stock at time t, V_{it} and R_{it} are, respectively, the stock trading volume and return and F_t is a vector of market factors. They include: the three Fama and French factors (FF) and the riskless rate (T-Bill rate). The FF factors are market, book-to-market and size, where market is the excess return of the market aggregate portfolio over the riskless rate, book-to-market (HML) is the difference between the average returns on the portfolios with high book-to-market ratios and the average returns on the portfolios with low book-to-market ratios. Size (SMB) is the difference between the average returns on three small stock portfolios and the average returns on the three big stock portfolios. These data have been downloaded from K. French's web page.

C_t is a vector of stock-specific control variables such as the standard deviation of the analysts' forecasts standardized by their average value, the absolute difference between the highest and lowest forecast, standardized by their average value, the number of positive and negative updates of the forecasts, the highest forecast and the lowest forecast.

D_{it} is the stock-specific measure of dispersion of opinion. We consider three measures of dispersion of opinion: a job-based measure, an age-based measure and income-based measure. For each measure, we estimate six different specifications. They differ either by the way the measure of dispersion has been constructed or by the variables included in the regression. In particular, we consider three ways of constructing the measure of dispersion, either the simple measure described in the previous section (Specifications I and II), or its value standardized by the number of shares outstanding (Specifications III and IV), or the standardized sum of measures of dispersion separately constructed on the basis of purchases and sales (Specifications V and VI).

We also consider two alternative measures of analysts' dispersion of forecasts, the standard deviation of the forecasts, standardized by their average value (Specifications I, III and V) and the difference between the highest and lowest forecast, standardized by their average value (Specifications II, IV and VI). The regressions are pooled estimations based on daily data for the period 1/1/1991-31/12/1995 on 100 stocks, with a consistent variance-covariance matrix (adjusted using the Newey West correction). Trading volume is defined as turnover, that is, the number of shares traded divided by the number of outstanding shares.

We recall that the sidelined-investors theory requires that $\gamma_V > 0$ $\gamma_{1,R} > 0$, while the uncertainty/asymmetric information theory requires that $\gamma_V > 0$ and $\gamma_{1,R} < 0$. The results are reported in Table 1, Panel A for the case of trading volume and in Panel B for the case of return. They show that dispersion of opinion is strongly positively related to both trading volume and returns, that is $\gamma_V > 0$ $\gamma_{1,R} > 0$. In particular, in the case of trading volume, a one standard deviation increase of the dispersion measure raises trading volume by an average of 0.7 standard deviation in the case of the job-based measure of dispersion and in the case of the age-based measure and 1.1 standard deviation in the case of the income-based measure. In the case of returns, a one standard deviation increase of the dispersion measure raises returns by an average of 14 bps per day in the case of the job-based measure of dispersion, 9 bps per day in the case of the age-based measure and 19 bps per day in the case of the income-based measure. These findings are robust across the different specifications and for different types of control variables, including the dispersion of the analysts' forecasts. They support the sidelined-investors hypothesis.

4.1.2 Dispersion and future returns

We now focus on the main restrictions that link future returns and dispersion of opinion. We estimate the following pooled regression:

$$R_T = \alpha_{2,R} + \beta_{2,R} F_t + \gamma_{2,R} C_{it} + \delta_{2,R} D_{it} + \varepsilon_{2,R,it} \qquad (6)$$

where, for the *i*th stock at time t, $R_{t,T}$ is the future (i.e., future time T) stock returns and D_{it} is the stock-specific measure of dispersion of opinion. Theory posits that the existence of sidelined investors determines contemporaneous overvaluation followed by a decrease in prices. However, the theory is mute about the timing of the reversion. Therefore, for the testing, we need to make some assumption about the interval over which returns and dispersion are constructed. We can reasonably expect that the average future returns will be affected by average past dispersion. We consider two alternative intervals over which returns and dispersion are averaged: a 5-day interval and a 10-day interval. We proceed as follows. For each stock and each time, we construct the future return ($R_{t,T}$) as the average stock return over a 10-day (5-day) period and the measure of dispersion of opinion (D_{it}) as the average value of the dispersion of opinion over a 10-day (5-day) period. Then, we regress the future average returns on the past average dispersion. We space returns and dispersion by a 10-day interval. This procedure allows us to average out some of the daily return bouncing due to microstructure effects.

F_t and C_t are the market factors and the control variables defined as in the previous section. We use different alternative specifications that differ depending on the control variables that are used. In particular, in Specifications I and II, we use the control variables defined as contemporaneous to the measure of dispersion (i.e., t–10), in Specifications III and IV we use the control variables defined as contemporaneous to the dependent variable (i.e., t) and in Specifications V and VI, we use both the control variables defined as contemporaneous to the measure of dispersion and the control variables defined as contemporaneous to the dependent variable.

As before, we also consider two alternative measures of analysts' dispersion of forecasts, the standard deviation of the forecasts standardized by their average value (Specifications I, III and V) and the difference between the highest and lowest forecast, standardized by their average value (Specifications II, IV and VI). The regressions are pooled estimations based on daily data for the period 1/1/1991-31/12/1995 on 100 stocks, with consistent variance-covariance matrix (adjusted using the Newey West correction). We recall that the sidelined-investors theory requires that $\gamma_{2,R} < 0$, while the uncertainty/asymmetric information theory requires that $\gamma_{2,R} > 0$.

The results are reported in Table 2, Panel A for the case the 5-day interval and Panel B for the case of 10-day interval. The results show that current dispersion of opinion is strongly negatively related to future returns, that is $\gamma_{2,R} < 0$. A one standard deviation increase of the dispersion measure lowers stock returns by an average of 6 bps per day in the case of the job-based measure of dispersion, 18 bps per day in the case of the of the age-based measure and 12 bps per day in the case of the of the income-based measure.[1] These results are robust across the different specifications and for different types of control variables, including the dispersion of the analysts' forecasts. They support the sidelined-investors theory.

4.2 Dispersion as a factor

As of now, we have only considered stock-specific uncertainty. We now study whether dispersion of opinion about different stocks aggregates and generates a market factor that is related to stock returns. The previous findings are consistent with the sidelined-investors theory. This would suggest that stocks with high dispersion factor beta earn low future returns. We investigate this issue by estimating the following specification:

$$R_{i,t} = \alpha_i + \beta_i F_t + \gamma_i E_t + \delta_i W_{it} + \varepsilon_{it}, \tag{7}$$

where, for the ith portfolio at time t, $\boldsymbol{F_t}$ is the vector of the three FF factors and $\boldsymbol{W_{it}}$ is a vector that contains the dispersion of analysts' forecasts, trading volume (defined as the number of traded shares over outstanding shares) and volatility (defined as the absolute value of daily return) defined at the portfolio level as averages of the values for the stocks part of the portfolio. We consider two alternative measures of the dispersion of analysts' forecasts: the standard deviation of the forecasts standardized by their average value (Analysts1) and the absolute difference between the highest and lowest forecast, standardized by their average value (Analysts2). These are defined at the stock level and then aggregated across all the stocks in the portfolio.

E_t is the tracking portfolio that mimics the dispersion of opinion factor. It is constructed in the following way. Each day, the stocks are ranked on the basis of our three proxies of dispersion of opinion (job-based, age-based and income-based dispersion) and grouped into 10 deciles. Then, the factors are constructed by going long the stocks belonging to the top 2 deciles and short the stocks belonging to the bottom 2 deciles. The net return is the value of the factor for

[1]In particular, if we define the standard deviation of the dispersion measure as σ_d, the value $\gamma_{2,R} * \sigma_d$ quantifies the number of basis points (bps) the stock return (dependent variables) changes for a change of the explanatory variable of one standard deviation.

the day. This generates three daily time series of returns that represent our factors: a job-based factor, an age-based factor and income-based factors. We will use them separately as alternative measures of dispersion of opinion.

Equation 7 can be estimated in two ways, either by using a "cross-sectional" approach (Fama and MacBeth, 1973) or a time series approach (Black, Jensen and Scholes, 1972, Fama and French, 1993). The first exploits the power contained in the cross-section of different portfolios, while the second exploits the time series dimension. We use both approaches for different reasons. First, this provides a useful robustness check. Second, given the limited time series dimension, the Fama and MacBeth approach, which requires the previous construction of factor loadings, further restricts the sample. On the other hand, the time series approach can exploit the entire sample. Finally, the Fama and French approach allows us to have an additional insight into how the relationship between dispersion and returns changes depending on portfolio aggregation. It is important to stress that, given the limited time series dimension, we can use these methods more to assess correlations and co-movements between stock returns and dispersion of opinion than to say that dispersion is priced in equilibrium.

4.2.1 Fama, MacBeth

We estimate a standard Fama-MacBeth two-stage time series cross-section test, applied to daily returns. We use rolling intervals and daily updated loadings. The stocks have been grouped into ten portfolios, based on stock market capitalization. For each portfolio, we carry out a regression of portfolio returns on market returns. This allows us to compute values of βs and γs (factor loadings) for each portfolio. The factors loadings are estimated using a 120-day rolling window. Then, the loadings are used as explanatory variables in the second step of the procedure in which, we regress the portfolio returns on the estimated loadings. In this second step, we also include, among the explanatory variables, the dispersion of the analysts' forecasts, trading volume and volatility. These variables are constructed for each portfolio as the average across all the stocks belonging to the portfolio. We then collect the time series of all these regression slopes. In order to overcome the potential problems of lead-lag effects due to asynchronous trading with daily data, we apply the Dimson-Marsh correction using either 1 or 2 days of leads and lags.[2] We consider two alternative specifications based on either the standardized measure of dispersion (Specification I) or on the measure of dispersions constructed on the basis of purchases and sales separately constructed (Specification II).

[2] The results do not differ, so we report only the ones based on two days' leads and lags.

If our hypothesis is correct, we expect the dispersion of opinion factor to have additional explanatory power. This additional power allows us to gauge the role played by dispersion of opinion in the formation of asset prices. The results are reported in Table 3, Panel A for the case of job-based dispersion, Panel B for the case of age-based dispersion and Panel C for the case of income-based dispersion. We report the average values and the *t-statistic* of the regression slopes for dispersion of opinion, dispersion of analysts' forecasts and trading volume as estimated in the cross-section of the second stage of the procedure. We also report the average *Adjusted* R^2 of the cross-sections.

The results support our working hypothesis and show that dispersion of opinion aggregates, creating a factor that directly affects stock returns and on which the portfolios load. These results are statistically significant across all the specifications and for different robustness checks. It is worth noting that the average value of the dispersion of opinion factor is negative in the sample and that the portfolios load on them negatively. This implies that dispersion of opinion can be considered as a risk factor that increases uncertainty and thus the required rate of return on the stocks/portfolios.

Moreover, the fact that dispersion of opinion is significant in the Fama and MacBeth procedure, even after controlling for the FF factors, suggests that our factor does not proxy for some macro effect or for income or employment shocks. Indeed, recent studies (Liew and Vassallou, 1999 and Vassallou, 2002) show that the FF factors are good proxies of news on future GDP growth and are correlated with innovations on other macroeconomic fundamentals. Also, the fact that our proxy of dispersion of opinion is significant, even after controlling for the dispersion of analysts' forecasts, suggests that it is not proxying for some standard microstructure effect.

4.2.2 Fama and French

We now turn to the time series test. We employ the methodology used by Fama and French (1993). That is, for each portfolio, we regress the return of the portfolio on factors proxying for the fundamentals and on our dispersion of opinion factor. We consider alternative specifications, where we use as fundamental factors either the return on the market portfolio or the three FF factors. We also estimate a conditional specification (Ferson, Kandel and Stambaugh, 1987, Ferson, 1990, Ferson and Harvey, 1999) in which the other measures of dispersion (i.e., $\boldsymbol{W_{it}}$) are used as conditioning information to which the betas of the factors are linearly related. We consider two alternative ways of constructing the portfolios: by sorting stocks either on the basis of their market capitalization (Size-sorted Portfolios) or on the basis of the dispersion of opinion factor (Dispersion-sorted Portfolios). Portfolios 1 to 10 are defined in descending order in the case of market capitalization and in ascending order in the case of dispersion of opinion.

We use as proxies for dispersion of opinion both the measure of dispersion described in Section 3 (Specification I) and the measures of dispersion separately constructed on the basis of purchases and sales (Specification II). The dispersion of opinion factor is the return on the tracking portfolio that mimics the factor based on differences in trades. It is constructed as described in the previous section. As before, we separately use three factors: a job-based factor, an age-based factor and income-based factors. The regressions are estimated with a robust variance-covariance matrix, with theWhite correction.

The results are reported in Table 4, Panel A for the case of job-based dispersion, Panel B for the case of age-based dispersion and Panel C for the case of income-based dispersion. We report the coefficients on the dispersion factor, its significance level and the average *Adjusted* R^2 for the regressions for the 10 portfolios. We consider a base specification with only the dispersion factor ("Dispersion factor alone"), a specification with the dispersion factor and the market factor ("Market Factor"), a specification with the dispersion factor and the 3 FF factors ("FF Factors") and a conditional specification with the dispersion factor and the 3 FF factors estimated market factor ("Conditional FF Factors").

The results strongly support our working hypothesis. Indeed, in all the portfolios and across all the specifications, dispersion of opinion is strongly and significantly related to portfolio returns. It is interesting to note that the impact of the dispersion factor changes sign depending on the size of the company and on its level of dispersion. Large stocks and stocks with small dispersion have a negative sign, while small stocks and stocks with high dispersion have a positive sign. This suggests that the dispersion variable captures difference of opinion better in relatively smaller companies, for which the dispersion of opinion is higher. This is consistent with the findings of Diether, Malloy and Scherbina (2002).

One possible explanation is related to the "transparency" of the company. There can also be a different explanation for this. Large companies tend to be more transparent, given the higher public scrutiny they are subject to and the greater number of analysts following them. More information should reduce both the amount of dispersion of opinion and the sensitivity of the stock to it. An alternative explanation is based on the size of float. It has been shown that in the presence of short sale constraints, the impact of dispersion of beliefs on stock prices is negatively related to the amount of float (Hong, Scheinkman and Xiong, 2003). If we assume that float increases with the size of the company, we have a negative relationship between market capitalization and the impact of dispersion.

It is also interesting to compare the incremental explanatory power of the dispersion of opinion-related factor after having accounted for the explanatory power of the standard asset pricing factors. Dispersion of opinion by itself explains around 17% (in terms of *Adjusted* R^2) of the returns and has an incremental explanatory power of approximately 4% (in terms of *Adjusted* R^2) over and above the three FF factors and the other proxies for dispersion. Finally, it is also worth noting that there is a very heterogeneous behavior across the different portfolios.

4.3 Evidence of causality

We have shown that our measure of opinion based on retail investor holdings has additional power with respect to the power of the standard measures of dispersion based on the dispersion of analysts' forecasts. The interesting question that arises is whether this implies that analysts are simply capturing in their forecasts the "mood" of the market. In other words, it is possible that analysts are simply reflecting the market sentiment, but do not forecast it. This would suggest that analysts are not leading the market, but simply trailing it.

To address this issue, we need to analyze the inter-relationship between dispersion of opinion and analysts' dispersion of forecasts. We use a VAR specification and perform a test of Granger causality. We estimate the following specification:

$$\begin{bmatrix} D_t \\ A_t \end{bmatrix} = \begin{bmatrix} \alpha_D \\ \alpha_A \end{bmatrix} + \begin{bmatrix} \beta\lambda^{DD}(L) & \gamma\lambda^{DA}(L) \\ \delta\lambda^{AD}(L) & \vartheta\lambda^{AA}(L) \end{bmatrix} * \begin{bmatrix} Q_{t-1} \\ A_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_t^D \\ \varepsilon_t^A \end{bmatrix} \tag{8}$$

where $\lambda\,(L)$ are distributed lag operators on lagged dispersion of opinion and analysts' forecast differences and Q_t and A_t are, respectively, an aggregated measure of dispersion of opinion based on investors' holdings and analysts' dispersion of forecasts. Q_t is constructed by taking the average across all the stocks of the stock-based measures of dispersion D_t we described in Section 4.1, while A_t is the average (across all the stocks) of the measure of dispersion of analysts' forecasts defined before. They have been aggregated across all the stocks under consideration. This generates time series of 1,265 daily observations. Aggregation across the stocks provides a market-wide measure of dispersion that can be considered as a "sentiment index" (Baker and Wurgler, 2003). As before, we consider standardized measures of dispersion and measures of dispersion separately constructed on the basis of purchases and sales.

We estimate equation 8 as a standard bivariate VAR between dispersion of opinion and dispersion of analysts' forecasts (Specification I). We consider three alternative specifications. In the first one, up to the 20th lag (i.e., 20 days) of each variable have been used. In the second specification, up to the 30th lag (i.e., 30 days) of each variable have been used. In the third specification, up to the 40th lag (i.e., 40 days) of each variable have been used. These periods should be long enough to allow the analysts' forecasts to be fully updated. As a robustness check, we also estimate a trivariate VAR containing as variables the dispersion of opinion, the dispersion of analysts' forecasts and stock returns (Specification II).

The results are reported in Table 5, Panels A and B. Panel A reports the specifications based on the standardized measure of dispersion and Panel B reports the specifications based on the measures of dispersions separately constructed on the basis of purchases and sales. We report the *F-tests* and the related probability values of the tests of Granger causality between our measure of dispersion of opinion and dispersion of analysts' forecasts. In particular, in the case in which the dependent variable is the dispersion of analysts forecasts, we report the *F-tests* and the related probability values of the test that dispersion of opinion Granger causes the dispersion of analysts forecasts, while, in the case in which the dependent variable is the dispersion of opinion, we report the *F-tests* and the related probability values of the test that the dispersion of analysts forecasts Granger causes the dispersion of opinion**.**

The results show that the dispersion of opinion almost always Granger-causes the dispersion of analysts' forecasts. This holds across the different specifications and for the alternative definitions of dispersion of opinion. Moreover, it is also robust to the inclusion of returns in VAR specification.

In other words, the uncertainty about stock value of the analysts does not affect the market and induces widespread dispersion, but follows the market. This suggests that the divergence of view across analysts reflects deep-rooted overall investors' dispersion of opinion. The analysts are effectively recording a sentiment already diffused in the market. It may be the case that the dynamics of consensus for professional advice is very different from that of ordinary investors, but it relies on it. That is, our measure proxies for a more fundamental difference of opinion that analysts absorb and reflect in their recommendations. For example, the classification based on age may suggest differences across generations explainable in terms of factors such as culture or education.

Conclusion

We study the way heterogeneity of trade among investors affects stock returns. Using a panel of more than 100,000 investor accounts in US stocks over the period 1991-1995, we construct an investor-based measure of dispersion of opinion and we use it to test two competing theories on dispersion of opinion: the sidelined-investors hypothesis and the uncertainty/asymmetric information hypothesis. We show that dispersion opinion on each stock increases contemporaneous stock return and trading volume, and reduces future stock returns in the way posited by the sidelined investor hypothesis. We also provide some evidence that dispersion of opinion aggregates across stocks. Finally, we show that this investor-based measure of dispersion of opinion Granger causes the dispersion of analysts' forecasts.

These results highlight the role played by heterogeneity of investors on the stock market. Investors come to the market bringing with them deep-rooted differences that can be traced to their wealth, income, social status, education and age. These differences affect the way investors approach the market, evaluate the stocks and design their trading strategies. The effect of this behavior does not average out in aggregate but directly impacts the market, generating a separate factor. An interesting question would be how sophisticated professional investors may account for it and exploit it in the construction of their portfolios.

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Table 1: Dispersion and Contemporaneous Stock Characteristics

We estimate: $s_{i,t} = \alpha_{I,R} + \beta_{I,R} F_t + \gamma_{I,R} C_{it} + \delta_{I,R} D_{it} + \varepsilon_{I,R,it}$, where S_{it} is the stock-specific characteristic (either trading volume or return) and F_t is a vector of market factors. They include: the three FF factors (R_{mkt}, *HML* and *SMB*) and the riskless rate (T-Bill rate). These data have been downloaded from K. French's web page. C_t is a vector of stock-specific control variables such as the standard deviation of the analysts' forecasts standardized by their average value, the absolute difference between the highest and lowest forecast, standardized by their average value, the number of positive and negative updates of the forecasts, the highest forecast and the lowest forecast. D_{it} is the stock-specific measure of dispersion of opinion. We consider three measures dispersion of opinion: a job-based measure, an age-based measure and income-based measure. For each of them, we estimate six different specifications. In particular, we consider three ways of constructing the measure of dispersion: the simple measure reported in the previous section (Specifications I and II), its value standardized by dividing it by the number of shares outstanding (Specifications III and IV), and the standardized sum of measures of dispersions separately constructed on the basis of purchases and sales (Specifications V and VI). We also consider two alternative measures of Analysts' dispersion, the standard deviation of the forecasts standardized by their average value (Specifications I, III and V) and the difference between the highest and lowest forecast, standardized by their average value (Specifications II, IV and VI). The regressions are pooled estimations based on daily data for the period 1/1/1991-31/12/1995 on 100 stocks, with consistent variance-covariance matrix (adjusted using the Newey West correction). Trading volume is defined as turnover, that is, the number of shares traded divided by the number of outstanding shares. Panel A contains the trading volume as a dependent variable, while Panel B contains stock return as a dependent variable. In Panel A, all the coefficients (except the ones on the return on the market, SML, HMS and riskless) have been multiplied by 100, except the one on dispersion. The coefficient on dispersion has been multiplied by 10,000 in Specifications I and II and divided by 100 in Specifications III-VI. In Panel B, the coefficients on the dispersions measures (Std. forecasts, High-Low, Num. Highs, Num. Lows) have been multiplied by 10,000, while the other coefficients (except the ones on the return on the market, SML, HMS and riskless) have been multiplied by 100. The coefficient on dispersion has been multiplied by 100,000 in Specifications I and II.

Panel A: Dispersion and Trading Volume

Variables	**Specifications**											
	I		*II*		*III*		*IV*		*V*		*VI*	
	Coeff.	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*
(Job-based dispersion)												
Constant	2.87	38.13	2.62	55.22	2.89	39.32	2.61	58.77	2.87	39.04	2.58	58.27
Dispersion	12.45	31.73	12.45	31.73	5.72	42.23	5.73	42.23	7.08	40.83	7.08	40.83
Std. Forecast	5.80	0.89	-	-	4.39	0.65	-	-	4.45	0.65	-	-
High-Low	-	-	-16.88	-6.94	-	-	-16.43	-7.01	-	-	-16.67	-7.09
Num. Highs	-15.34	-6.15	-	-	-16.71	-6.63	-	-	-17.14	-6.75	-	-
Num. Lows	-12.08	-3.34	-	-	-14.25	-3.86	-	-	-14.65	-3.96	-	-
Num. Up	-2.99	-12.60	-3.12	-13.00	-2.07	-9.11	-2.23	-9.65	-1.94	-8.54	-2.10	-9.11
Num. Down	-0.45	-1.86	-0.53	-2.17	-0.96	-4.32	-1.06	-4.71	-0.92	-4.02	-1.02	-4.42
R_{mkt}	12.28	4.89	12.35	4.91	9.75	4.26	9.82	4.29	10.52	4.59	10.59	4.63
HML	-2.32	-0.72	-2.15	-0.66	-5.15	-1.75	-4.98	-1.69	-4.52	-1.53	-4.35	-1.47
SMB	16.47	3.84	16.69	3.89	12.63	3.13	12.86	3.19	14.20	3.53	14.44	3.59
R_f	700.85	2.63	729.71	2.76	194.33	0.7940	232.21	0.95	119.48	0.49	159.37	0.66
Adj.RSquare	0.045		0.045		0.094		0.094		0.103		0.103	
(Age-based dispersion)												
Constant	2.81	37.57	2.55	54.63	2.83	38.94	2.54	58.48	2.82	38.75	2.58	58.23
Dispersion	7.80	37.88	7.80	37.88	3.28	47.23	3.28	47.23	3.78	47.40	3.78	47.39
Std Forecast	5.84	0.92	-	-	4.45	0.66	-	-	3.73	0.55	-	-
High-Low	-	-	-16.42	-6.88	-	-	-15.60	-6.86	-	-	-15.62	-6.91
Num. Highs	-15.52	-6.33	-	-	-17.40	-6.95	-	-	-17.56	-6.99	-	-
Num. Lows	-12.25	-3.42	-	-	-14.90	-4.06	-	-	-15.47	-4.17	-	-
Num. Up	-2.87	-12.21	-3.00	-12.62	-1.78	-7.97	-1.95	-8.58	-1.69	-7.51	-1.86	-8.15
Num. Down	-0.48	-1.99	-0.56	-2.32	-0.99	-4.48	-1.10	-4.92	-0.87	-3.97	-0.98	-4.44
R_{mkt}	12.22	4.93	12.28	4.95	10.28	4.61	10.36	4.64	11.26	4.99	11.33	5.02
HML	-0.91	-0.2	-0.74	-0.23	-4.45	-1.57	-4.28	-1.51	-3.42	-1.20	-3.25	-1.14
SMB	16.35	3.85	16.57	3.90	12.59	3.18	12.81	3.23	12.01	3.06	12.24	3.12
R_f	650.82	2.48	681.	2.61	64.64	0.27	108.24	0.45	66.98	0.28	111.94	0.47
AdjRSquare	0.065		0.065		0.150		0.150		0.147		0.144	
(Income-based dispersion)												
Constant	2.82	37.82	2.57	55.09	2.84	38.85	2.55	57.94	2.82	38.71	2.52	57.89
Dispersion	5.04	35.69	5.04	35.69	2.35	45.27	2.35	45.26	3.06	45.19	3.06	45.18
Std Forecast	5.60	0.88	-	-	3.99	0.59	-	-	3.91	0.58	-	-
High-Low	-	-	-16.26	-6.81	-	-	-15.35	-6.78	-	-	-15.49	-6.85
Num. Highs	-15.06	-6.17	-	-	-17.24	-6.89	-	-	-17.24	-6.91	-	-
Num. Lows	-11.92	-3.33	-	-	-15.01	-4.07	-	-	-15.05	-4.09	-	-
Num. Up	-2.78	-11.90	-2.91	-12.31	-1.85	-8.26	-2.01	-8.87	-1.78	-7.92	-1.94	-8.53
Num. Down	-0.29	-1.19	-0.37	-1.51	-0.75	-3.35	-0.86	-3.81	-0.77	-3.44	-0.88	-3.89
R_{mkt}	12.9	5.24	13.01	5.26	11.16	4.95	11.22	4.98	11.44	5.04	11.51	5.07
HML	-1.22	-0.38	-1.06	-0.33	-3.34	-1.17	-3.18	-1.11	-3.87	-1.36	-3.70	-1.30
SMB	15.96	3.78	16.17	3.83	12.30	3.13	12.52	3.19	10.96	2.78	11.18	2.83
R_f	693.04	2.64	722.	2.77	162.44	0.67	206.22	0.86	119.63	0.50	163.18	0.69
AdjRSquare	0.060		0.060		0.137		0.136		0.142		0.141	

Panel B: Dispersion and Contemporaneous Returns

Variables	Specifications											
	I		*II*		*III*		*IV*		*V*		*VI*	
	Coeff.	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*
(Job-based dispersion)												
Constant	0.04	2.21	0.03	2.12	0.04	2.25	0.03	2.17	0.04	2.10	0.03	2.09
Dispersion	0.02	2.08	0.02	2.08	0.07	2.01	0.07	2.01	0.09	1.84	0.09	1.84
Std Forecast	0.28	0.11	-	-	0.36	0.15	-	-	0.48	0.19	-	-
High-Low	-	-	-1.14	-1.06	-	-	-1.17	-1.09	-	-	-1.15	-1.07
Num. Highs	-0.67	-0.88	-	-	-0.70	-0.90	-	-	-0.64	-0.83	-	-
Num. Lows	-0.51	-0.47	-	-	-0.49	-0.44	-	-	-0.37	-0.33	-	-
Num. Up	0.0006	0.61	0.05	0.57	0.0007	0.63	0.06	0.59	0.0006	0.60	0.05	0.56
Num. Down	-0.0004	-0.48	-0.04	-0.49	-0.0003	-0.33	-0.03	-0.34	-0.0005	-0.57	-0.05	-0.57
R_{mkt}	1.02	109.30	1.02	109.32	1.02	109.74	1.02	109.75	1.0205	109.38	1.02	109.39
HML	-0.26	-22.164	-0.26	-22.15	-0.27	-22.32	-0.27	-22.31	-0.27	-22.29	-0.27	-22.28
SMB	-0.06	-4.44	-0.06	-4.42	-0.06	-4.40	-0.06	-4.38	-0.07	-4.54	-0.07	-4.52
R_f	0.45	0.50	0.46	0.50	0.33	0.36	0.33	0.37	0.44	0.48	0.44	0.48
Adj.RSquare	0.171		0.171		0.171		0.171		0.171		0.171	
(Age-based dispersion)												
Constant	0.03	1.85	0.03	1.91	0.04	1.99	0.02	1.75	0.03	1.94	0.02	1.77
Dispersion	0.01	2.07	0.01	2.06	0.04	2.37	0.04	2.37	0.06	2.61	0.06	2.60
Std Forecast	0.55	0.22	-	-	0.31	0.13	-	-	0.33	0.13	-	-
High-Low	-	-	-1.16	-1.08	-	-	-1.13	-1.06	-	-	-1.11	-1.04
Num. Highs	-0.54	-0.71	-	-	-0.75	-0.97	-	-	-0.70	-0.90	-	-
Num. Lows	-0.23	-0.21	-	-	-0.57	-0.52	-	-	-0.51	-0.46	-	-
Num. Up	0.0006	0.52	0.05	0.50	0.0007	0.65	0.06	0.60	0.0006	0.61	0.05	0.56
Num. Down	-0.0004	-0.43	-0.03	-0.42	-0.0005	-0.50	-0.04	-0.52	-0.0005	-0.54	-0.04	-0.55
R_{mkt}	1.01	109.34	1.01	109.35	1.01	109.59	1.01	109.61	1.01	109.79	1.01	109.
HML	-0.26	-22.24	-0.26	-22.23	-0.2713	-22.39	-0.27	-22.38	-0.27	-22.65	-0.27	-22.64
SMB	-0.07	-4.59	-0.07	-4.58	-0.07	-4.58	-0.07	-4.57	-0.07	-4.54	-0.07	-4.52
R_f	0.56	0.62	0.55	0.61	0.58	0.64	0.58	0.65	0.56	0.62	0.57	0.63
AdjRSquare	0.170		0.170		0.171		0.171		0.71		0.171	
(Income-based dispersion)												
Constant	0.03	1.84	0.02	1.82	0.03	1.96	0.02	1.79	0.03	1.91	0.02	1.79
Dispersion	0.01	3.60	0.01	3.60	0.03	2.27	0.03	2.26	0.05	2.75	0.05	2.75
Std Forecast	0.47	0.19	-	-	0.37	0.15	-	-	0.43	0.18	-	-
High-Low	-	-	-1.12	-1.05	-	-	-1.14	-1.06	-	-	-1.14	-1.07
Num. Highs	-0.58	-0.76	-	-			-	-	-0.68	-0.88	-	-
Num. Lows	-0.31	-0.29	-	-	-0.71	-0.92	-	-	-0.43	-0.39	-	-
Num. Up	0.0005	0.47	0.04	0.44	-0.50	-0.45	0.06	0.58	0.0007	0.67	0.06	0.63
Num. Down	-0.0005	-0.57	-0.05	-0.56	0.0007	0.63	-0.03	-0.40	-0.0005	-0.53	-0.04	-0.53
R_{mkt}	1.01	108.98	1.01	108.99	-0.0004	-0.39	1.01	109.47	1.0180	109.39	1.01	109.40
HML	-0.27	-22.40	-0.27	-22.39	1.01	109.46	-0.27	-22.55	-0.27	-22.54	-0.27	-22.53
SMB	-0.07	-4.58	-0.07	-4.56	-0.27	-22.56	-0.07	-4.56	-0.07	-4.54	-0.07	-4.53
R_f	0.62	0.69	0.62	0.68	-0.07	-4.58	0.62	0.69	0.55	0.61	0.55	0.61
AdjRSquare	0.170		0.171		0.171		0.171		0.171		0.171	

Table 2: Dispersion and Future Returns

We estimate: $R_T = \alpha_{2,R} + \beta_{2,R} F_t + \gamma_{2,R} C_{it} + \delta_{2,R} D_{it} + \varepsilon_{2,R,t}$, where, for the *i*th stock at time t, $R_{t,T}$ is the future stock returns and D_{it} is the stock-specific measure of dispersion of opinion. They have been constructed as follows. We consider two alternative intervals: one 5-day and the other 10-day. For each stock and each time, we construct the future return ($R_{t,T}$) as the average stock return over a 10-day (5-day) period and the measure of dispersion of opinion (D_{it}) as the average value of the dispersion of opinion over a 10-day (5-day) period. Then, we regress these future returns on the measure of dispersion. We space returns and dispersion by 10-day intervals. F_t and C_t are the market factors and the control variables defined as in Table 1. We use alternative specifications that differ depending on the control variables that are used. In particular, in Specifications I and II, we use the control variables defined as contemporaneous to the measure of dispersion (i.e., *t*–10), in Specifications III and IV, we use the control variables defined as contemporaneous to the dependent variable (i.e., *t*) and in Specifications V and VI, we use both the control variables defined as contemporaneous to the measure of dispersion and the control variables defined as contemporaneous to the dependent variable. As before, we also consider two alternative measures of analysts' dispersion of forecasts, the standard deviation of the forecasts standardized by their average value (Specifications I, III and V) and the difference between the highest and lowest forecast, standardized by their average value (Specifications II, IV and VI). The regressions are pooled estimations based on daily data for the period 1/1/1991-31/12/1995 on 100 stocks, with consistent variance-covariance matrix (adjusted using the Newey West correction). Panel A contains the specification based on average future returns and average dispersion constructed over a 5-day interval, while Panel B contains the specification based on average future returns and average dispersion constructed over a 10-day interval. The coefficients on the dispersions measures (Std. forecasts, High-Low, Num. Highs, Num. Lows) have been multiplied by 10,000, while the other coefficients (except the ones on the return on the market, SML, HMS and riskless) have been multiplied by 100. The coefficient on dispersion has been multiplied by 100,000 in Specifications I and II.

Panel A: 5 days

Variables	***Specifications***											
	I		*II*		*III*		*IV*		*V*		*VI*	
	Coeff.	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*
(Job-based dispersion)												
Constant	-0.010	-0.19	-0.22	-5.43	-0.12	-2.50	-0.24	-5.89	-0.03	-0.72	-0.20	-4.87
Dispersion_{t-1}	-0.06	-2.49	-0.06	-2.35	-0.06	-2.34	-0.06	-2.49	-0.06	-2.35	-0.06	-2.35
$\text{Std Forecast}_{t-1}$	-7.94	-1.41	-	-	-	-	-	-	-19.12	-3.07	-	-
High-Low_{t-1}	-	-	-6.59	-3.03	-	-	-	-	-	-	-2.41	-0.83
Num. Highs_{t-1}	-10.43	-4.99	-	-	-	-	-	-	-11.35	-4.52	-	-
Num. Lows_{t-1}	-14.87	-5.57	-	-	-	-	-	-	-22.06	-6.06	-	-
Num. Up_{t-1}	0.001	0.45	0.57	2.21	-	-	-	-	-0.007	-2.35	-0.86	-2.57
Num. Down_{t-1}	0.0002	0.08	0.21	0.94	-	-	-	-	-0.004	-1.38	-0.52	-1.50
$R_{mkt,t-1}$	0.0707	3.01	0.89	38.18	-	-	-	-	0.08	3.65	0.08	3.70
HML_{t-1}	-0.15	-4.87	-0.34	-10.93	-	-	-	-	-0.16	-5.43	-0.16	-5.36
SMB_{t-1}	0.06	1.71	-0.23	-6.41	-	-	-	-	0.04	1.12	0.04	1.14
$R_{f,t-1}$	47.24	19.82	42.80	18.19	-	-	-	-	-7.41	-0.82	-7.97	-0.88
Std Forecast_{t}	-	-	-	-	2.40	0.52	-	-	15.978	2.86	-	-
High-Low_{t}	-	-	-	-	-	-	-6.60	-3.23	-	-	-	-
Num. Highs_{t}	-	-	-	-	-6.25	-3.44	-	-	3.31	1.26	-4.92	-1.64
Num. Lows_{t}	-	-	-	-	-4.90	-2.15	-	-	12.25	3.63	-	-
Num. Up_{t}	-	-	-	-	0.006	2.39	-0.01	-0.05	0.01	3.47	1.14	3.38
Num. Down_{t}	-	-	-	-	0.002	1.04	-0.08	-0.35	0.006	1.79	0.61	1.72
$R_{mkt,t}$	-	-	-	-	0.89	38.15	0.07	3.02	0.89	38.14	0.89	38.25
HML_{t}	-	-	-	-	-0.34	-10.97	-0.15	-4.85	-0.33	-10.88	-0.33	-10.78
SMB_{t}	-	-	-	-	-0.23	-6.45	0.06	1.74	-0.23	-6.45	-0.23	-6.36
$R_{f,t}$	-	-	-	-	42.78	18.20	47.6	19.95	49.17	5.45	50.13	5.55
Adj.RSquare	0.004		0.03		0.03		0.004		0.03		0.03	
(Age-based dispersion)												
Constant	-0.01	-0.28	-0.22	-5.35	-0.12	-2.58	-0.24	-5.88	-0.04	-0.82	-0.20	-4.83
Dispersion_{t-1}	-0.03	-2.60	-0.03	-2.38	-0.02	-2.36	-0.03	-2.61	-0.03	-2.39	-0.03	-2.40
$\text{Std Forecast}_{t-1}$	-7.83	-1.40	-	-	-	-	-	-	-19.16	-3.10	-	-
High-Low_{t-1}	-	-	-6.45	-2.97	-	-	-	-	-	-	-2.42	-0.83
Num. Highs_{t-1}	-10.18	-4.89	-	-	-	-	-	-	-11.20	-4.47	-	-
Num. Lows_{t-1}	-14.57	-5.47	-	-	-	-	-	-	-21.94	-6.05	-	-
Num. Up_{t-1}	0.001	0.51	0.51	1.99	-	-	-	-	-0.006	-2.03	-0.75	-2.24
Num. Down_{t-1}	0.0004	0.15	0.197	0.86	-	-	-	-	-0.00	-1.20	-0.46	-1.32
$R_{mkt,t-1}$	0.07	3.09	0.89	38.31	-	-	-	-	0.08	3.73	0.08	3.78
HML_{t-1}	-0.14	-4.60	-0.33	-10.85	-	-	-	-	-0.15	-5.16	-0.15	-5.09
SMB_{t-1}	0.06	1.75	-0.22	-6.17	-	-	-	-	0.04	1.14	0.04	1.17
$R_{f,t-1}$	47.16	19.82	42.65	18.16	-	-	-	-	-6.88	-0.76	-7.44	-0.83
Std Forecast_{t}	-	-	-	-	2.51	0.55	-	-	16.03	2.87	-	-
High-Low_{t}	-	-	-	-	-	-	-6.52	-3.19	-	-	-	-
Num. Highs_{t}	-	-	-	-	-5.88	-3.26	-	-	3.55	1.35	-4.78	-1.58
Num. Lows_{t}	-	-	-	-	-4.47	-1.97	-	-	12.53	3.72	-	-
Num. Up_{t}	-	-	-	-	0.005	2.16	0.005	0.02	0.01	3.10	1.02	3.01
Num. Down_{t}	-	-	-	-	0.002	0.95	-0.06	-0.27	0.005	1.61	0.54	1.54
$R_{mkt,t}$	-	-	-	-	0.89	38.29	0.07	3.10	0.89	38.28	0.89	38.38
HML_{t}	-	-	-	-	-0.33	-10.89	-0.14	-4.57	-0.33	-10.81	-0.33	-10.71
SMB_{t}	-	-	-	-	-0.22	-6.21	0.06	1.78	-0.22	-6.21	-0.22	-6.12
$R_{f,t}$	-	-	-	-	42.63	18.18	47.57	19.94	48.50	5.38	49.46	5.49
Adj.RSquare	0.004		0.03		0.03		0.004		0.03		0.03	

Panel A: 5 days (continues)

Variables	*I*		*II*		*III*		*IV*		*V*		*VI*	
	Coeff.	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*
(Income-based dispersion)												
Constant	-0.01	-0.20	-0.22	-5.41	-0.12	-2.47	-0.25	-6.00	-0.03	-0.70	-0.20	-4.89
Dispersion$_{t-1}$	-0.02	-2.76	-0.021	-2.556	-0.02	-2.53	-0.02	-2.77	-0.02	-2.55	-0.02	-2.57
Std Forecast$_{t-1}$	-8.29	-1.46	-	-	-	-	-	-	-19.60	-3.12	-	-
High-Low$_{t-1}$	-	-	-6.51	-2.99	-	-	-	-	-	-	-2.38	-0.81
Num. Highs$_{t-1}$	-10.50	-5.02	-	-	-	-	-	-	-11.51	-4.57	-	-
Num. Lows$_{t-1}$	-15.15	-5.63	-	-	-	-	-	-	-22.49	-6.14	-	-
Num. Up$_{t-1}$	0.001	0.39	0.51	1.97	-	-	-	-	-0.007	-2.19	-0.81	-2.42
Num. Down$_{t-1}$	0.0001	0.04	0.16	0.70	-	-	-	-	-0.004	-1.20	-0.46	-1.33
$R_{mkt,t-1}$	0.06	2.84	0.89	38.18	-	-	-	-	0.08	3.47	0.08	3.52
HML$_{t-1}$	-0.15	-4.83	-0.33	-10.84	-	-	-	-	-0.16	-5.39	-0.16	-5.31
SMB$_{t-1}$	0.05	1.60	-0.23	-6.28	-	-	-	-	0.03	1.00	0.03	1.03
$R_{f,t-1}$	47.56	20.00	42.90	18.27	-	-	-	-	-4.63	-0.51	-5.22	-0.58
Std Forecast$_t$	-	-	-	-	2.18	0.47	-	-	16.00	2.84	-	-
High-Low$_t$	-	-	-	-	-	-	-6.52	-3.19	-	-	-	-
Num. Highs$_t$	-	-	-	-	-6.19	-3.41	-	-	3.51	1.33	-4.86	-1.61
Num. Lows$_t$	-	-	-	-	-4.97	-2.17	-	-	12.48	3.68	-	-
Num. Up$_t$	-	-	-	-	0.00	2.15	-0.02	-0.11	0.01	3.20	1.05	3.11
Num. Down$_t$	-	-	-	-	0.001	0.81	-0.09	-0.39	0.005	1.52	0.51	1.44
$R_{mkt,t}$	-	-	-	-	0.89	38.15	0.06	2.85	0.89	38.15	0.89	38.26
HML$_t$	-	-	-	-	-0.33	-10.88	-0.14	-4.80	-0.33	-10.80	-0.33	-10.69
SMB$_t$	-	-	-	-	-0.23	-6.31	0.06	1.63	-0.23	-6.31	-0.22	-6.21
$R_{f,t}$	-	-	-	-	42.87	18.28	47.99	20.13	46.578	5.18	47.54	5.30
Adj.RSquare	0.004		0.03		0.03		0.004		0.03		0.03	

Panel B: 10 days

Variables	*I*		*II*		*III*		*IV*		*V*		*VI*	
	Coeff.	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*
(Job-based dispersion)												
Constant	-0.00	-0.01	-0.36	-6.61	-0.12	-1.38	-0.40	-7.22	0.02	0.39	-0.33	-6.00
Dispersion_{t-1}	-0.11	-3.24	-0.10	-3.12	-0.06	-3.08	-0.11	-3.26	-0.10	-3.05	-0.10	-3.08
$\text{Std Forecast}_{t-1}$	-15.00	-1.90	-	-	-	-	-	-	-24.80	-3.20	-	-
High-Low_{t-1}	-	-	-12.36	-4.32	-	-	-	-	-	-	-4.03	-1.07
Num. Highs_{t-1}	-17.09	-5.99	-	-	-	-	-	-	-14.45	-5.18	-	-
Num. Lows_{t-1}	-25.44	-6.80	-	-	-	-	-	-	-28.34	-6.36	-	-
Num. Up_{t-1}	0.0003	0.09	0.49	1.47	-	-	-	-	-0.008	-1.95	-1.01	-2.28
Num. Down_{t-1}	-0.002	-0.74	0.26	0.86	-	-	-	-	-0.01	-2.78	-1.41	-3.00
$R_{mkt,t-1}$	-0.09	-3.04	0.68	22.36	-	-	-	-	-0.07	-2.44	-0.07	-2.41
HML_{t-1}	-0.28	-6.99	-0.30	-7.42	-	-	-	-	-0.28	-7.13	-0.28	-7.08
SMB_{t-1}	-0.21	-4.49	-0.55	-11.56	-	-	-	-	-0.22	-4.75	-0.22	-4.71
$R_{f,t-1}$	84.26	26.82	78.47	25.15	-	-	-	-	45.07	3.87	44.19	3.79
Std Forecast_{t}	-	-	-	-	-0.21	0.56	-	-	19.04	2.90	-	-
High-Low_{t}	-	-	-	-	-	-	-11.27	-4.42	-	-	-	-
Num. Highs_{t}	-	-	-	-	-14.57	-5.44	-	-	-3.42	-1.10	-9.24	-2.26
Num. Lows_{t}	-	-	-	-	-14.69	-4.20	-	-	7.23	1.77	-	-
Num. Up_{t}	-	-	-	-	0.006	1.86	-0.18	-0.53	0.01	2.70	1.11	2.51
Num. Down_{t}	-	-	-	-	0.003	1.13	-0.38	-1.29	0.01	2.85	1.30	2.73
$R_{mkt,t}$	-	-	-	-	0.68	22.31	-0.09	-3.02	0.68	22.49	0.69	22.64
HML_{t}	-	-	-	-	-0.31	-7.48	-0.28	-6.96	-0.30	-7.41	-0.30	-7.28
SMB_{t}	-	-	-	-	-0.56	-11.61	-0.21	-4.45	-0.55	-11.43	-0.54	-11.32
$R_{f,t}$	-	-	-	-	78.32	25.16	84.93	26.95	33.08	2.82	34.62	2.96
Adj.RSquare	0.01		0.02		0.02		0.01		0.02		0.02	
(Age-based dispersion)												
Constant	0.008	0.11	-0.34	-6.27	-0.08	-1.25	-0.38	-6.96	0.03	0.50	-0.31	-5.70
Dispersion_{t-1}	-0.04	-2.59	-0.04	-2.47	-0.04	-2.42	-0.04	-2.63	-0.04	-2.38	-0.041	-2.42
$\text{Std Forecast}_{t-1}$	-14.69	-1.88	-	-	-	-	-	-	-25.38	-3.28	-	-
High-Low_{t-1}	-	-	-12.37	-4.33	-	-	-	-	-	-	-3.99	-1.06
Num. Highs_{t-1}	-16.79	-5.92	-	-	-	-	-	-	-14.53	-5.21	-	-
Num. Lows_{t-1}	-25.02	-6.73	-	-	-	-	-	-	-28.75	-6.46	-	-
Num. Up_{t-1}	0.001	0.37	0.54	1.62	-	-	-	-	-0.007	-1.68	-0.89	-2.01
Num. Down_{t-1}	-0.002	-0.91	0.20	0.65	-	-	-	-	-0.01	-2.85	-1.42	-3.06
$R_{mkt,t-1}$	-0.08	-2.96	0.67	22.19	-	-	-	-	-0.07	-2.35	-0.06	-2.32
HML_{t-1}	-0.28	-6.92	-0.32	-7.71	-	-	-	-	-0.28	-7.04	-0.28	-6.98
SMB_{t-1}	-0.21	-4.42	-0.55	-11.41	-	-	-	-	-0.22	-4.68	-0.21	-4.64
$R_{f,t-1}$	82.89	26.40	76.95	24.70	-	-	-	-	47.70	4.10	46.82	4.03
Std Forecast_{t}	-	-	-	-	0.45	0.06	-	-	20.03	3.06	-	-
High-Low_{t}	-	-	-	-	-	-	-11.25	-4.41	-	-	-	-
Num. Highs_{t}	-	-	-	-	-14.19	-5.33	-	-	-2.93	-0.94	-9.29	-2.28
Num. Lows_{t}	-	-	-	-	-13.94	-4.04	-	-	8.28	2.02	-	-
Num. Up_{t}	-	-	-	-	0.006	1.99	-0.08	-0.25	0.01	2.62	1.08	2.45
Num. Down_{t}	-	-	-	-	0.002	0.91	-0.43	-1.46	0.01	2.76	1.26	2.64
$R_{mkt,t}$	-	-	-	-	0.67	22.14	-0.08	-2.95	0.68	22.33	0.68	22.47
HML_{t}	-	-	-	-	-0.32	-7.77	-0.28	-6.88	-0.32	-7.70	-0.31	-7.58
SMB_{t}	-	-	-	-	-0.55	-11.47	-0.20	-4.38	-0.54	-11.28	-0.54	-11.17
$R_{f,t}$	-	-	-	-	76.81	24.70	83.57	26.53	28.98	2.48	30.52	2.61
Adj.RSquare	0.01		0.02		0.02		0.01		0.02		0.02	

Panel B: 10 days (continues)

Variables	Specifications											
	I		*II*		*III*		*IV*		*V*		*VI*	
	Coeff.	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*
(Income-based dispersion)												
Constant	0.001	0.02	-0.36	-6.62	-0.08	-1.27	-0.40	-7.32	0.03	0.48	-0.33	-6.04
$Dispersion_{t-1}$	-0.01	-1.58	-0.01	-1.49	-0.01	-1.43	-0.01	-1.63	-0.01	-1.39	-0.01	-1.44
Std $Forecast_{t-1}$	-15.42	-1.93	-	-	-	-	-	-	-25.06	-3.20	-	-
$High\text{-}Low_{t-1}$	-	-	-12.45	-4.36	-	-	-	-	-	-	-4.05	-1.08
Num. $Highs_{t-1}$	-17.31	-6.07	-	-	-	-	-	-	-14.59	- 5.2284	-	-
Num. $Lows_{t-1}$	-25.95	-6.91	-	-	-	-	-	-	-28.62	-6.40	-	-
Num. Up_{t-1}	0.0007	0.19	0.47	1.41	-	-	-	-	-0.00	-1.73	-0.92	-2.07
Num. $Down_{t-1}$	-0.002	-0.80	0.24	0.80	-	-	-	-	-0.01	-2.87	-1.44	-3.10
$R_{mkt,t-1}$	-0.08	-2.92	0.68	22.35	-	-	-	-	-0.06	-2.34	-0.06	-2.30
HML_{t-1}	-0.27	-6.84	-0.30	-7.34	-	-	-	-	-0.28	-6.98	-0.28	-6.93
SMB_{t-1}	-0.21	-4.47	-0.55	-11.40	-	-	-	-	-0.22	-4.74	-0.22	-4.70
$R_{f,t-1}$	83.96	26.74	77.95	25.00	-	-	-	-	49.09	4.21	48.14	4.13
Std $Forecast_t$	-	-	-	-	-0.488	-0.06	-	-	18.96	2.87	-	-
$High\text{-}Low_t$	-	-	-	-	-	-	-11.34	-4.44	-	-	-	-
Num. $Highs_t$	-	-	-	-	-14.83	-5.52	-	-	-3.62	-1.16	-9.32	-2.29
Num. $Lows_t$	-	-	-	-	-15.10	-4.31	-	-	6.99	1.71	-	-
Num. Up_t	-	-	-	-	0.006	1.81	-0.15	-0.44	0.01	2.52	1.03	2.33
Num. $Down_t$	-	-	-	-	0.003	1.09	-0.41	-1.37	0.01	2.88	1.32	2.76
$R_{mkt,t}$	-	-	-	-	0.68	22.30	-0.087	-2.90	0.68	22.48	0.69	22.63
HML_t	-	-	-	-	-0.30	-7.41	-0.27	-6.81	-0.30	-7.35	-0.30	-7.23
SMB_t	-	-	-	-	-0.55	-11.45	-0.21	-4.43	-0.54	-11.27	-0.54	-11.16
$R_{f,t}$	-	-	-	-	77.78	25.00	84.65	26.88	28.59	2.44	30.21	2.58
Adj.RSquare	0.01		0.02		0.02		0.01		0.02		0.02	

Table 3: Dispersion as a factor:
Fama and MacBeth Methodology

This table reports the results of the second stage of a standard Fama and MacBeth two-stage time series cross-section test, applied to daily returns. We perform a standard two-stage time series cross-section test, applied to daily returns. We use rolling intervals and daily updated loadings. We proceed as follows. First, we group the stocks into ten portfolios, based on stock market capitalization. Second, for each portfolio, we carry out a regression of portfolio returns on the three FF factors and a factor constructed as a tracking portfolio that mimics the dispersion of opinion factor. This portfolio is constructed in the following way. Each day, the stocks are ranked on the basis of our three proxies of dispersion of opinion (job-based, age-based and income-based dispersion) and grouped into 10 deciles. Then, the factors are constructed by going long the stocks belonging to the top 2 deciles and short the stocks belonging to the bottom 2 deciles. The net return is the value of the factor for the day. These regressions are performed using a 120-day rolling window. This generates three daily time series of returns that represent our factors: a job-based factor, an age-based factor and income-based factors. We use them separately as alternative measures of dispersion of opinion. We then store these values of the slopes of the first stage regressions (factor loadings). Third, the loadings are used as explanatory variables in the second step of the procedure in which we regress the portfolio returns on the estimated portfolio loadings. In this second step, we also include, among the explanatory variables, the dispersion of the analysts' forecasts, trading volume (defined as number of traded shares over outstanding shares) and volatility (defined as absolute value of daily returns). These variables are constructed for each portfolio as the average across all the stocks belonging to the portfolio. We then collect the time series of all these regression slopes. In order to overcome the potential problems of lead-lag effects due to asynchronous trading with daily data, we apply the Dimson-Marsh correction using either 1 or 2 days of leads and lags. We use two alternative proxies of dispersion of analysts' forecasts: either the standard deviation of the forecasts standardized by their average value (Analysts1) or the absolute difference between the highest and lowest forecast, standardized by their average value (Analysts2). These are defined at the stock level and then aggregated across all the stocks in the portfolio. We consider two alternative specifications based on either the standardized measure of dispersion (Specification I) or on the measure of dispersions constructed on the basis of purchases and sales separately constructed (Specification II). We report the average values and the *t-statistic* of the coefficients in the cross-section for the dispersion of opinion, dispersion of analysts' forecasts and trading volume. We also report the average *Adjusted Rsquare* of the cross-sections. The coefficients of the dispersion of opinion, the dispersion of the analysts' forecasts and volatility have been multiplied by 1,000.

Impact of Dispersion of opinion on Stock Returns

Panel A

Job-based dispersion

Variables	*No Analysts*				*Analysts1*						*AnalystsII*			
	Coeff.	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*
							Specification I							
Dispersion	-0.19	-2.68	-0.43	-4.65	-0.53	-4.31	-0.53	-3.58	-0.44	-4.79	-0.52	-4.24	-0.54	-3.60
Analysts	-	-	-0.47	-4.72	-0.55	-4.39	-0.37	-2.32	-0.48	-4.79	-0.55	-4.38	-0.39	-2.41
Trade	-	-	-	-	0.14	2.35	-0.26	-3.50	-	-	0.13	2.20	-0.27	-3.52
Volatility	-	-	-	-	-	-	4.05	8.58	-	-	-	-	4.09	8.63
Adj.RSquare	0.17		0.18		0.22		0.38		0.18		0.22		0.38	
							Specification II							
Dispersion	-0.18	-2.62	-0.42	-4.70	-0.54	-4.65	-0.55	-4.00	-0.43	-4.65	-0.53	-4.31	-0.53	-3.58
Analysts	-	-	-2.01	-4.84	-2.61	-5.26	-1.97	-3.28	-0.47	-4.72	-0.55	-4.39	-0.37	-2.32
Trade	-	-	-	-	0.16	2.69	-0.20	-2.83	-	-	0.14	2.35	-0.26	-3.50
Volatility	-	-	-	-	-	-	3.46	7.45	-	-	-	-	4.05	8.58
Adj.RSquare	0.17		0.18		0.23		0.37		0.18		0.22		0.38	

Impact of Dispersion of opinion on Stock Returns

Panel B

Age-based dispersion

Variables	*No Analysts*		*Analysts1*						*AnalystsII*					
	Coeff.	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*
Specification I														
Dispersion	-0.21	-2.82	-0.45	-4.88	-0.64	-5.42	-0.40	-2.77	-0.45	-4.78	-0.63	-5.10	-0.49	-2.88
Analysts	-	-	-2.18	-5.20	-3.10	-6.36	-1.46	-2.46	-0.50	-4.95	-0.68	-5.59	-0.34	-2.21
Trade	-	-	-	-	0.24	4.11	-0.12	-1.68	-	-	0.23	3.89	-0.16	-2.17
Volatility	-	-	-	-	-	-	3.58	7.37	-	-	-	-	4.12	8.48
Adj.RSquare	0.16		0.18		0.21		0.37		0.17		0.21		0.37	
Specification II														
Dispersion	-0.19	-2.62	-0.44	-4.76	-0.64	-5.39	-0.41	-2.80	-0.44	-4.66	-0.63	-5.02	-0.42	-2.48
Analysts	-	-	-2.19	-5.21	-3.16	-6.44	-1.52	-2.55	-0.50	-4.98	-0.69	-5.61	-0.29	-1.86
Trade	-	-	-	-	0.24	4.16	-0.14	-1.90	-	-	0.23	3.91	-0.18	-2.46
Volatility	-	-	-	-	-	-	3.66	7.54	-	-	-	-	4.05	8.09
Adj.RSquare	0.16		0.18		0.22		0.37		0.17		0.21		0.37	

Impact of Dispersion of opinion on Stock Returns

Panel C

Income-based dispersion

Variables	*No Analysts*		*Analysts1*						*AnalystsII*					
	Coeff.	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*
							Specification I							
Dispersion	-0.20	-2.80	-0.46	-4.94	-0.65	-5.52	-0.43	-2.89	-0.46	-4.86	-0.64	-5.07	-0.29	-1.89
Analysts	-	-	-2.20	-5.10	-3.08	-6.18	-1.75	-2.90	-0.50	-4.91	-0.65	-5.21	-0.23	-1.51
Trade	-	-	-	-	0.25	4.19	-0.13	-1.85	-	-	0.26	3.90	-0.19	-2.51
Volatility	-	-	-	-	-	-	3.71	8.06	-	-	-	-	3.98	8.43
Adj.RSquare	0.16		0.18		0.21		0.37		0.17		0.21		0.37	
							Specification II							
Dispersion	-0.21	-2.81	-0.46	-4.90	-0.69	-5.72	-0.38	-2.59	-0.47	-4.82	-0.67	-5.23	-0.21	-1.38
Analysts	-	-	-2.16	-5.04	-3.16	-6.34	-1.62	-2.77	-0.50	-4.85	-0.67	-5.35	-0.18	-1.20
Trade	-	-	-	-	0.25	4.28	-0.16	-2.21	-	-	0.23	3.97	-0.21	-2.79
Volatility	-	-	-	-	-	-	3.86	8.50	-	-	-	-	4.06	8.45
Adj.RSquare	0.16		0.18		0.21		0.36		0.17		0.21		0.37	

Table 4: Dispersion as a factor:
Fama and French (1993) Methodology

We employ the methodology used by Fama and French (1993). That is, for each portfolio, we estimate: $R_{i,t} = \alpha + \boldsymbol{\beta F_t} + \gamma E_t + \varepsilon_{it}$, where $\mathbf{F_t}$ is a vector of the three FF factors and E_t is the return on the portfolio mimicking the dispersion of opinion factor. We also consider a conditional specification ("Conditional FF factors") in which the other measures of dispersion are used as conditioning information to which the betas of the factors are linearly related. We consider two alternative ways of constructing the portfolios: by sorting stocks either on the basis of their market capitalization (Size-sorted Portfolios) or on the basis of the dispersion of opinion factor (Dispersion-sorted Portfolios). Portfolios 1 to 10 are defined in descending order in the case of market capitalization and in ascending order in the case of dispersion of opinion. We use as proxies for dispersion of opinion both the measure of dispersion described in the previous section (Specification I) and the measures of dispersion separately constructed on the basis of purchases and sales (Specification II). The dispersion of opinion factor is the return on the tracking portfolio that mimics the factor based on differences in trades. The regressions are estimated with a robust variance-covariance matrix, with White correction. We consider alternative specifications, where we use as control variables either the return on the market portfolio, or the three FF factors. In particular, we consider a base specification with only the dispersion factor ("0 Factors"), a specification with the dispersion factor and the market factor ("Market Factor"), a specification with the dispersion factor and the 3 FF factors ("FF Factors") and a conditional specification with the dispersion factor and the 3 FF factors estimated market factor ("Conditional FF Factors"). We report the coefficients on the dispersion factor, its significance level and the average *Adjusted* R^2 for the regressions for the 10 portfolios.

Panel A:
(Job-based dispersion)

	Size-sorted Portfolios				**Dispersion-sorted Portfolios**							
	Additional Factors (on top of the dispersion factor)											
	Market Factor		*Conditional FF Factors*		*0 Factors (Dispersion Factor Alone)*		*1 Factors*		*FF Factors*		*Conditional FF Factors.*	
	Coeff.	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*
					Specification I							
Portfolios												
Portfolio 1	-0.47	-10.08	-0.50	-15.05	-0.39	-6.08	-0.89	-29.42	-0.91	-30.63	-0.91	-39.18
Portfolio 2	-0.11	-3.46	-0.13	-4.56	-0.22	-4.18	-0.61	-24.37	-0.61	-25.52	-0.60	-28.32
Portfolio 3	-0.39	-12.98	-0.41	-17.14	0.45	8.44	0.08	2.71	0.06	2.08	0.06	2.27
Portfolio 4	-0.11	-3.66	-0.12	-4.66	0.47	7.81	0.07	2.39	0.05	1.82	0.06	2.46
Portfolio 5	0.25	7.24	0.20	6.59	0.58	9.35	0.17	5.24	0.17	5.53	0.16	5.67
Portfolio 6	0.14	4.64	0.12	4.21	0.63	10.78	0.22	6.49	0.22	6.53	0.21	6.80
Portfolio 7	0.19	5.66	0.21	6.90	0.70	11.90	0.25	7.04	0.23	6.89	0.23	7.02
Portfolio 8	0.32	9.49	0.30	9.80	0.74	12.13	0.28	8.26	0.26	7.77	0.28	8.69
Portfolio 9	0.24	5.91	0.25	7.99	0.81	12.01	0.32	8.82	0.30	8.11	0.29	8.91
Portfolio 10	0.40	9.06	0.39	9.91	1.11	13.47	0.56	10.93	0.53	10.54	0.54	11.58
Adj.RSquare	0.70		0.71		0.17		0.63		0.63		0.64	
					Specification II							
Portfolios												
Portfolio 1	-0.47	-9.98	-0.49	-14.86	-0.38	-5.90	-0.89	-29.85	-0.92	-31.00	-0.91	-39.41
Portfolio 2	-0.11	-3.48	-0.12	-4.51	-0.21	-4.02	-0.60	-24.32	-0.61	-25.57	-0.61	-28.79
Portfolio 3	-0.39	-13.09	-0.41	-17.29	0.46	8.52	0.08	2.74	0.06	2.21	0.06	2.35
Portfolio 4	-0.11	-3.75	-0.13	-4.69	0.48	8.03	0.07	2.52	0.06	2.04	0.07	2.52
Portfolio 5	0.24	7.03	0.20	6.56	0.59	9.38	0.17	5.13	0.17	5.36	0.17	5.85
Portfolio 6	0.13	4.35	0.11	4.04	0.63	10.99	0.21	6.19	0.21	6.28	0.20	6.66
Portfolio 7	0.20	5.80	0.22	7.05	0.72	12.02	0.25	7.51	0.24	7.42	0.23	7.18
Portfolio 8	0.33	9.67	0.31	10.04	0.76	11.74	0.29	8.35	0.27	7.97	0.28	8.84
Portfolio 9	0.23	5.72	0.25	7.79	0.82	12.69	0.32	8.88	0.29	8.23	0.29	8.81
Portfolio 10	0.41	9.21	0.39	10.08	1.11	13.78	0.53	10.70	0.52	10.38	0.53	11.22
Adj.RSquare	0.70		0.71		0.17		0.63		0.64		0.64	

	Size-sorted Portfolios				Dispersion-sorted Portfolios							
	Additional Factors (on top of the dispersion factor)											
	Market Factor		*Conditional FF Factors*		*0 Factors (Dispersion Factor Alone)*		*1 Factors*		*FF Factors*		*Conditional FF Factors*	
	Coeff.	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*
					Specification I							
Portfolios												
Portfolio 1	-0.40	-7.69	-0.43	-11.89	-0.35	-5.31	-0.90	-26.58	-0.93	-27.94	-0.92	-37.19
Portfolio 2	-0.02	-0.75	-0.04	-1.46	-0.13	-2.43	-0.59	-20.73	-0.60	-22.10	-0.59	-25.91
Portfolio 3	-0.39	-11.49	-0.41	-16.16	0.49	9.48	0.07	2.40	0.03	1.41	0.05	1.79
Portfolio 4	-0.25	-7.72	-0.27	-9.54	0.53	9.19	0.08	2.68	0.08	2.76	0.07	2.66
Portfolio 5	0.17	4.72	0.10	3.26	0.69	12.12	0.23	6.79	0.24	7.19	0.25	8.07
Portfolio 6	0.13	4.19	0.10	3.51	0.63	10.99	0.15	3.88	0.14	3.76	0.12	3.59
Portfolio 7	0.20	5.60	0.23	7.19	0.70	10.87	0.18	5.02	0.15	4.35	0.16	5.28
Portfolio 8	0.36	10.28	0.34	10.35	0.76	12.42	0.24	7.67	0.21	6.88	0.23	7.18
Portfolio 9	0.22	5.20	0.25	7.34	0.84	13.12	0.31	8.53	0.29	7.96	0.30	8.62
Portfolio 10	0.46	10.30	0.44	10.88	1.38	14.54	0.71	11.83	0.68	11.44	0.64	12.33
Adj.RSquare	0.70		0.71		0.21		0.64		0.64		0.65	
					Specification II							
Portfolios												
Portfolio 1	-0.39	-7.59	-0.42	-11.83	-0.34	-5.12	-0.89	-26.79	-0.92	-28.18	-0.92	-37.09
Portfolio 2	-0.01	-0.37	-0.03	-1.07	-0.13	-2.48	-0.60	-21.17	-0.61	-22.62	-0.61	-27.25
Portfolio 3	-0.38	-11.41	-0.41	-16.19	0.50	9.21	0.07	2.48	0.04	1.59	0.05	1.80
Portfolio 4	-0.25	-7.82	-0.27	-9.57	0.53	9.17	0.08	2.72	0.08	2.77	0.08	2.75
Portfolio 5	0.16	4.47	0.09	2.97	0.70	12.19	0.23	6.80	0.24	7.19	0.24	7.91
Portfolio 6	0.13	4.05	0.10	3.34	0.63	11.05	0.13	3.74	0.13	3.58	0.12	3.59
Portfolio 7	0.20	5.41	0.23	7.05	0.72	10.99	0.20	5.87	0.17	5.10	0.17	5.56
Portfolio 8	0.35	10.05	0.33	10.13	0.79	13.04	0.26	7.84	0.23	7.11	0.23	7.23
Portfolio 9	0.22	5.30	0.25	7.45	0.85	13.38	0.31	8.35	0.29	7.79	0.29	8.42
Portfolio 10	0.46	10.25	0.44	10.74	1.34	14.31	0.66	11.48	0.63	11.02	0.63	12.33
Adj.RSquare	0.70		0.71		0.21		0.64		0.64		0.65	

Panel C:
(Income-based dispersion)

	Size-sorted Portfolios				Dispersion-sorted Portfolios							
					Additional Factors (on top of the dispersion factor)							
	Market Factor		*Conditional FF Factors*		*0 Factors (Dispersion Factor Alone)*		*1 Factors*		*FF Factors*		*Conditional FF Factors*	
	Coeff.	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*	*Coeff.*	*t-stat*
					Specification I							
Portfolios												
Portfolio 1	-0.41	-7.79	-0.44	-12.24	-0.35	-5.17	-0.91	-27.07	-0.93	-28.72	-0.94	-37.87
Portfolio 2	-0.01	-0.57	-0.03	-1.14	-0.12	-2.34	-0.58	-21.44	-0.59	-22.68	-0.57	-25.22
Portfolio 3	-0.38	-11.23	-0.41	-15.86	0.50	9.18	0.07	2.54	0.04	1.54	0.04	1.77
Portfolio 4	-0.25	-7.61	-0.26	-9.20	0.55	9.17	0.10	3.09	0.10	3.42	0.11	3.83
Portfolio 5	0.18	4.86	0.10	3.17	0.68	11.49	0.22	5.99	0.22	6.24	0.23	7.39
Portfolio 6	0.14	4.35	0.11	3.70	0.61	10.48	0.12	3.22	0.11	3.05	0.10	3.15
Portfolio 7	0.18	4.94	0.22	6.71	0.71	11.68	0.20	5.73	0.17	5.10	0.16	5.22
Portfolio 8	0.35	10.03	0.33	10.14	0.74	12.17	0.23	7.42	0.21	6.63	0.20	6.45
Portfolio 9	0.20	4.80	0.25	7.24	0.85	12.34	0.30	7.54	0.28	7.08	0.32	8.97
Portfolio 10	0.49	10.75	0.46	11.18	1.40	14.48	0.72	12.02	0.69	11.68	0.66	12.48
Adj.RSquare	0.71		0.71		0.21		0.65		0.65		0.65	

					Specification II							
Portfolios												
Portfolio 1	-0.39	-7.50	-0.42	-11.81	-0.35	-5.30	-0.91	-27.54	-0.94	-29.27	-0.93	-38.46
Portfolio 2	-0.01	-0.40	-0.02	-0.97	-0.12	-2.29	-0.58	-21.26	-0.59	-22.68	-0.59	-26.74
Portfolio 3	-0.38	-11.20	-0.41	-15.94	0.50	9.44	0.07	2.44	0.04	1.43	0.04	1.60
Portfolio 4	-0.25	-7.82	-0.26	-9.44	0.55	9.30	0.10	3.28	0.11	3.58	0.10	3.65
Portfolio 5	0.16	4.30	0.08	2.67	0.68	11.73	0.22	5.97	0.22	6.50	0.23	7.52
Portfolio 6	0.13	3.96	0.10	3.34	0.61	10.81	0.11	3.25	0.11	3.07	0.10	2.9927
Portfolio 7	0.18	4.79	0.21	6.55	0.71	11.42	0.20	5.98	0.16	5.10	0.17	5.49
Portfolio 8	0.35	9.92	0.33	10.03	0.76	12.53	0.23	7.32	0.20	6.52	0.20	6.49
Portfolio 9	0.20	4.88	0.24	7.27	0.87	13.03	0.33	8.18	0.31	7.92	0.31	8.93
Portfolio 10	0.49	10.95	0.46	11.33	1.37	14.07	0.69	11.07	0.66	10.91	0.67	12.78
Adj.RSquare	0.71		0.71		0.21		0.64		0.65		0.65	

Table 5: Causality between dispersion of opinion and dispersion of analysts' forecasts

We estimate the following VAR: $\begin{bmatrix} D_t \\ A_t \end{bmatrix} = \begin{bmatrix} \alpha_D \\ \alpha_A \end{bmatrix} + \begin{bmatrix} \beta\lambda^{DD}(L) & \gamma\lambda^{DA}(L) \\ \delta\lambda^{AD}(L) & \vartheta\lambda^{AA}(L) \end{bmatrix} * \begin{bmatrix} Q_{t-1} \\ A_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_t^D \\ \varepsilon_t^A \end{bmatrix}$, where $\lambda(L)$ are distributed lag operators on lagged dispersion of opinion and analysts' forecast differences and Q_t and A_t are, respectively, an aggregated measure of dispersion of opinion based on investors' holdings and analysts' dispersion of forecasts. Q_t is constructed by taking the average across all the stocks of the stock-based measures of dispersion D_t described in Section 4.1, while A_t is the average (across all the stocks) of the measure of dispersion of analysts' forecasts. They have been aggregated across all the stocks under consideration. Specification I is a bivariate VAR between dispersion of opinion and dispersion of analysts' forecasts, this is the one reported in equation 8. Specification II is a trivariate VAR containing as variables the dispersion of opinion, the dispersion of analysts' forecasts and stock returns.). We consider three alternative specifications. We consider three alternative specifications. In the first one, up to the 20th lag (i.e., 20 days) of each variable have been used. In the second specification, up to the 30th lag (i.e., 30 days) of each variable have been used. In the third specification, up to the 40th lag (i.e., 40 days) of each variable have been used. Panel A reports the specifications based on the standardized measure of dispersion and Panel B reports the specifications based the measures of dispersions separately constructed on the basis of purchases and sales. We report the *F-tests* and the related probability values of the tests of Granger causality between our measure of dispersion of opinion and dispersion of analysts' forecasts. In particular, in the case in which the dependent variable is dispersion of analysts forecasts, we report the *F-tests* and the related probability values of the test that the dispersion of opinion Granger causes the dispersion of analysts forecasts, while, in the case in which the dependent variable is the dispersion of opinion, we report the *F-tests* and the related probability values of the test that the dispersion of analysts forecasts Granger causes the dispersion of opinion.

	Dependent Variable											
Specif.	*Dispersion of Analyst Forecasts*		*Dispersion of Opinion*		*Dispersion of Analyst Forecasts*		*Dispersion of Opinion*		*Dispersion of Analyst Forecasts*		*Dispersion of Opinion*	
	Lags = 20 Days				*Lags = 30 Days*				*Lags = 40 Days*			
	(Job-based dispersion)											
	Panel A											
	F-test	*p-value*	*F-test*	*p-value*	*F-test*	*p-value*	*F-test*	*p-value*	*F-test*	*p-value*	*F-test*	*p-value*
I	1.4187	0.1035	1.3663	0.1291	1.7134	0.0100	0.9369	0.5648	1.3914	0.0550	1.1064	0.3010
II	1.4767	0.0803	1.2805	0.1819	1.7209	0.0095	1.0913	0.3369	1.3510	0.0730	1.1858	0.2010
	Panel B											
	F-test	*p-value*	*F-test*	*p-value*	*F-test*	*p-value*	*F-test*	*p-value*	*F-test*	*p-value*	*F-test*	*p-value*
I	1.047	0.401	0.970	0.496	1.537	0.032	0.739	0.845	1.305	0.098	0.895	0.658
II	1.122	0.318	0.947	0.525	1.544	0.031	0.886	0.643	1.250	0.138	0.967	0.529
	(Age-based dispersion)											
	Panel A											
	F-test	*p-value*	*F-test*	*p-value*	*F-test*	*p-value*	*F-test*	*p-value*	*F-test*	*p-value*	*F-test*	*p-value*
I	2.053	0.004	0.939	0.535	1.616	0.019	0.779	0.797	1.445	0.037	1.120	0.281
II	2.062	0.004	0.926	0.552	1.575	0.025	0.885	0.645	1.383	0.058	1.166	0.222
	Panel B											
	F-test	*p-value*	*F-test*	*p-value*	*F-test*	*p-value*	*F-test*	*p-value*	*F-test*	*p-value*	*F-test*	*p-value*
I	1.580	0.049	0.935	0.541	1.355	0.096	0.696	0.888	1.293	0.106	1.007	0.459
II	1.664	0.033	0.953	0.517	1.343	0.103	0.805	0.763	1.219	0.166	1.068	0.358
	(Income-based dispersion)											
	Panel A											
	F-test	*p-value*	*F-test*	*p-value*	*F-test*	*p-value*	*F-test*	*p-value*	*F-test*	*p-value*	*F-test*	*p-value*
I	1.596	0.046	1.136	0.304	1.393	0.078	0.993	0.477	1.270	0.122	1.157	0.233
II	1.795	0.016	1.107	0.334	1.381	0.083	1.080	0.351	1.200	0.185	1.1980	0.187
	Panel B											
	F-test	*p-value*	*F-test*	*p-value*	*F-test*	*p-value*	*F-test*	*p-value*	*F-test*	*p-value*	*F-test*	*p-value*
I	1.881	0.010	1.127	0.313	1.487	0.044	0.921	0.588	1.395	0.053	1.068	0.358
II	2.078	0.003	1.161	0.280	1.453	0.055	1.022	0.433	1.315	0.092	1.090	0.324