Analyst Forecast Dispersion, Trading Volume, and Stock Return

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We examine the relationship between opinion divergence among analysts, trading volume, and stock returns around earnings announcements. We find that the positive relation between volume and subsequent returns is stronger among stocks with lower dispersion in analysts' earnings estimates. We show that the high -volume stocks with low opinion divergence also have good past performance, suggesting that the selling pressure from investors with disposition effect may be the cause for the positive volume-return relationship.

Keywords: Analyst forecast dispersion, Trading volume, Disposition effect

JEL Classification: G1, G12, G14

I. Introduction

Analyst forecast dispersion is used to capture the heterogeneity on stock valuation among investors in many research (For example, Ajinkya *et al.* 1991; Diether *et al.* 2002; Sadka and Scherbina 2007). However, given a natural interpretation that heterogeneity on stock valuation may lead to large trading volume among investors (Cho 1992), it is surprising that little empirical research examines how

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analyst dispersion, trading volume, and stock returns are related. This is especially so since recent research by Gervais *et al.* (2001) and Kaniel *et al.* (2005) show that stocks that experience high abnormal volume generate higher returns than stocks with low abnormal volume, for a sustained period of time, in stock markets of the U.S. and in other countries. Given this, examining links among analyst dispersion, trading volume and cross section of future stock returns warrant a closer examination.

In this paper, we examine the relationship between opinion divergence among analysts, trading volume, and stock return. We use the dispersion in analysts' earnings forecasts reported in the IBES data set as the proxy for the opinion divergence. We then focus on the trading volume around earnings announcements. Attention grabbing events such as earnings announcements frequently serve as focal points where investors make important portfolio rebalancing decisions (Barber and Odean 2008), and thus generate huge abnormal trading volume (Kandel and Pearson 1995; Lee *et al.* 1993; Lamont and Frazzini 2007). Further, Garfinkel and Sokobin (2006), Lerman *et al.* (2008), and Choi *et al.* (2009) document that the stocks that attract high volume around earnings announcements exhibit higher returns afterwards, in a similar way to the patterns reported in Gervais *et al.* (2001).

We analyze a calendar time portfolio strategy based on abnormal trading volume measured around earnings announcement across analyst forecast dispersion quintile. In each analyst forecast dispersion quintile, we construct a zero investment portfolio that has long position in stocks that experience high abnormal trading volume and short position in stocks that experience low abnormal trading volume. Each stock is included in zero investment portfolio from the first trading day of the next month after earnings announcement is made and held until the next earnings announcement month or four months elapse, whichever comes first. The return of this zero investment portfolio is defined as the 'high volume return premium (henceforth HVRP),' as in Gervais *et al.* (2001). In controlling for the due compensation for the risk associated with the strategy, we use conventional risk adjustment procedures of Fama-French's 3 factor model or its extension to include momentum (Carhart 1997) and liquidity (Sadka 2006) factors. To check whether our results reflect well-known post-earnings announcement drift (henceforth, PEAD) we also include a standardized unexpected earnings (SUE) factor.[1]

When we divide the sample into quintiles based on analyst forecast dispersion, we find that the HVRP is concentrated in stocks with the smallest analyst forecast dispersion. This is surprising since these are the firms with the least pre-existing heterogeneity. The zero investment portfolio of these stocks generates 44 basis points per month, or 5.28% annualized return. Other quintiles do not attract significant HVRP. We find that higher volume stocks in the first dispersion quintile have higher SUE values, higher average turnover rates, and tend to be growth and winner stocks based on 12 month momentum. These suggest that the selling pressure coming from investors who prematurely realize gains in stocks with good past performance, known as the disposition effect (Shefrin and Statman 1985),[2] may explain the HVRP, as suggested in Odean (1998), Grinblatt and Han (2005), and Ranguelova (2008). This is because the selling decisions of investors who are subject to the disposition effect could depend much on the past performance of stocks, not on future fundamental prospects of firms. If they are prematurely selling potential winner stocks, arbitrageurs would buy from them in order to exploit the profit opportunity. Large trading volume generated by these two groups of investors would be followed by higher stock returns as stock prices correctly incorporate fundamentals eventually.[3]

To investigate the hypothesis further that the premature realization of gains is an important factor for the HVRP, we subdivide the stocks with the least dispersion into terciles based on past 12 month momentum. Consistent with the hypothesis, HVRP is concentrated in high momentum stocks in the first dispersion tercile.

Our results cast doubt on some of existing interpretation on abnormal trading volume observed around earnings announcements. If the analyst forecast dispersion is a risk factor as discussed in Varian

[1] SUE is standardized unexpected earnings based on a seasonal random walk model. The SUE factor is calculated as the difference in monthly equally weighted returns between the highest and the lowest SUE decile portfolios. See Section 2 for further detail.

[2] The disposition effect also suggests that investors tend to hold losing stocks far too long due to increased risk taking tendency when they experience loss. Recent evidence suggests that for large losses, investors eventually realize losses, especially for smaller stocks. See Choi *et al.* (2009).

[3] Thus, we are assuming that high abnormal trading volume that has future return implication arises from the interaction between backward looking investors (whose investment decision is based on the past performance of stocks) and forward looking rational arbitrageurs (whose investment decision is based on future prospects of stocks).

(1985) and Garfinkel and Sokobin (2006), and if high trading volume reflects investor heterogeneity captured by the dispersion, we expect strongest HVRP in the fifth dispersion quintile. But we find the exact opposite. For a similar reason, our results also cast doubt on the hypothesis that the dispersion of opinion, which causes large trading volume, leads to temporary price increase due to short-sale constraints (Miller 1977; Harrison and Kreps 1978; Scheinkman and Xiong 2003; Mei *et al.* 2005).

Our results suggest that HVRP may reflect the interaction between investors who are subject to behavioural bias (the disposition effect) and rational investors, the possibility of which is discussed in Grinblatt and Han (2005). By analyzing the daily trading records of a major U.S. discount brokerage house, Odean (1998) and Ranguelova (2008) reports evidence of the premature realization of gains. Especially, Ranguelova (2008) finds that investors tend to realize gains too early for large capitalization stocks. Since firms followed by analysts in IBES data set are mostly large firms, our evidence is consistent with her finding.

This paper is structured as follows. Section 2 reviews related literature. Section 3 discusses the construction of variables. Section 4 shows the empirical results. Section 5 concludes.

II. Related Literature

There are several researches that propose distinctive hypotheses regarding the relationship between opinion divergence, trading volume, and future returns. Garfinkel and Sokobin (2006) argue that the high returns following high volume could be interpreted as required compensation for risk associated with high dispersion in opinions (Varian 1985).[4] However, these authors do not provide rationale regarding how the dispersion of opinion could be associated with systematic risk. For example, if the dispersion of opinion of a stock is purely idiosyncratic or firm-specific, it would not be priced in equilibrium.

Miller (1977) and Harrison and Kreps (1978) show that differences of opinion leads to temporary overpricing in the stock market.[5] They

[4] According to the risk hypothesis, the price of stock with high dispersion in opinion should be low enough for the expected return to be high, which can be interpreted as a due compensation for risk taking.

[5] Consistent with this, Diether *et al.* (2002) find that stocks with high dispersion in analysts' forecasts tend to exhibit abnormally low returns. However, Avramov *et al.* (2009) show that this negative relationship is mainly explained

hypothesize that stocks tend to get overpriced when investors hold diverse opinions and there exist short-sale constraints, because the opinions of the pessimistic investors are not properly incorporated into prices. In a similar vein, Scheinkman and Xiong (2003), Baker and Stein (2004), and Mei, Scheinkman, and Xiong (2005) present models where high trading volume is a sign of overpricing in the presence of short-sale constraints. Lamont and Frazzini (2007) interpret these theories as explaining why large trading volume, resulting from the opinion divergence among investors, leads to higher price, at least temporarily.

Whether it be risk as discussed in Garfinkel and Sokobin (2006) or temporary price increase due to short-sale constraints, aforementioned explanations suggest that the HVRP, if the dispersion of opinion is positively related to trading volume, should be observed in stocks with highest analyst forecast dispersion. Unfortunately, our empirical results find little support to these hypotheses at least for stocks covered in the IBES data set.

Several researches focus on identifying the source of opinion divergence among investors. Kim and Verrecchia (1991) develop a model where differences in private information investors hold prior to the arrival of public news are the major source of heterogeneity. Kandel and Pearson (1995) emphasize differential interpretation of public information. Daniel *et al.* (1998), and Barberis *et al.* (1998) discuss the possibility that a certain subset of investors are subject to behavioural biases in forming their expectation. For example, Daniel *et al.* (1998) argue that investors tend to be overly confident of the precision of noisy private signal, especially when a subsequent public signal is consistent with his initial belief. Barberis *et al.* (1998) emphasize conservatism bias. According to psychology literature, conservatism is the reluctance of individuals to update their belief s upon receiving new information (Edwards 1968). Barberis *et al.* (1998) show that this bias could be a source of the well known earnings announcement drift (Bernard 1993) and price momentum (Jegadeesh and Titman 1993). Extending Barberis *et al.* (1998) and Kandel and Pearson (1995), Choi and Kim (2009) analyze the interaction between two groups of investors, where the first group consists of investors who are subject to

by financial distress, as proxied by credit rating downgrades. As a result, they suspect that short-sale constraints may not be an underlying factor for the temporal overpricing and following price reversal.

conservatism bias while the second group consists of rational arbitrageurs. Investors with conservatism bias tend to overestimate the precision of their private signal and downplay newly arrived public signal, and thus underreact to the news. Investors in the second group exploit the behavioral biases of the first group. Choi and Kim (2009) show that in their model, high trading volume, resulting from interactions between the two groups, predicts stronger drift. Thus, if good (bad) earnings news arrives, high volume predicts persistent increase (decrease) in stock price afterwards. They find that their model's prediction holds only for good news. For bad news, large trading volume is not associated with stronger downward drift of stock prices. Choi and Kim (2009)'s empirical findings is similar to those of Gervais *et al.* (2001) who find that stocks that experience positive volume shocks over a short window continue to appreciate over the following several weeks, regardless of whether firms receive good earnings news or not.

Models discussed so far hypothesize an investor whose investment decision is based on forward looking expectation, or in other words, whose investment decision is based on future forecast of stock returns, regardless of whether an investor is subject to behavioral biases or not. Discussions above show that these models fail to explain the HVRP in that they do not predict unidirectional price increases with large trading volume.

Interestingly, recent studies suggest that a subset of investors actually make investment decision based on the past performance of stocks, not based on future prospects of them. Grinblatt and Han (2005) provide a model, in which trading volume can arise as the result of interaction between investors with the disposition effect and rational arbitrageurs. Grinblatt and Han (2005) hypothesize that the well-known momentum effects (Jegadeesh and Titman 1993) arise out of selling pressure from investors subject to disposition effect (Shefrin and Statman 1985), who tend to realize gains prematurely and are reluctant to realize losses. Their model implies that the HVRP is associated with downward pressure in stock prices, which arises from the excess selling by investors who are subject to the disposition effect. In this case, we expect the HVRP should be stronger in stocks with good past performance, and we find supportive evidence for this hypothesis in Section 4.

III. Data

Our sample consists of common shares of NYSE/AMEX companies which are also followed by analysts as covered in IBES data set for the time period between 1984 and 2001. There are 25,558 quarterly earnings announcements made during the sample period. This section details the construction methodologies for the main variables used in the paper.

A. Abnormal Volume

To calculate the trading volume triggered by earnings announcements, we need to control for the normal level of trading volume for each company (*i.e.*, expected volume were it not an earnings announcement day). As in Tkac (1999) and Lo and Wang (2000), we estimate the normal level of volume by running a market model regression using daily turnover data for the prior calendar year (*i.e.*, $y-1$):

$$TO_{i,t}=\alpha_{i,y-1}+\beta_{i,y-1}\cdot MKTTO_t+e_{i,t} \tag{1}$$

where $TO_{i,t}$ is the turnover measure for company i on day t (in year $y-1$) and $MKTTO_t$ is the value weighted turnover for the entire market measured on day t (in year $y-1$). The resultant α and β coefficients for company i in year $y-1$ are then used to calculate estimated daily turnovers (ESTTO) for company i in year y. Specifically, ESTTO is calculated as:

$$ESTTO_{i,t,y}=\hat{\alpha}_{i,y-1}+\hat{\beta}_{i,y-1}\cdot MKTTO_{t,y} \tag{2}$$

where $ESTTO_{i,t,y}$ is the estimated turnover for stock i on day t of year y and $\hat{\alpha}_{i,y-1}$ and $\hat{\beta}_{i,y-1}$ are the α and β parameter estimates from (1). The difference between the actual daily turnover and the estimated daily turnover is the market-adjusted volume for the day. Finally, we define abnormal volume for an earnings announcement made on day t as the sum of daily market-adjusted volume over the three day window $[t-1, t+1]$.

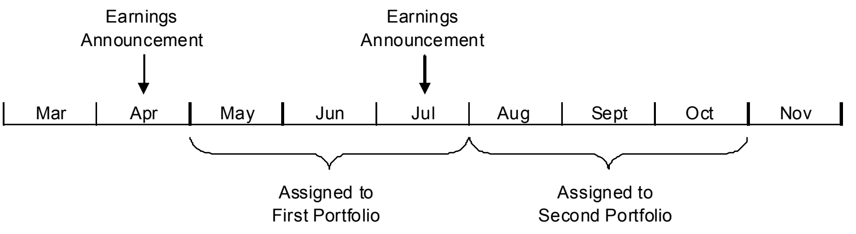


FIGURE 1
TIME LINE OF THE PORTFOLIO STRATEGY

B. Analyst Forecast Dispersion (DISP)

By using analysts' forecast data from IBES, we are able to calculate a dispersion measure as the standard deviation of forecasts for the next reporting period divided by the prior year end stock price as in Zhang (2006).

C. Standardized Unexpected Earnings (SUE)

We measure surprise using standardized unexpected earnings (SUE) based on a seasonal random walk hypothesis, where unexpected earnings are calculated as earnings per share for the current quarter less earnings per share for the same quarter, one year prior. We then normalize this difference by dividing it by the standard deviation of the past 20 unexpected earnings values (*i.e.*, five years of data).[6]

IV. Empirical Findings

A. HVRP for the Full IBES Sample

To examine the relationship between abnormal trading volume and return, we construct calendar time portfolios. To ensure that the trading strategy is implementable, for a given quarter, a stock is assigned to an abnormal volume tercile portfolio at the start of the next month after the earnings announcement, and is held within that portfolio until the end of the next earnings announcement month or

[6] If more than 10 of the past 20 unexpected earnings values are missing or invalid, we do not calculate the standard deviation and consider the quarter's SUE value to be missing for the company.

until four months elapse, whichever comes first.

Figure 1 clarifies how the strategy is implemented. As an example, consider the case where earnings announcements for a given stock are made in the middle of April and July. The stock will enter its first portfolio on the first trading day of May, and remain in that portfolio until the end of July. On the first trading day of August, the stock will be removed from its first portfolio and reassigned to a second portfolio based on its July earnings announcement. We do this for all the firms in our data.

All cutoff values are based on the prior quarter's distribution, and regression coefficients to calculate abnormal trading volume are based on the prior year's data. Further, analyst forecast dispersion number is available before an earnings announcement is made and a stock enters a portfolio from the first trading day of the next month after earnings announcement. This shows that all the variables used in forming portfolios are predetermined to investors when they assign a stock to a portfolio and thus our strategy is implementable in real time.

For each month, we calculate the average monthly return of stocks in a particular portfolio. The difference between the average monthly return of long and short portfolios is the month's HVRP. We then calculate the average of monthly HVRP over our sample period and this becomes the HVRP reported in Tables. Annualized HVRP can be calculated by multiplying the monthly HVRP by 12.

Our portfolio strategy generates very conservative estimates for the possible profit. For example, if an earnings announcement is made in the first week of a month, the stock will not enter a portfolio until almost four weeks after the earnings announcement. If the high returns of high abnormal volume stocks are concentrated only around earnings announcements (for example, they persist for only one or two weeks immediately after the earnings announcements), our portfolio strategy underestimates the magnitude of abnormal volume's effect on future returns. However, we introduce this lag to measure the persistent impact of high abnormal volume on future returns and to ensure that portfolio rebalancing occurs monthly.

Panel A ('ALL' column) of Table 1 shows mean values of the analyst forecast dispersion and abnormal trading volume for the whole sample and for the first and the third volume tercile, separately. Abnormal volume in the first and the third tercile shows significant variation from -0.49% to 1.38%. The mean number of observation in each portfolio ranges from 145 to 156. Panel B ('ALL' column) of Table 1 shows the

TABLE 1

RAW AND RISK ADJUSTED RETURNS FOR MONTHLY CALENDAR TIME PORTFOLIOS DOUBLE-SORTED BY DISPERSION QUINTILE AND ABNORMAL VOLUME TERCILE

This table reports monthly high volume return premium (HVRP) for the whole sample ('ALL') and for each DISP quintile. DISP of a company is calculated as the standard deviation of quarterly analyst forecasts normalized by the previous year-end price. HVRP is defined as the monthly return of a zero investment portfolio which takes a long position in the 3^{rd} abnormal volume tercile and an equivalent short position in the 1^{st} abnormal volume tercile defined over the whole sample or within each DISP quintile. All the cutoff values are based on the previous quarter's distributions. Abnormal volume is defined as the sum of daily market-adjusted volumes for the three trading day interval, [t-1, t+1], around earnings announcements. Panel A reports the mean (median) values of DISP values and abnormal volume for the whole sample and by DISP quintile across all abnormal volume terciles, as well as for the high and low abnormal volume terciles separately and for the difference between the high and low abnormal volume terciles. The average number of monthly observations is also reported across all abnormal volume terciles, as well as for the low and high abnormal volume terciles separately. Panel B reports raw and risk adjusted returns from various factor model specifications for each portfolio and for the zero investment portfolio. Dependent variables for high and low abnormal volume tercile portfolios are raw returns minus the risk-free (t-bill) rate, and dependent variables for the high–low portfolios are the difference in raw returns between the high abnormal volume and low abnormal volume portfolios. 3F regressions use the standard Fama–French 3 factors. 4F regressions add the momentum factor of Carhart (1997) to the 3F specification. 3F+SUE Factor regressions add a SUE factor to the 3F specification, where the SUE factor is calculated as the difference in monthly equally weighted raw returns between the highest and the lowest SUE decile portfolio. 4F+Liq Factor regressions add the variable liquidity factor of Sadka (2006) to the 4F regressions. Results with *p-values* below 0.05 (0.10) are marked with ** (*) and are in bold.

Panel A — Characteristics of Portfolios Based on Dispersion and Volume

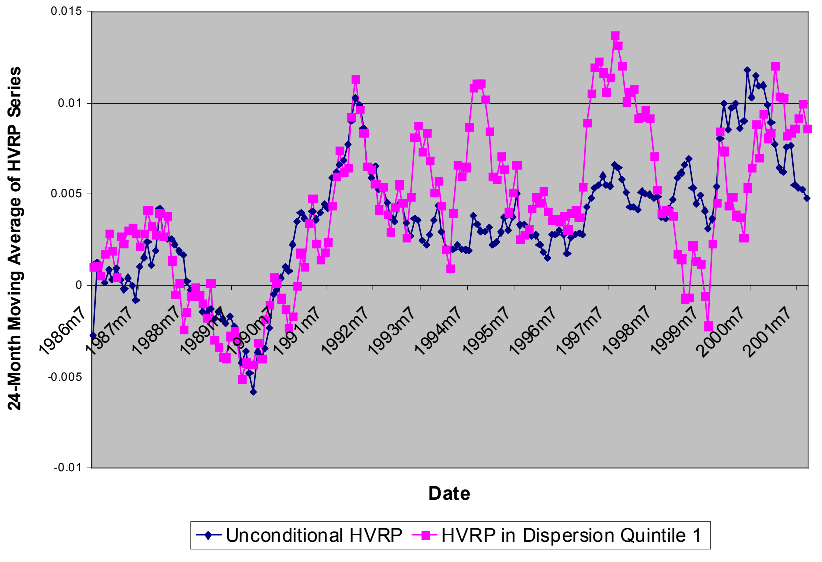
Abnormal Volume Tercile		ALL	DISP Quintile 1	2	3	4	5
			DISP values				
Full Sample	Mean	**0.0017****	**0.0004****	**0.0005****	**0.0010****	**0.0017****	**0.0050****
	p-value	*(0.0000)*	*(0.0000)*	*(0.0000)*	*(0.0000)*	*(0.0000)*	*(0.0000)*
	Median	0.0006	0.0000	0.0003	0.0006	0.0011	0.0027
1	Mean	**0.0019****	**0.0005****	**0.0005****	**0.0010****	**0.0018****	**0.0051****
	p-value	*(0.0000)*	*(0.0000)*	*(0.0000)*	*(0.0000)*	*(0.0000)*	*(0.0000)*
	Median	0.0007	0.0001	0.0003	0.0006	0.0012	0.0028
3	Mean	**0.0016****	**0.0004****	**0.0005****	**0.0010****	**0.0018****	**0.0050****
	p-value	*(0.0000)*	*(0.0000)*	*(0.0000)*	*(0.0000)*	*(0.0000)*	*(0.0000)*
	Median	0.0006	0.0000	0.0003	0.0006	0.0011	0.0028
High–Low	Mean	**-0.0003****	-0.0001	0.0000	0.0000	0.0000	0.0000
	p-value	*(0.0000)*	*(0.2716)*	*(0.7017)*	*(0.6463)*	*(0.7624)*	*(0.9811)*
	Median	-0.0001	-0.0001	0.0000	0.0000	-0.0001	0.0000
			Abnormal volume values				
Full Sample	Mean	**0.0034****	**0.0035****	**0.0037****	**0.0033****	**0.0036****	**0.0031****
	p-value	*(0.0000)*	*(0.0000)*	*(0.0000)*	*(0.0000)*	*(0.0000)*	*(0.0000)*
	Median	0.0004	0.0005	0.0006	0.0004	0.0003	-0.0001
1	Mean	**-0.0049****	**-0.0034****	**-0.0029****	**-0.0037****	**-0.0038****	**-0.0046****
	p-value	*(0.0000)*	*(0.0000)*	*(0.0000)*	*(0.0000)*	*(0.0000)*	*(0.0000)*
	Median	-0.0034	-0.0026	-0.0023	-0.0030	-0.0033	-0.0043
3	Mean	**0.0138****	**0.0128****	**0.0133****	**0.0129****	**0.0144****	**0.0139****
	p-value	*(0.0000)*	*(0.0000)*	*(0.0000)*	*(0.0000)*	*(0.0000)*	*(0.0000)*
	Median	0.0080	0.0070	0.0078	0.0084	0.0089	0.0079
High–Low	Mean	**0.0187****	**0.0162****	**0.0162****	**0.0165****	**0.0182****	**0.0185****
	p-value	*(0.0000)*	*(0.0000)*	*(0.0000)*	*(0.0000)*	*(0.0000)*	*(0.0000)*
	Median	0.0114	0.0096	0.0100	0.0114	0.0122	0.0122

(Table 1 Continued)

Abnormal Volume Tercile		ALL	DISP Quintile 1	2	3	4	5
			Number of observations				
Full Sample	Mean	432.5	86.1	81.0	85.6	85.1	94.8
	Median	451.0	84.0	82.0	87.0	86.0	99.0
1	Mean	144.7	28.8	28.2	28.7	27.9	31.7
	Median	145.0	29.0	28.5	29.5	28.0	31.0
3	Mean	155.5	29.3	27.0	28.0	27.4	30.0
	Median	153.0	27.0	27.0	28.0	26.0	30.0

Panel B – Returns of Portfolios Based on Dispersion and Volume

Abnormal Volume Tercile		All	DISP Quintile 1	2	3	4	5
			Raw returns				
1	Mean	**0.0120****	**0.0177****	**0.0120****	**0.0103****	**0.0098****	**0.0101****
	p-value	*(0.0006)*	*(0.0000)*	*(0.0003)*	*(0.0033)*	*(0.0048)*	*(0.0180)*
3	Mean	**0.0147****	**0.0221****	**0.0130****	**0.0096****	**0.0125****	**0.0142****
	p-value	*(0.0001)*	*(0.0000)*	*(0.0006)*	*(0.0145)*	*(0.0012)*	*(0.0013)*
High–Low	Mean	**0.0027****	**0.0044****	0.0011	-0.0007	0.0031	0.0041
	p-value	*(0.0274)*	*(0.0236)*	*(0.5939)*	*(0.7189)*	*(0.1343)*	*(0.1014)*
			3 Factor alpha values				
1	Mean	**-0.0022**	**0.0051****	-0.0014	**-0.0040****	**-0.0044****	**-0.0051****
	p-value	*(0.1467)*	*(0.0025)*	*(0.3952)*	*(0.0264)*	*(0.0141)*	*(0.0303)*
3	Mean	0.0009	**0.0099****	0.0001	**-0.0049****	-0.0009	-0.0014
	p-value	*(0.5148)*	*(0.0000)*	*(0.9379)*	*(0.0123)*	*(0.6537)*	*(0.5639)*
High–Low	Mean	**0.0031****	**0.0044****	0.0016	-0.0009	**0.0035***	0.0037
	p-value	*(0.0094)*	*(0.0232)*	*(0.4068)*	*(0.6304)*	*(0.0929)*	*(0.1504)*
			4 Factor alpha values				
1	Mean	0.0008	**0.0060****	-0.0007	-0.0013	-0.0018	-0.0003
	p-value	*(0.5541)*	*(0.0006)*	*(0.6867)*	*(0.4376)*	*(0.2834)*	*(0.8947)*
3	Mean	**0.0026***	**0.0118****	0.0010	-0.0022	0.0013	0.0001
	p-value	*(0.0736)*	*(0.0000)*	*(0.5923)*	*(0.2338)*	*(0.5376)*	*(0.9743)*
High–Low	Mean	0.0018	**0.0055****	0.0017	-0.0009	0.0030	0.0003
	p-value	*(0.1238)*	*(0.0060)*	*(0.3884)*	*(0.6416)*	*(0.1610)*	*(0.8889)*
			3F + SUE Factor alpha values				
1	Mean	-0.0017	**0.0048****	-0.0025	**-0.0042****	**-0.0041****	-0.0036
	p-value	*(0.2678)*	*(0.0069)*	*(0.1541)*	*(0.0258)*	*(0.0305)*	*(0.1472)*
3	Mean	0.0002	**0.0094****	-0.0006	**-0.0060****	-0.0017	-0.0013
	p-value	*(0.8777)*	*(0.0000)*	*(0.7480)*	*(0.0034)*	*(0.4343)*	*(0.6036)*
High–Low	Mean	0.0020	**0.0042****	0.0019	-0.0018	0.0024	0.0022
	p-value	*(0.1095)*	*(0.0426)*	*(0.3415)*	*(0.3686)*	*(0.2744)*	*(0.4085)*
			4F + Liq Factor alpha values				
1	Mean	0.0009	**0.0066****	-0.0004	-0.0011	-0.0015	-0.0002
	p-value	*(0.4876)*	*(0.0002)*	*(0.8268)*	*(0.5347)*	*(0.3687)*	*(0.9344)*
3	Mean	**0.0030****	**0.0117****	0.0014	-0.0015	0.0018	0.0003
	p-value	*(0.0417)*	*(0.0000)*	*(0.4620)*	*(0.4350)*	*(0.3750)*	*(0.9128)*
High–Low	Mean	**0.0021***	**0.0048****	0.0018	-0.0004	0.0033	0.0004
	p-value	*(0.0851)*	*(0.0177)*	*(0.3756)*	*(0.8427)*	*(0.1193)*	*(0.8598)*



The graph shows 24-month moving average of HVRP defined for the whole sample and for the 1^{st} DISP quintile. DISP of a company is calculated as the standard deviation of quarterly analyst forecasts normalized by the previous year-end price. HVRP is defined as the monthly return of a zero investment portfolio which takes a long position in the 3^{rd} abnormal volume tercile and an equivalent short position in the 1^{st} abnormal volume tercile defined over the whole sample or within the 1^{st} DISP quintile. All the cutoff values are based on the previous quarter's distributions. Abnormal volume is defined as the sum of daily market-adjusted volumes for the three trading day interval, $[t-1, t+1]$, around earnings announcements.

FIGURE 2

TIME-SERIES OF HIGH VOLUME RETURN PREMIUM

HVRP defined as the return difference between high volume and low volume tercile. The HVRP is shown to be 0.27% per month, or 3.24% per year. The magnitude of the HVRP for IBES firms are smaller than the HVRP which is calculated in Choi *et al.* (2009) for all AMEX and NYSE sample firms for the same period. This is consistent with the findings in Gervais *et al.* (2001), and Choi *et al.* (2009) who find that the HVRP is higher for smaller firms.

To check whether HVRP for IBES firms reflect systematic risk, we calculate risk adjusted returns (Jensen's alpha) using widely used asset pricing models. First, we use Fama-French's 3 factor model (Fama and French 1993) and its extension to include momentum factor (Carhart

1997). In addition to the market factor of the CAPM, 3 factor model adds size and book to market factors. Fama-French 3 factor model has been very successful in explaining almost all known trading strategies' profits as risk premium associated with either size or book to market factors (Fama 1998). Carhart (1997) extends the 3 factor model by adding momentum factor which measures return difference between winner and loser stocks based on past stock performance. This is motivated by the fact that 3 factor model cannot explain momentum effect (Jegadeesh and Titman 1993). We further consider liquidity factor as defined in Sadka (2006) to check whether HVRP is the result of depressed stock prices due to illiquidity. Finally, to check whether these profits merely reflect the well known post-earnings announcement drift (Bernard and Thomas 1989, 1990), we also include a SUE factor.

Panel B ('ALL' column) of Table 1 shows Jensen' alphas for various risk adjustments. They show that HVRP is not a mere reflection of known risk premium. Risk adjusted returns of HVRP range from 0.18% to 0.31% per month, or 2.16% to 3.72% per year. The risk-adjusted returns are mostly significant at 10% confidence level.

Figure 2 shows the time series plot of the HVRP calculated as 24 month moving average. The figure shows that the HVRP is observed throughout our sample period.

B. The HVRP for IBES Sample Across Dispersion Quintile

To investigate the effect of analyst forecast dispersion on HVRP, we calculate HVRP across analyst forecast dispersion quintile. Stocks in a given quarter are divided into quintiles based on the prior quarter's distribution of analyst forecast dispersion ('DISP'). DISP of a company is calculated as the standard deviation of quarterly analyst forecasts normalized by the previous year-end price. Panel A of Table 1 shows the descriptive statistics for dispersion values, abnormal volume, and number of stocks across dispersion quintiles for the full sample and for the high and low abnormal volume terciles. Analyst forecast dispersion shows large variation. Dispersion value for the 5^{th} quintile is more than 12 times larger than that of the 1^{st} quintile in the full sample.

Within each dispersion quintile, high and low abnormal volume terciles do not show statistically significant differences in dispersion values. Interestingly, abnormal volume values across dispersion quintile exhibit similar magnitude. For example, average abnormal volume for

TABLE 2

SUMMARY STATISTICS BY ABNORMAL VOLUME TERCILE FOR EACH DISPERSION TERCILE

Each panel reports the summary statistics of firm characteristic variables for each volume tercile portfolio defined in each dispersion tercile. DISP of a company is calculated as the standard deviation of quarterly analyst forecasts normalized by the previous year-end price. Abnormal volume is defined as the sum of daily market-adjusted volumes for three trading day interval, [t-1, t+1] around earnings announcements. Each stock is assigned to an abnormal volume tercile portfolio from the next month after earnings announcement and held until the month of next earnings announcement or until four months elapse, whichever comes first. All the cutoff values are based on the previous quarter's distributions. SUE is standardized unexpected earnings based on a seasonal random walk model. Turnover is the average of daily share turnover over the 52 weeks period prior to the earnings announcement week. Size is defined as market capitalization measured at the end of each calendar year. B/M is book to market ratio calculated as in Fama and French (1993). Momentum is measured using 12 calendar months ending immediately prior to the month in which the earnings announcement is made. The last row shows differences in these variables between the 3rd and 1st abnormal volume terciles, along with the associated *p-values*.

Panel A — Summary statistics by abnormal volume tercile for DISP Tercile = 1

Abnormal Volume tertile		Obs per Month	Abnormal Volume	SUE	Turnover	Size	B/M	Momentum
All	Mean	137.4	0.0034	-0.0190	0.0140	6,861	0.4724	0.2438
	Median	138.0	0.0032	0.0041	0.0134	5,523	0.4601	0.2479
1	Mean	45.2	-0.0032	-0.0520	0.0137	5,949	0.5178	0.2092
	Median	44.0	-0.0028	-0.0066	0.0126	4,631	0.5109	0.2127
2	Mean	46.7	0.0010	-0.0335	0.0105	8,697	0.4457	0.2107
	Median	47.0	0.0010	-0.0191	0.0102	6,758	0.4360	0.2279
3	Mean	46.2	0.0127	0.0108	0.0181	5,734	0.4583	0.3143
	Median	44.0	0.0119	0.0365	0.0169	4,936	0.4384	0.3196
High-Low			**0.0160****	**0.0628****	**0.0044****	-214	**-0.0594****	**0.1051****
p-value			*(0.0000)*	*(0.0311)*	*(0.0000)*	*(0.6039)*	*(0.0000)*	*(0.0000)*

Panel B — Summary statistics by abnormal volume tercile for DISP Tercile = 2

Abnormal Volume tertile		Obs per Month	Abnormal Volume	SUE	Turnover	Size	B/M	Momentum
All	Mean	144.5	0.0031	-0.0715	0.0144	3,023	0.6357	0.1569
	Median	149.0	0.0030	-0.0264	0.0136	2,702	0.6349	0.1638
1	Mean	47.9	-0.0036	-0.1385	0.0146	2,483	0.6620	0.1285
	Median	49.0	-0.0031	-0.0981	0.0140	1,907	0.6612	0.1456
2	Mean	49.8	0.0010	-0.0881	0.0111	3,559	0.6387	0.1376
	Median	49.0	0.0007	-0.0189	0.0107	3,243	0.6431	0.1468
3	Mean	46.8	0.0127	-0.0285	0.0178	2,890	0.6062	0.2091
	Median	46.0	0.0126	-0.0230	0.0168	2,702	0.5798	0.2060
High-Low			**0.0163****	**0.1100****	**0.0031****	**407****	**-0.0558****	**0.0806****
p-value			*(0.0000)*	*(0.0035)*	*(0.0000)*	*(0.0066)*	*(0.0000)*	*(0.0000)*

(Table 2 Continued)

Panel C — Summary statistics by abnormal volume tercile for DISP Tercile = 3

Abnormal Volume tertile		Obs per Month	Abnormal Volume	SUE	Turnover	Size	B/M	Momentum
All	Mean	150.6	0.0033	-0.2212	0.0160	1,471	0.9483	0.6840
	Median	159.0	0.0034	-0.2144	0.0154	1,314	0.9051	0.0746
1	Mean	50.0	-0.0043	-0.2711	0.0171	1,257	0.9919	0.0007
	Median	50.0	-0.0040	-0.2800	0.0165	1,607	0.9389	0.0035
2	Mean	53.9	0.0008	-0.2190	0.0120	1,621	0.9481	0.0596
	Median	56.0	0.0009	-0.1712	0.0115	1,568	0.9120	0.0668
3	Mean	46.6	0.0145	-0.1680	0.0197	1,471	0.8954	0.1482
	Median	46.0	0.0142	-0.1300	0.0195	1,265	0.8783	0.1618
High-Low			**0.0188****	**0.1031****	**0.0026****	**214****	**-0.0965****	**0.1474****
p-value			*(0.0000)*	*(0.0045)*	*(0.0000)*	*(0.0024)*	*(0.0000)*	*(0.0000)*

the 5^{th} dispersion quintile is 0.0031 while that of the 1^{st} dispersion quintile is 0.0035 in the full sample. This result suggests that the pre-existing heterogeneity among analysts before the earnings announcement might not be the most important factor in explaining trading volume generated with the arrival of the earnings announcements. Within each dispersion quintile, high and low abnormal volume terciles exhibit significant variation in the magnitude of abnormal volume. Finally, there are about 27 to 32 stocks within each volume tercile for each dispersion quintile.

Panel B of Table 1 shows the HVRP across the dispersion quintile. Surprisingly, we find that the HVRP is concentrated in the first dispersion quintile. HVRP is not observed in any other quintiles.[7] HVRP in the first dispersion quintile is highly significant and amount to 0.44% per month or 5.28% per year. The HVRPs after the adjustment of risk using various asset pricing models are very robust. They are all significant and ranges from 5.04% per month or 6.60% per year.

To ensure that we have reasonably high number of stocks in each dispersion group when we further subdivide stocks based on an

[7] This finding contrasts with Garfinkel and Sokobin (2006) who could not find significant volume effect in IBES sample in their firm level cross-sectional regression analysis. The reason can be related to the fact that they do not analyze the interaction between analyst forecast dispersion and trading volume in their analysis.

additional sorting variable in the following section, we divide stocks into dispersion terciles to check the robustness of above findings. Patterns are very similar to the ones reported in Table 1. HVRP is concentrated in the first dispersion tercile. HVRP is 0.33% per month or 3.96% per year.

The fact that similar amount of high abnormal volumes is observed across dispersion terciles but that HVRP is concentrated in the first tercile suggests that it may be useful to examine various characteristics of stocks in each portfolio to identify a source for the relationship.

Panels A, B, and C of Table 2 report summary statistics for the whole sample and the first and third abnormal volume tercile for each dispersion tercile. They report mean and median values of the number of observations per month, abnormal volume, SUE, turnover, size (market capitalization), book to market ratio, and momentum. In the last row of each panel, statistical test for the significance of the difference between low and high abnormal volume group is provided. By comparing the values in the first rows of 3 panels ('All'), we find that the first dispersion tercile group is characterized by higher SUE values, large market capitalization, and low book to market values. These characteristics justify calculating abnormal return using the 3 factor model or its extensions. The pattern suggests that analysts tend to have more homogeneous opinions on firms which tend to experience earnings increase from the last quarter. It is generally consistent with the findings of Hong *et al.* (2000) who argue that bad news relatively travels slowly in the market since firms do not have active incentive to reveal poor state of a company in advance.

One variable that is particularly interesting is the momentum, which measures past performance of stocks over the past year. Disposition effect (Shefrin and Statman 1985) suggests that investors tend to sell winners prematurely and hold onto losers far too long since they tend to be more risk averse when they experience gains and tend to be more risk taking when they experience losses. This prediction can be derived from the prospect theory (Kahneman and Tversky 1979), which shows that investor's utility can be defined not in terms of the level of the wealth, but in terms of its changes. Odean (1998) finds evidence for the hypothesis using a unique data set that records trading behavior of individual investors at a well-known brokerage company. Further, he reports that stocks which had good performance in the past but were heavily sold by investors tend to perform better in the following period as well. This suggests that investors' decision to sell these stocks was sub-optimal since their selling decision was based on the past performance, not on the future prospects of the stock.

Odean (1998) and Ranguelova (2008) emphasize that how stocks performed in the past may affect buying and selling decisions of investors. Especially, if investors' selling decisions are based on past performance and not fully incorporate future prospect of the firms, rational investors (*i.e.*, arbitrageurs) would be willing to take the other side of the trade. Consequently, trading volume would arise, and the stock price would slowly adjust, reflecting the fundamentals of the firms. In the following section, we test this hypothesis that the disposition effect is related to the HVRP by refining our strategies based on both analyst dispersion and momentum.

C. HVRP in Subsamples Double Sorted by Dispersion and Momentum

Within each dispersion tercile, we further divide the sample into momentum terciles. Panels A, B, and C of Table 3 show HVRPs across momentum terciles for each dispersion tercile. It shows that HVRP is concentrated in the third momentum tercile in the first dispersion tercile. The magnitude of HVRP is 0.71% per month or 8.52% per year, which is highly significant. Risk adjusted HVRP ranges from 0.71% per month to 0.92% per month. They are all statistically significant. This suggests that using the information on analyst forecast dispersion, abnormal volume and past momentum can significantly improve the profit of HVRP or earnings announcement related strategies. It is also interesting to note that the HVRP is mainly driven by higher returns of the high volume stocks, especially after the risk adjustments.

Panels A, B, and C of Table 4 shows summary statistics for the volume tercile portfolios defined within each momentum tercile in the first dispersion tercile. The third volume tercile exhibits some patterns distinct from other volume teritles. The high volume group consists of relatively small and high book to market stocks with higher increase in earnings (SUE) in the third momentum tercile, while the difference is either insignificant or in the opposite direction for the first and the second momentum terciles.

The results in the section suggest that for the stocks covered in IBES, the high returns associated with high trading volume are observed in stocks with little divergence in opinions and good momentum. Several researches emphasize that trading volume may provide addi-

TABLE 3
HVRP ACROSS MOMENTUM TERCILES IN EACH DISPERSION TERCILE

This table reports monthly high volume return premium (HVRP) in sub-samples double-sorted by DISP tercile and momentum tercile. DISP of a company is calculated as the standard deviation of quarterly analyst forecasts normalized by the previous year-end price. Momentum is measured using 12 calendar months ending immediately prior to the month in which the earnings announcement is made. HVRP is defined as the monthly return of a zero investment portfolio which takes a long position in the 3^{rd} abnormal volume tercile and an equivalent short position in the 1^{st} abnormal volume tercile defined within each sub-sample. All the cutoff values are based on the previous quarter's distributions. Abnormal volume is defined as the sum of daily market-adjusted volumes for the three trading day interval, $[t-1,\ t+1]$, around earnings announcements. Panel A reports raw and risk adjusted returns from various factor model specifications for each portfolio and for the zero investment portfolio within the 1^{st} dispersion tercile. Dependent variables for high and low abnormal volume tercile portfolios are raw returns minus the risk-free (t-bill) rate, and dependent variables for the high − low portfolios are the difference in raw returns between the high abnormal volume and low abnormal volume portfolios. 3F regressions use the standard Fama–French 3 factors. 4F regressions add the momentum factor of Carhart (1997) to the 3F specification. 3F+SUE Factor regressions add a SUE factor to the 3F specification, where the SUE factor is calculated as the difference in monthly equally weighted raw returns between the highest and the lowest SUE decile portfolio. 4F+Liq Factor regressions add the variable liquidity factor of Sadka (2006) to the 4F regressions. Results with *p-values* below 0.05 (0.10) are marked with ** (*) and are in bold. Panel B and C report raw and risk adjusted returns for the portfolios in the 2^{nd} and 3^{rd} dispersion terciles, respectively.

DISP Tercile = 1 Only

Volume Tercile	Momentum Tercile 1	2	3
Raw Returns			
1	0.0140	0.0167	0.0165
3	0.0153	0.0146	0.0235
High-Low	0.0013	-0.0020	**0.0071**
	(0.6378)	*(0.3153)*	*(0.0073)*
3F alpha values			
1	0.0013	**0.0039**	**0.0039**
	(0.5627)	*(0.0853)*	*(0.0707)*
3	0.0018	0.0027	**0.0113**
	(0.4792)	*(0.1693)*	*(0.0000)*
High-Low	0.0006	-0.0016	**0.0074**
	(0.8301)	*(0.4422)*	*(0.0063)*
4F alpha values			
1	**0.0042**	**0.0051**	0.0027
	(0.0468)	*(0.0294)*	*(0.2141)*
3	**0.0060**	**0.0041**	**0.0119**
	(0.0137)	*(0.0417)*	*(0.0000)*
High-Low	0.0018	-0.0010	**0.0092**
	(0.5119)	*(0.6264)*	*(0.0009)*
3F + SUE Factor alpha values			
1	0.0013	0.0035	0.0019
	(0.5807)	*(0.1458)*	*(0.3927)*
3	0.0030	0.0019	**0.0090**
	(0.2780)	*(0.3529)*	*(0.0012)*
High-Low	0.0017	-0.0020	**0.0071**
	(0.5463)	*(0.3727)*	*(0.0130)*
4F + Liq Factor alpha values			
1	**0.0052**	**0.0050**	0.0035
	(0.0121)	*(0.0330)*	*(0.1114)*
3	**0.0061**	**0.0044**	**0.0118**
	(0.0129)	*(0.0328)*	*(0.0000)*
High-Low	0.0009	-0.0012	**0.0083**
	(0.7485)	*(0.5711)*	*(0.0028)*

DISP Tercile = 2 Only

Volume Tercile	Momentum Tercile 1	2	3
Raw Returns			
1	0.0083	0.0110	0.0138
3	0.0095	0.0106	0.0122
High-Low	0.0012	-0.0004	-0.0016
	(0.6428)	*(0.8672)*	*(0.5989)*
3F alpha values			
1	**-0.0060**	-0.0029	0.0002
	(0.0148)	*(0.1656)*	*(0.9434)*
3	-0.0036	-0.0029	-0.0013
	(0.1729)	*(0.2097)*	*(0.5913)*
High-Low	0.0024	0.0000	-0.0014
	(0.3352)	*(0.9977)*	*(0.6256)*
4F alpha values			
1	-0.0012	-0.0011	-0.0002
	(0.5753)	*(0.5858)*	*(0.9344)*
3	0.0020	-0.0019	-0.0011
	(0.3657)	*(0.4272)*	*(0.6495)*
High-Low	0.0032	-0.0007	-0.0009
	(0.2197)	*(0.7804)*	*(0.7658)*
3F + SUE Factor alpha values			
1	**-0.0045**	-0.0035	-0.0024
	(0.0826)	*(0.1086)*	*(0.3206)*
3	-0.0032	-0.0033	**-0.0042**
	(0.2452)	*(0.1751)*	*(0.0793)*
High-Low	0.0013	0.0002	-0.0018
	(0.6372)	*(0.9350)*	*(0.5640)*
4F + Liq Factor alpha values			
1	-0.0006	-0.0006	0.0001
	(0.7858)	*(0.7701)*	*(0.9654)*
3	0.0024	-0.0012	-0.0006
	(0.2793)	*(0.6199)*	*(0.7909)*
High-Low	0.0030	-0.0006	-0.0008
	(0.2556)	*(0.8337)*	*(0.8048)*

DISP Tercile = 3 Only

Volume Tercile	Momentum Tercile 1	2	3
Raw Returns			
1	0.0124	0.0101	0.0070
3	0.0154	0.0076	0.0131
High-Low	0.0030	-0.0030	**0.0062**
	(0.3824)	*(0.2650)*	*(0.0563)*
3F alpha values			
1	-0.0017	-0.0037	**-0.0066**
	(0.5766)	*(0.1704)*	*(0.0119)*
3	0.0013	**-0.0059**	-0.0024
	(0.7042)	*(0.0214)*	*(0.4525)*
High-Low	0.0031	-0.0027	0.0042
	(0.3853)	*(0.3269)*	*(0.1968)*
4F alpha values			
1	**0.0047**	0.0003	**-0.0065**
	(0.0786)	*(0.9157)*	*(0.0159)*
3	0.0051	-0.0030	-0.0036
	(0.1409)	*(0.2392)*	*(0.2674)*
High-Low	0.0004	-0.0036	0.0029
	(0.9162)	*(0.2113)*	*(0.3849)*
3F + SUE Factor alpha values			
1	0.0027	-0.0038	**-0.0082**
	(0.3920)	*(0.1795)*	*(0.0027)*
3	0.0050	**-0.0055**	**-0.0073**
	(0.1665)	*(0.0439)*	*(0.0214)*
High-Low	0.0023	-0.0022	0.0009
	(0.5398)	*(0.4479)*	*(0.7840)*
4F + Liq Factor alpha values			
1	**0.0047**	0.0003	**-0.0056**
	(0.0839)	*(0.9172)*	*(0.0380)*
3	0.0053	-0.0025	-0.0028
	(0.1318)	*(0.3263)*	*(0.3958)*
High-Low	0.0006	-0.0031	0.0028
	(0.8719)	*(0.2826)*	*(0.4045)*

TABLE 4
SUMMARY STATISTICS FOR THE PORTFOLIOS TRIPLE-SORTED BY ABNORMAL VOLUME, MOMENTUM, AND DISPERSION (1st DISP TERCILE ONLY)

Each panel reports the summary statistics of firm characteristic variables for abnormal volume terciles defined within each momentum tercile of the 1st DISP tercile. DISP of a company is calculated as the standard deviation of quarterly analyst forecasts normalized by the previous year-end price. Abnormal volume is defined as the sum of daily market-adjusted volumes for three trading day interval, [t−1, t+1] around earnings announcements. Each stock is assigned to an abnormal volume tercile portfolio from the next month after earnings announcement and held until the month of next earnings announcement or until four months elapse, whichever comes first. All the cutoff values are based on the previous quarter's distributions. SUE is standardized unexpected earnings based on a seasonal random walk model. Turnover is the average of daily share turnover over the 52 weeks period prior to the earnings announcement week. Size is defined as market capitalization measured at the end of each calendar year. B/M is book to market ratio calculated as in Fama and French (1993). Momentum is measured using 12 calendar months ending immediately prior to the month in which the earnings announcement is made. The last row shows differences in these variables between the 3rd and 1st abnormal volume terciles, along with the associated *p-values*.

Panel A: Summary statistics by abnormal volume tercile for DISP Tercile = 1 and MOM Tercile = 1

Abnormal Volume tertile		Obs per Month	Abnorma Volume	SUE	Turnover	Size	B/M	Momentum
All	Mean	50.5	0.0030	-0.1470	0.0134	5,639	0.5403	-0.0307
	Median	50.0	0.0028	-0.0897	0.0125	4,008	0.5151	-0.0155
1	Mean	16.4	-0.0032	-0.1755	0.0139	3,488	0.6496	-0.0367
	Median	16.0	-0.0028	-0.1285	0.0134	1,864	0.6306	-0.0216
2	Mean	18.7	0.0010	-0.1434	0.0098	6,102	0.5134	0.0001
	Median	18.0	0.0008	-0.1025	0.0094	3,671	0.5114	0.0180
3	Mean	15.4	0.0123	-0.1024	0.0177	6,887	0.4613	-0.0669
	Median	15.0	0.0120	-0.1024	0.0161	5,731	0.4483	-0.0618
High-Low			**0.0156****	0.0731	**0.0038****	**3,399****	**-0.1883****	**-0.0301****
p-value			*(0.0000)*	*(0.1071)*	*(0.0000)*	*(0.0000)*	*(0.0000)*	*(0.0196)*

Panel B: Summary statistics by abnormal volume tercile for DISP Tercile = 1 and MOM Tercile = 2

Abnormal Volume tertile		Obs per Month	Abnorma Volume	SUE	Turnover	Size	B/M	Momentum
All	Mean	40.7	0.0023	0.0483	0.0122	7,997	0.4488	0.1928
	Median	41.0	0.0023	0.0412	0.0116	5,766	0.4278	0.2103
1	Mean	14.1	-0.0030	0.0772	0.0122	6,871	0.4679	0.1987
	Median	13.0	-0.0027	0.0953	0.0113	4,307	0.4603	0.2132
2	Mean	12.6	0.0007	-0.0417	0.0100	9,993	0.4327	0.1924
	Median	12.0	0.0006	-0.0384	0.0093	6,596	0.4180	0.2033
3	Mean	14.4	0.0093	0.0868	0.0146	6,880	0.4488	0.1961
	Median	14.0	0.0084	0.1086	0.0138	5,632	0.4233	0.2133
High-Low			**0.0123****	0.0097	**0.0024****	0.009	**-0.0191***	-0.0026
p-value			*(0.0000)*	*(0.8056)*	*(0.0000)*	*(0.9884)*	*(0.0761)*	*(0.8444)*

(Table 4 Continued)

Panel C: Summary statistics by abnormal volume tercile for DISP Tercile = 1 and MOM Tercile = 3

Abnormal Volume tertile		Obs per Month	Abnorma Volume	SUE	Turnover	Size	B/M	Momentum
All	Mean	47.5	0.0053	-0.0059	0.0165	6,986	0.4269	0.5857
	Median	46.0	0.0045	0.0724	0.0155	4,785	0.4143	0.5913
1	Mean	15.7	-0.0029	-0.0616	0.0152	8,141	0.4188	0.5324
	Median	15.0	-0.0027	0.0410	0.0133	5,257	0.4028	0.5486
2	Mean	14.8	0.0017	-0.0354	0.0129	8,195	0.4006	0.5332
	Median	15.0	0.0015	0.0365	0.0123	5,109	0.3922	0.5397
3	Mean	17.0	0.0163	0.0522	0.0211	4,373	0.4638	0.6861
	Median	16.0	0.0138	0.0925	0.0203	3,248	0.4362	0.6579
High-Low			**0.0193****	**0.1138****	**0.0059****	**-3,768****	**0.0451****	**0.1537****
p-value			*(0.0000)*	*(0.0338)*	*(0.0000)*	*(0.0000)*	*(0.0008)*	*(0.0000)*

tional information that price variable may not capture (For example, Lee and Swaminathan 2000; Blume *et al.* 1994; and Choi and Kim 2009). Our finding that the high abnormal trading volume stocks with good past performance and least forecast dispersion is the major source of the HVRP even after we control for momentum effects through 4-factor model (Carhart 1997) suggests that the trading volume interacted with analyst forecast dispersion has information not subsumed by price momentum or other firm characteristics.

Our results are inconsistent with either the risk interpretation of HVRP (Varian 1985; Garfinkel and Sokobin 2006) or short-sale constraints driven price increase (Miller 1977), which predicts higher HVRP in the higher dispersion group. We find that high abnormal trading volume with high analyst forecast dispersion does not attract any predictable return patterns.

V. Conclusion

We examine a possible cause for the positive cross-sectional relationship between abnormal trading volume and subsequent returns around earnings announcements for the firms followed by analysts. Recent literature documents that there exists a positive cross-sectional relation between volume and subsequent returns (Gervais *et al.* 2001; Kaniel *et al.* 2005; Choi and Kim 2009; Garfinkel and Sokobin 2006), which is often defined as the 'high volume return premium (HVRP).' Given that divergence in opinions, which is often proxied by the dispersion in analysts' earnings forecasts, is considered to be a major source of trading volume (Kim and Verrecchia 1991; Kandel and Pearson 1995), it is natural to hypothesize that higher dispersion could be a possible explanation for positive relationship between trading volume and return (Varian 1985; Garfinkel and Sokobin 2006; Lamont and Frazzini 2007).

We test the hypothesis that opinion divergence is the primary cause for HVRP by forming separate zero-investment portfolios (high volume minus low volume) after sorting our sample of IBES-covered stocks into quintiles based on the dispersion in analysts' earnings forecasts. Surprisingly, we find that the HVRP is the strongest in the lowest quintile of forecast dispersion. This result contrasts with the view that dispersion in opinions is a priced risk factor (Varian 1985; Garfinkel and Sokobin 2006) or leads to price increase, at least temporarily, due to short-sale constraints (Miller 1977; Diether *et al.* 2002).

In the lowest quintile, HVRP remains significantly positive even after controlling for major risk factors, such as Fama-French 3 factor model and its extensions including momentum (Carhart 1997) and liquidity (Sadka 2006) factors.

Systematic positive relationship between abnormal trading volume and subsequent return suggests that sellers consistently lose to the buyers. This suggests an alternative hypothesis that the premature selling of stocks with good past performance by investors who are subject to the disposition effect might underlie the relationship (Shefrin and Statman 1985; Odean 1998; Grinblatt and Han 2005; Ranguelova 2008). In this case, if investors sell prematurely the stocks with good past performance, arbitrageurs would buy from them if they believe the stocks would continue to outperform. Large trading volume arises and is followed by higher future returns. Consistent with the hypothesis, we find that HVRP is concentrated among past winners.[8]

Trading volume, until very recently, has not been widely discussed in asset pricing literature. This is partly because traditional asset pricing

[8] Future research using investors' accounts level data would be interesting. Price momentum is a proxy for unrealized capital gains investors experience. In investors' accounts level data, we can calculate capital gains for each stock, each investor directly. With the data, analyzing how trading behavior is related to analyst forecast dispersion, and what implication it has on future return would further clarify the source of HVRP analyzed in this paper.

models (CAPM, APT, and Consumption CAPM) are based on investors with homogeneous expectations. Thus, in these models, equilibrium is achieved without trading volume. Our results suggest that trading volume can contain interesting information on future return and analyzing the pattern of interaction among investors would provide a fruitful future venue for theoretical models.

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