News and Investor Sentiments: the impact on trading behavior

Yu-Chen Wei, Yang-Cheng Lu, Yen-Ju Hsu*

Abstract

This study examines and compares the sentiment effect driven by trading and news information on market returns and volatility, as well as the applicability of news sentiment in portfolio construction. I employ linguistic analysis to construct the market aggregate news sentiment index (*MANSI*), drawn from daily financial news about Taiwan listed firms, and I form the investor sentiment index (*SI*) by following Baker and Wurgler (2006). The evidence shows that *MANSI* has a stronger influence on market trading behavior than investor sentiment. The results also reveal that the news sentiment effect is more profound during market expansion periods, consistent with the findings in Chung, Hung and Yeh (2012) and Stambaugh, Yu and Yuan (2012). The cross-sectional portfolio analyses suggest that conditional on the lower news sentiment, smaller, more volatile and less profitable stocks generate higher returns. In addition, I develop long-short portfolios on the basis of size, volatility, and profitability and show that the previous *MANSI* state is a significant determinant of portfolio returns. In addition, *MANSI* has more influence on the trading behavior of foreign institutional investors and dealers, while investor sentiment reveals a stronger influence on domestic institutional traders. The results suggest that news sentiment can be an effective proxy for market returns and volatility and can be applied in portfolio construction.

Keywords: News sentiment, Investor sentiment, Trading behavior, Institutional investors

JEL Classification: D82; G11; G14; G41

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1. Introduction

The information effects of trading, financial reports, news reports, microblogging forums and corporate social responsibility activities have been proven and they are related to firm performance and even the performance of collaborator and rival firms. Diverse information sources and their truth increase the difficulty in predicting investors' and market responses. Moreover, a complicated causal relationship arises from the interactions of inside information with informed and noise traders.

Serial empirical studies have started with the assumption of irrational trading behavior and the contagion effect of investor mood on markets. Nofsinger (2001) showed that investors trade more around news releasing and that the behavior of investor types is different. Cao, Coval and Hirshleifer (2002) discusses the trading behaviors of sidelined investors, who present delayed trading until price movements validate their private signals. Regarding trading-based sentiment, Baker and Wurgler (2006) demonstrated that investor sentiment has significant effects on the cross-section of stock prices among specific categories. Another noticeable issue is that sentiment status is measured by news information, which is viewed as a channel for attracting investor attention and affecting market trading activities. With regard to news effects, media coverage, news content, the categories of news, and the location of the press have all been found to have impacts on investors.

In addition, a large number of studies have provided evidence for the existence of strong correlations between news reported by the media and stock market reactions (Chan, 2003; Fang and Peress, 2009; Aman, 2011, 2013) and have confirmed findings that press releases prior to financial events, such as earnings announcements, have a significant impact on the market's reaction (Vega, 2006; Demers and Vega, 2014; Tetlock, 2007; Tetlock, Tsechansky and Macskassy, 2008; Engelberg and Parsons, 2011). This study attempts to build a bridge between general sentiment proxies from

trading processes and news sentiment, which is captured by quantifying the context of the enormous volume of daily equity market news.

This study provides a serial investigation of sentiment index construction, a comparison of the effect of sentiment on trading behavior, cross-section analysis of news sentiment, the portfolio predictability of news sentiment and the impact on institutional investors' trading. To compare the sentiment effects driven by trading and news information, this study employs linguistic analysis to construct the market aggregate news sentiment index (*MANSI*), drawn from daily financial news about Taiwan listed firms, inspired by the role of news played in information delivery and the influence incorporated into trading activities. Referring to the methods of Baker and Wurgler (2006), the investor sentiment index (*SI*) and the sentiment index with news (*SIN*) are constructed to measure and compare the diverse influences of investor sentiment and news sentiment. A standardized residual in the regression analysis is employed as a sentiment proxy from the orthogonalized process to exclude the influence of macroeconomic variables.

This study proposes that news sentiment could be proxy for the sentiment status indicator, instead of using complicated models and data sources. The construction of investor sentiment, news sentiment and the combination of these two indices is introduced first. The analyses focus on three parts, one being the impact of sentiment indices on both contemporaneous and lagged trading activities, including market returns and volatility. Another part further examines the asymmetric effects of the sentiment index effect on different market states and trading behavior. In addition, it compares the effect and the magnitude of each sentiment index on trading behavior and attempts to prove whether the information released by the daily financial press can improve the ability to capture the market sentiment. Compared to prior studies, in addition to considering the traditional risk and behavioral factors of investor sentiment,

this study goes on to verify the predictability of the degree of *MANSI* with regard to the returns of long and short portfolios. The average equally weighted and value-weighted portfolio returns are examined as a check for the robustness of the findings. The last empirical issues focus on the influence of news sentiment on the trading behavior of different investor types, including foreign institutional investors, dealers and domestic institutional investors.

The empirical evidence presented in this paper suggests that there is a contemporaneous, positive relationship between *SI*, *SIN* and *MANSI*, while the market variation presents negative responses. Conversely, when the market is in an expansion period, the returns would increase in the subsequent period, but the high-low ratio and sigma decreases. However, when the market and news sentiment are both higher, the subsequent market return is lower. The multiple effects of market transactions and news increase the motivation for active investment and volatility because of confident expectations. The cross-sectional analysis of news sentiment reveals that portfolios should include stocks with higher *TURN*, large *Size*, low *Revenue%*, higher *Sigma* and higher *HL* when the previous *MANSI* is higher. The results suggest that market volatility variables are more sensitive to news sentiment and generate positive returns between classified portfolios sorted and referred to by *MANSI*. The foreign investors and dealers trading activities have stronger correlations with *MANSI* and market state. *MANSI* reveals the stronger predictability of equally weighted portfolio returns with foreign institutional investment sorting.

This paper makes contributions to the literature on news sentiment in three important ways. First, the results report that sentiment index constructed by news sentiment exhibits a stronger influence on market trading behavior even if it considers the market state effect. Moreover, the predictability of the effect of news sentiment on future returns has been documented as well. The results contribute to the study of

measuring investor sentiment proxies and their application in portfolio allocation (Brown and Cliff, 2004, Baker and Wurgler, 2006). Second, the combination of news sentiment and market status has a more significant impact on subsequent trading behaviors, consistent with Chung, Hung and Yeh (2012) and Stambaugh, Yu and Yuan (2012), who both employ the investor sentiment in Baker and Wurgler (2006). Third, the different responses of institutional investors to sentiment indices and market status are documented, in response to the information skills of the findings of Engelberg, Reed and Ringgenberg (2012). The results reveal that the combination of news sentiment and stock characters can present efficiency predictability and generate benefits for portfolios.

The remainder of this paper is organized as follows. Section 2 introduces the literature and describes the hypothesis development. The description and construction of investor sentiment and news sentiment are provided in Section 3. The examination and comparison of sentiment indices regarding trading behavior, and the cross-sectional analysis and predictive regressions for long and short portfolios are presented in Section 4. Section 5 summarizes the results of institutional investors' trading behaviors. Finally, the conclusions drawn from this study are presented in Section 6.

2. Literature and Hypothesis development

The process of information being incorporated into investor decisions and affecting trading behavior remains complicated and varies during different market statuses. The measurement of investor sentiment has evolved from that in the prior literature, such as the turnover ratio (Baker and Stein, 2004; Baker and Wurgler, 2007), consumer confidence (Lemmom and Portniaguina, 2006; Akhtar et al. 2011; Antoniou, Doukas and Subrahmanyam, 2013), Initial Public Offering (IPO) activity, derivatives, and so on.

The literature on the role of the news effect on market has also been extended to international markets and different news sources, the analysis of news content and the specific effects of specific news categories. Griffin, Hirschey and Kelly (2011) showed that there are largely different responses to news between developed and emerging markets. In addition, Da, Engelberg and Gao (2015) and Baker, Bloom and Davis (2016) searched news articles with specific sentiment keywords and construct indices to investigate the relationship with market trends and trading activities.

Vega (2006) showed that the degree of net optimism in relation to news content can be an effective factor in predicting cumulative abnormal returns after announcements. Tetlock (2007) found that high media pessimism exerts downward pressure on market prices, followed by a reversion to fundamentals, and unusually, high or low pessimism gives rise to high market trading volume. Demers and Vega (2014) found that the higher that the net optimism regarding news content is, the greater that the cumulative return is. Antweiler and Frank (2004) found that Internet messages can help to predict market volatility and exert statistically significant effects on stock returns. The results support the perspective that disagreement induces trading. Brown and Cliff (2004) documented that indirect sentiment proxies are related to survey sentiment, while the evidence does not support sentiment primarily affecting market returns.

Baker and Wurgler (2006) constructed a commonly cited representative aggregate investor sentiment index using the market trading sentiment proxy and found that a cross-section of future stock returns is conditional on the beginning-of-period proxies for sentiment. Sentiment represents the expectations of market investors regardless of whether releases are trading based or news information based. To identify the difference in the influence of news sentiment and investor sentiment, this study performs contemporaneous and predictive regressions on the

relationships among investor sentiment, news sentiment and trading behaviors. Based on the advantages of news, which disseminates rapidly and easily captures investor attention, this study supposes that news sentiment is more strongly correlated with market trading behaviors. The hypothesis is as follows:

H1. The Market Aggregate News Sentiment Index (MANSI) has a stronger influence on trading behavior than market-wide trading investor sentiment

Interest has been expressed in terms of its application to portfolio management (Baker and Wurgler, 2006; Kumar and Lee, 2006), its asymmetric effects (Lee, Jiang and Indro, 2002; Groß-Klußmann and Hautsch, 2011; Chung et al., 2012) and various anomalies (Stambaugh, Yu and Yuan, 2012). Chung, Hung and Yeh (2012), used sentiment from Baker and Wurgler (2006) and proved that only in the expansion state does sentiment exert both in-sample and out-of-sample predictive power for the returns of specific categories of portfolios. Stambaugh, Yu and Yuan (2012) used the same investor sentiment index and showed that a long-short strategy is more profitable following a high level of sentiment. Da, Engelberg and Gao (2015) searched news about household concerns and constructed a Financial and Economic Attitudes Revealed by Search index, finding that it can predict short-term returns and temporary increases in volatility. In addition, Berger and Turtle (2015) examined relationship between the cumulative changes in investor sentiment and asset pricing. That path-dependent sentiment motivates arbitrage activities by riding the bubble and lead to mispricing was proved.

In summary, in addition to the finding of market reaction to investor sentiment and the news sentiment effect on investor trading behavior, this assumes that stronger news sentiment is exhibited during expansion periods. Moreover, portfolio and investor strategy can profit by identifying the market investment atmosphere using

news sentiment. Hypotheses arise as below:

H2. The sentiment effects on trading behavior are different in market status of expansion and recession.

H3. The degree of news sentiment can be employed to identify market states in forecasting portfolios.

Recently, a related study investigated who receives and reacts to the news, and the existing literature has also provided evidence for the limited cognitive character and analytic ability of investors, leading to information disagreement and underreaction to news. The results showed that institutional investors respond more quickly to news (Ben-Rephael, Da and Israelsen, 2017) than retail investors. However, investors tend to react to the lack of cognitive ability and attention by focusing on the market, conducting sector-wide information analysis (Peng and Xiong, 2009) and trading the assets in their present portfolios (Baber and Odean, 2008). Yuan (2015) found the market-wide attention-grabbing events with regard to trading activities and news can both motivate investors to pay attention to their portfolios. Moreover, increasing ownership by foreign investors motivates notice of performance and influences market and domestic investors. Engelberg, Reed and Ringgenberg (2012) found that public news provides a valuable trading opportunity for short sellers who have skilled information processes. Bae, Min and Jung (2011) compared the trading behaviors of different investor types in the South Korean stock market. The results showed that foreign investors profit by the momentum strategy and information-processing advantages. By referring to the related literature, the next hypothesis is proposed as shown below:

H4. Institutional investors present different responses to sentiment indices.

This study complements the literature on the construction and comparison of sentiment indices and institutional investors' reactions, as well as empirical analyses, and the predictability of new sentiment is processed in the following section.

3. Data Description

In this study, we analyze the news sentiment drawn from two principal media databases in Taiwan, namely, the InfoTimes database and the United Daily news group, which include five publications: the China Times, Commercial Times, Commercial Electronic Times, Economic Daily News and United Evening News. The monthly sentiment proxies and transaction data are obtained from the TEJ database (Taiwan Economic Journal Co., Ltd.) This study includes listed firms on the Taiwan Stock Exchange (TWSE) for the sample period from 2006 to 2016.

With regard to the measurement of the dependent variables, the monthly return, the high-low ratio (*HL*) and Sigma, the HL ratio is the ratio of the difference between the highest price and the lowest price to the previous closing price. Sigma is the annual standard deviation of the market monthly returns.

3.1 News sentiment

The accurate qualitative news information analysis approach remains a popular topic. The news sentiment indicator, relating to each stock from the news reports, is constructed by referring to the concepts of Demers and Vega (2014) and Lu and Wei (2014). The degree of firm-level news sentiment is measured by determining 'net optimism' and 'net pessimism'. According to Diction,[1] optimism is defined as 'language endorsing some person, group, concept or event, or highlighting their

[1] Diction is a computer-aided text analysis program for determining the tone of a verbal message. For details about Diction, readers can refer to the Web site introduction at: http://www.dictionsoftware.com/.

positive entailments'. The Diction formula for the degree of net optimism (the difference between 'optimism' and 'pessimism') is expressed as follows: (Praise + Satisfaction + Inspiration) – (Blame + Hardship + Denial).

The News Sentiment Index is essentially an indicator reflected by the individual stock; this indicator is measured as follows:

$$NSI_{i,d,m} = \frac{\sum_{p=1}^{P} tf_{i,d,p} - \sum_{n=1}^{N} tf_{i,d,n}}{TF_{i,d,m}} \times 100\% \quad (1)$$

$$NSI_{i,d} = \frac{1}{M} \sum_{m=1}^{M} NSI_{i,d,m} \quad (2)$$

where $NSI_{i,d,m}$ is the news sentiment of the mth news for the ith firm on day d; $tf_{i,d,p}$ is the term frequency of the pth optimistic characteristic term for the ith firm on day d; $tf_{i,d,n}$ is the term frequency of the nth pessimistic characteristic term for the ith firm on day d; $TF_{i,d,m}$ is the total term frequency of the mth news for the ith firm on day d; and $NSI_{i,d}$ is the average score for the mth news for the ith firm on day d, which could be a proxy for the news sentiment level, based upon public information related to the ith firm.

In this section, we calculate the market news sentiment index by considering the market value of each firm, and the news sentiment index (*NSI*) of each individual stock is standardized in eq. (2). The market aggregate news sentiment index (*MANSI*) is calculated by considering the news sentiment ratio and previous market value of each stock. The measurement of *MANSI* is as shown below.

$$MANSI_m = Std\left(\frac{1}{N}\sum_{n=1}^{N} NSI_{i,d}\right) \times k_{i,q-1},\ k_{i,q} = MV_{i,q} / \sum_{i=1}^{I} MV_{i,q} \quad (3)$$

where $MANSI_m$ is the standardization of the monthly market aggregate news sentiment index, which is calculated by the average of the daily aggregate news sentiment index, n=1…*N*, where *N* equals the number of calendar days in each month,

and N ranges from 28 to 31. $NSR_{i,d,}$ is the standardization of the news sentiment ratio for the ith firm on day d, and $k_{i,d}$ is the weight of the market value for the ith firm on day d. $MV_{i,d}$ is the market value for the ith firm in month d.

3.2 Investor sentiment index

In general, the methods used to measure investor sentiment can be classified into direct and indirect sentiment proxies, the former being acquired from market investor surveys and the latter being drawn by related transaction variables. This study collects six indirect sentiment proxies from the stock market, referring to the previous literature (Brown and Cliff, 2004; Baker and Wurgler, 2006; Baker and Stein, 2004). Following the approaches and results in the literature, the stock market-related sentiment variables include the market turnover ratio (*TURN*), the ratio of advancing and declining issues (*ADVDEC*), *ARMS*, the ratio of the variation in margin loans (*MARGIN*), the ratio of the variation in stock loans (*SHORT*), and the short interest ratio (*SSR*). Table 1 reports the results of initial summary statistics and correlations between sentiment proxies. *MANSI* shows positive and significant correlations with the aggressive trading activity variables, including market turnover ratio, *ADVDEC*, *ARMS* and *MARGIN*, while it is negatively correlated with the pessimistic expectation proxy short sell ratio.

<Table 1 is inserted about here>

In the beginning, this study regresses every sentiment proxy on growth rates in industrial production, durable consumption, nondurable consumption, services consumption, employment, and monitoring indicators to control for the influence of macroeconomic variables (Baker and Wurgler, 2006; Antoniou et al, 2013; Hung, 2016). The residual of each regression is standardized and applied in the following principle component analysis process to construct investor sentiment, as shown in eq. (4) and eq. (5) below:

$$Senti_{it} = \alpha_i + \beta_{1i} Indus_t + \beta_{2i} Durable_t + \beta_{3i} NonDurable + \beta_{4i} Services_t + \beta_{5i} Employ_t + \beta_{6i} MI_t + e_{it} \quad (4)$$

$$StdSenti_{it} = \frac{e_{it} - \overline{e}_i}{\sigma_e} \quad (5)$$

where the macroeconomic variables are monthly data incorporating the growth in industrial production (*Indus*), durable consumption (*Durable*), nondurable consumption (*NonDurable*), services consumption (*Services*), employment (*Employ*) and monitoring indicators (*MI*).

This study forms the sentiment index (*SI*) and sentiment index with news (*SIN*) by referring to Baker and Wurgler (2006), who incorporated current sentiment proxies and the lag term. The first principle component weight of each sentiment proxy is adopted to process the second principal component, retaining an eigenvalue greater than 1.00 from the results of the principal components analysis. The sentiment index result shows that the eigenvalues of the two principal components analyses are 2.1671 and 1.4283, which can explain 59.6% of the sample variance of the orthogonalized sentiment proxies. In contrast, the results of principle component analysis of the sentiment index with news find 67.3% explanatory power and retain three components 2.2940, 1.43 and 1.013. The weight and formulation of the combined sentiment index equation are shown as follows:

- Sentiment Index (*SI*)

$$\varphi_i = 0.6027\text{Prin1}_i + 0.3973\text{Prin2}_i \quad (6)$$

$$SI_t = 0.3649 TURN_t + 0.293 ADVDEC_{t-1} + 0.2076 ARMS_{t\text{-}1} + 0.3951 \Delta MARGIN_t + 0.2381 \Delta SHORT_t + 0.2136 SSR_t \quad (7)$$

- Sentiment Index with News (*SIN*)

$$\varphi_i = 0.4843\text{Prin1}_i + 0.3019\text{Prin2}_i + 0.2138\text{Prin3}_i \quad (8)$$

$$
\begin{aligned}
SIN_t = {} & 0.2553 TURN_t + 0.197 ADVDEC_{t-1} + 0.1117 ARMS_{t\text{-}1} \\
& + 0.3275 \Delta MARGIN_t + 0.0632 \Delta SHORT_t + 0.2799 SSR_{t-1} \\
& + 0.2558 MANSI_{t-1}
\end{aligned} \tag{9}
$$

As the summary statistics in Table 2 show, the mean of investor sentiment and sentiment index with news is closed. With regard to dependent variables, trading behavior also includes institutional investors except for market stock returns and variations. Stock returns is positive and significantly correlated with contemporaneous *SI*, *SIN* and *MANSI*, but it is not correlated with the lag term of sentiment indices. The current and lag terms of *MANSI* are both negatively correlated with *HL* and Sigma, especially contemporaneous *MANSI*, which presents the stronger correlation. The higher news sentiment follows the lower market variation. Moreover, the trading value of foreign institutional investors (*FTV*) is positive and significantly correlated with *SI*, *SIN*, *MANSI* and news sentiment, which present stronger and immediate responses to information. The results of the trading value of domestic institutional investors (*STV*) show negative and significant correlations with previous sentiment indices. Compared to the responses of foreign institutional investors, domestic institutional investors reduce the trading value when the previous news sentiment is higher.

<Table 2 is inserted about here>

4. Estimates of the impacts of investor sentiment and news sentiment

4.1 Market trading behavior

The contemporaneous and lagged influences of investor sentiment and news sentiment on market trading activities have been examined in the previous literature. News information increases and is transmitted quickly with the development of social media. Thus, contemporaneous regression and lead-lag regression are used to

investigate the relationship with trading activities in this paper. For comparison, this study begins with an examination of the impact of sentiment on trading behavior by considering the market status. The responses of market returns and variance to investor sentiment, news sentiment and the combination of the above indices are included in this section.

$$Y_t = \alpha_0 + \beta_1 \times Sentiment_t / Sentiment_{t\text{-}1} + \beta_2 \times Y_{t\text{-}1} + \varepsilon_t \tag{10}$$

$$\begin{aligned} Y_t = \alpha_0 &+ \beta_1 \times Sentiment_{t\text{-}1} + \beta_2 \times Exp_{t\text{-}1} \\ &+ \beta_3 \times Sentiment_{t\text{-}1} \times Exp_{t\text{-}1} + \beta_4 \times Y_{t\text{-}1} + \varepsilon_t \end{aligned} \tag{11}$$

where the dependent variable *Y* is market return, and the variance variables include the high-low ratio (*HL*) and Sigma. *Sentiment* includes investor sentiment (*SI*), aggregate news sentiment index *(MANSI*) and the investor sentiment with news (*SIN*). *Exp* is a dummy variable for the market state, which equals one if the market is in an expansion period, and zero otherwise. The business cycles period is referred to by the dates of Taiwan business cycles reported by the National Development Council.[2]

Table 3 reports the results of Eq.(10) in the relationship between sentiment indices and trading behavior. Panel A indicates that market returns exhibit a positive, contemporaneous relationship with *SI*, *SIN* and *MANSI* conditioned on the previous stock market returns. The market variation reports contrary responses, presenting a negative, contemporaneous relationship between news sentiment and market variation. When the *MANSI* is high, the market high low ratio and Sigma are both low. The optimism of the market atmosphere would only to be expected to be closed to overreaction and reversal situations; then, the diminished trading activity reduces market variation. Conversely, there is no significant influence of previous sentiment observed in the results of lead-lag analysis in Panel B, revealing the advantage of the

[2] https://www.ndc.gov.tw/Content_List.aspx?n=EB8094238F87553B

sensitive character of news information in exploring the stock market.

<Table 3 is inserted about here>

Like the assumption of the investor limited attention hypothesis (Pend and Xiong, 2009) and asymmetrical responses among different market state (Garcia, 2013), this study explores whether the impacts of sentiment indices are distinct by considering market states. The results in Table 4 indicate that, when the market is in an expansion period, the returns increase in the subsequent period. An optimistic market atmosphere increases investor confidence and drives better market performance. However, the interactive effect of news sentiment and market states show that when market status and news sentiment are both optimistic, the returns in the subsequent month are lower. A potential explanation is that the multiple effects of the combination of market transaction and news promote the motivation to invest because of high expectations.

In contrast, the variation in market returns demonstrates a negative response to news sentiment. The lower *HL* and *Sigma* follow the expanding market state. Higher *MANSI* signals market optimism, which follows fewer market transactions. However, when news sentiment is optimistic, and it is during an expansion period, the subsequent *HL* and *Sigma* are higher. There are more disagreeing expectations about the market, which drive greater market variation when the market and news both release optimistic signals. The obvious influence of news sentiment on market trading behavior during expansion is consistent with the findings of Chung et al. (2012) and Stambaugh et al. (2012).

Compared to the investor sentiment index, *MANSI* exhibits stronger and more significant impacts on market trading behavior; therefore *MANSI* is adopted to examine cross-sectional effects and predictability in the subsequent section.

<Table 4 is inserted about here>

4.2 The cross-sectional effect and predictability of news sentiment

4.2.1 The cross-sectional analysis

In this section, news sentiment is employed in the cross-sectional analysis of news sentiment for portfolio construction, first by sorting *MANSI* from the previous month and then with the returns being calculated for each of the firm characteristics according to the ten portfolio quintiles, this study presents the results for both equally weighted and value-weighted portfolio returns, which are respectively reported in Panel A and Panel B. Table 5 classifies *MANSI* into high and low regimes and compares the differences among the ten portfolios. The firm characteristics include turnover ratio (*TURN*), *Sigma*, high-low ratio (*HL*), *Size*, price-to-book ratio (*PB ratio*), price-to-earnings ratio (*PE ratio*), the change of revenue (*Revenue%*) and *Age*. The highest return following the high *MANSI* is in the lowest *TURN* (decile 1), which equals 1.6503, and the high return is in decile 10 of the *TURN* group. The active trading activities following the optimistic market atmosphere lead to lower returns due to the overreaction.

For the *Sigma* and *HL* categories, the returns following low *MANSI* are higher than those following high *MANSI*. When the market is in a lower *MANSI* period, indicating a market with lower investor expectations, the higher volatility firms will attract more market attention and obtain higher returns. The small firms obtain higher returns regardless of whether the market is in high or low *MANSI* conditions, especially following low *MANSI*. The results reveal that the lower *Sigma*, *HL* and small *Size* firms obtain higher returns, which also indicates the characteristic of lower attention. The lower profitability groups of the *PB ratio* and *PE ratio* conditions on the lower *MANSI* appear to result in higher returns. The firms with higher revenue attract investor attention, especially in optimistic periods, thus promoting market trading activities. Greater disagreement among stocks produces higher volatility and

reduces stock performance.

The high volatility, higher revenue firms, large firms and young firms come with lower subsequent returns, revealing the less sensitive character of news sentiment. There is less arbitrage opportunity, and it is relatively difficult to value the true price and risk to those firms. These results indicate that firms can earn higher returns in the portfolio categories of *TURN*, *Sigma*, *HL*, *Size*, *Revenue%* and *Age* when the *MANSI* in the previous month is relatively low, with notable exceptions in the low *MANSI* portfolios for *PB ratio and PE ratio*. Furthermore, the portfolio returns constructed by firm characteristics and *MANSI* are found to be similar, regardless of whether they are calculated by equally weighted or value-weighted measures and irrespective of whether the returns are classified into groups of five or ten portfolios.

All of the results reported above are found to be consistent with those reported in the prior related studies, in which the market regime was also classified as higher or lower investor sentiment, such as Baker and Wurgler (2006). Similar findings are again discernible for all of the other firm characteristics when the samples are sorted into five portfolio groups, which is not displayed here due to space considerations.

<Table 5 is inserted about here>

The cross-sectional portfolio analyses suggest that when engaging in their portfolio decision making and portfolio management, participants in the Taiwan Stock Market should construct their portfolios based upon either equal or value weighting. The results suggest that such participants should focus on younger firms with smaller sizes, higher *Sigma* and *HL*, lower *PB ratio* and *PE ratio*, higher *Revenve%* and lower *Turnover* when market sentiment is conditioned during a relatively low period; conversely, they should construct their portfolios based upon higher *TURN*, large *Size*, low *Revenue%*, higher *Sigma* and higher *HL* firms when the previous *MANSI* was higher.

4.2.2 Predictive regression for long-short portfolios

The cross-sectional analysis results of the above section reveal that regardless of the specific characteristics that are to be considered during portfolio construction, the results suggest that investors should analyze the aggregate news sentiment index prior to engaging in their portfolio decision making. The difference in stock return based on the categories of news sentiment and firm characteristics indicates the potential arbitrage opportunity in forming portfolio strategies by considering *MANSI*. This study further assumes that portfolio performance can benefit from the early detection of the investment atmosphere with news sentiment classification.

This study further goes on to examine the long and short portfolio returns using equal weighting and value weighting, with the respective results reported in Table 6 and Table 7, both of which provide strong support for the preliminary findings regarding various factors. The predictive regressions show the coefficient estimates on news sentiment. Compared to the analysis in Baker and Wurgler (2006), which focused on the effect of investor sentiment, this study investigates the applicability of news sentiment in prediction.

This study considers both long and short portfolios classified into 5 groups '$R_{x=Quintile5}$-$R_{x=Quintile1}$' and 10 groups '$R_{x=Decile10}$-$R_{x=Decile1}$', that is, those that are long in the highest characteristic group and short in the lowest characteristic group. The equal weighting and value weighting excess returns are both included.

$$R_{X_{it}=High,t} - R_{X_{it}=Low,t} = c + \alpha_1 MANSI_{t\text{-}1} + \alpha_2 SI_{t\text{-}1} + \alpha_3 RMRF_t + \alpha_4 SMB_t + \alpha_5 HML_t + u_{it} \tag{12}$$

$$R_{X_{it}=High,t} - R_{X_{it}=Low,t} = c + \alpha_1 MANSI_{t\text{-}1} + \alpha_2 SI_{t\text{-}1} + \alpha_3 RMRF_t + \alpha_4 SMB_t + \alpha_5 HML_t + \alpha_6 MTM_t + u_{it} \tag{13}$$

where *MANSI* is the aggregate news sentiment index; *SI* is the sentiment index, which

is constructed by means of principal component analysis; *RMRF* is the excess return of the market portfolio return minus the riskless return; *SMB* is the size premium factor; *HML* is the book-to-market premium factor, which is constructed to isolate the difference between high and low book-value to market-value portfolios; and *MTM* is the momentum factor, which is the moving average monthly return from month −12 to −2. The details of the *RMRF*, *SMB*, *HML* and *MTM* factors used in the present study were obtained from the Taiwan Economic Journal (*TEJ*) database.

As shown in Table 6 and 7, the model (1) presents the results of Eq (12) and model (2) is Eq (13) without considering the effect from investor sentiment. The model (3) and model (4) are both condition on news sentiment and investor sentiment.

<Table 6 is inserted about here>

<Table 7 is inserted about here>

The results for trading behavior reported in Panel A of Tables 6 and 7 show that, when *MANSI* is high, returns for high volatility firms are relatively high over the subsequent month for either 5 or 10 categories and especially for value-weighted portfolios.

As shown in Model (4), the coefficient on *MANSI* remains consistent once controls are put in place for *SI*, *RMRF*, *SMB*, *HML*, and *MTM*. Volatile stocks have higher returns following relatively slower news sentiment periods. Panel B in Table 6 shows that the returns between the highest and lowest portfolios of larger firms decrease when *MANSI* is in a relatively higher period. It can be inferred that large firms attract more market attention in optimistic periods, leading to lower returns from disagreeing transactions.

Like the predictive regression in the change of Revenue (*Revenue%*), it is found that the higher *Revenue%* firms have lower returns following the relatively lower *MANSI* period. It is also found that the higher volatility of revenue indicates that the

risky character would potentially come with a more distinct perspective from investors and relatively lower stock returns. Although the results reported by Baker and Wurgler (2006) used only equally weighted calculations, the calculation of the results in the present study use value weighting as a check for the robustness of the earlier findings. The results of value-weighted return portfolios, reported in Table 7, reveal similar coefficients but more consistent results for both '$R_{x=Decile10}$-$R_{x=Decile1}$' and '$R_{x=Quintile5}$-$R_{x=Quintile1}$' regarding trading behavior classification, even when it considers the influence of investor sentiment, while the predictive regression of news sentiment has no significant influence on firm size, age and profitability categories except for the trading behavior.

The influence of news sentiment is more strongly correlated with market trading behavior variables, which are easily motivated by market atmosphere and expectation. These results provide general support for the supposition that the aggregate news sentiment index has stronger effects on stocks when firm characteristics are influenced by the prospects and trading behavior of investors, with the results effectively complementing the findings of Baker and Wurgler (2006, 2007).

In summary, the sentiment index constructed by news sentiment exhibits a stronger influence on market trading behavior, even if it considers the market state effect. The *MANSI* has a positive impact on contemporaneous market returns but a negative impact on contemporaneous HL and Sigma, while it reports the contrary results for subsequent trading behavior. Market volatility variables rapidly and sensitively reflect news sentiment and generate positive returns between classified portfolios sorted and referred to by *MANSI*. The advantage of news sentiment is that it reflects market trading activities more rapidly than the sentiment proxy constructed by the realized trading data. For the application and considerations of efficiency, we can only observe the news sentiment and sort the firms' characteristics to form portfolios,

rather than constructing the sentiment index with complicated methods and processes.

5. Analysis of the effect of sentiment on institutional trading behavior

The influence of news sentiment on trading behavior and the predictability of future returns are documented in the previous section. The previous literature has revealed that institutional investors have information advantages and professional analytic ability, which can help them to process relatively beneficial portfolio allocation. Furthermore, the different investor types present different responses to news (Nofsinger, 2001; Wu and Lin, 2017). Moreover, institutional trading behavior is referred by sidelined investors in observing the market investment atmosphere and making investor decisions (Cao et al., 2002). Accordingly, this study further investigates the influence of investor sentiment and news sentiment on investors' trading behavior by considering the total trading value of foreign institutional investors (*FTV*), dealers (*STV*) and domestic institutional investors (*ITV*).

Table 8 reports the results of the contemporaneous and lead-lag analysis between sentiment indices and institutional investors. The results show that news sentiment is positively correlated with the trading activities of foreign institutional investors. The synchronic correlation also notes that foreign institutional investors can capture market timing early. In contrast, domestic institutional investors present contemporaneous relations with *SI* and *SIN*, which are market trading-based component indices. The lead-lag analysis results are summarized in Panel B. The higher *SI* and *SIN* lead to higher subsequent trading value for domestic institutional investors, while foreign institutional investors are more correlated with the synchronic news sentiment. The domestic institutional investors, market return and previous trading activities show significant relationships. The contrary results of dealers' trading behavior show that higher news sentiment reduces the subsequent trading

value for dealers. They show the reversal investment decisions of dealers according to market atmosphere, constructed by news sentiment.

<Table 8 is inserted about here>

The following analysis further examines the influence of the market state on institutional investors. Table 9 shows that, when the market is in an expansion period and sentiment is higher, foreign institutional investors will reduce subsequent trading value. Regardless of whether market trading-based (*SI* and *SIN*) or news-based sentiment (*MANSI*) indices are disclosed in expansion periods, both indices reveal the significant optimistic market state, leading to reversal of expectations about the future market. The results of *STV* show a similar negative relationship with *MANSI* during expansion. However, domestic institutional investors do not show significant correlations with market state, although it is related to previous *SI* and *SIN*.

<Table 9 is inserted about here>

The last analysis focuses on the application of news sentiment in predictive regression of institutional investor trading behavior. The regressions are run to predict the difference between high and low institutional investment portfolios. Table 10 reveals the results of predictive regression of '$R_{x=Decile3}$-$R_{x=Decile1}$' on institutional trading value when it considers the influence of news sentiment and even investor sentiment. The results show that when *MANSI* is high, subsequent returns on higher foreign institutional investment firm are lower than those of foreign institutional investment firms. The regressions are affected by controlling for *RMRF*, *SMB*, *HML* and *UMD*, *and* the *SI* is also included to control for the effects of other sentiments from the market. While the results show that *MANSI* indeed has significant predictive power for portfolios with foreign institutional investment sorting, the portfolio categories of *ITV* and *STV* do not exhibit significant conditional effects with news sentiment.

<Table 10 is inserted about here>

Overall, sentiment is constructed by market trading and news information, which both affect institutional investors' behaviors. The trading behavior of foreign investors and dealers is more strongly correlated with *MANSI* and market state, indicating that foreign investors and dealers are more sensitive to news. In contrast, domestic institutional investors focus more on market trading activities than on news. It can also be seen that domestic institutional investors have information advantages over foreign institutional investors. *MANSI* reveals stronger predictability for portfolios with foreign institutional investment as well.

6. Conclusion

Previous research has shown diverse measurements and the impact of sentiment indices on the market. This study seeks to fill the gap with a comprehensive investigation of sentiment indices. The intention of this study is to examine and compare the sentiment effects driven by trading and news information on market returns and volatility, as well as the application of news sentiment to portfolio construction.

The empirical results show that *MANSI* exhibits a stronger influence on market trading behavior than investor sentiment, even if it considers the market state effect. The cross-sectional portfolio analyses suggest that when conditioned on lower news sentiment, smaller size, higher volatility and lower profitable stock categories can result in higher returns. The characteristics of long-short portfolios of categories can earn profits by referring to previous *MANSI* states. Conversely, the trading behavior foreign institutional investors and dealers shows stronger correlations with *MANSI*, especially when the previous market state is an expansion period. The identification of *MANSI* presents stronger predictability for the portfolio with foreign institutional investment sorting, while the investor sentiment index, which captures trading

activities reveals a stronger influence for domestic institutional investors than news sentiment.

By considering the sentiments released in the news, the results support that the news sentiment should be a proxy for the market sentiment indicator, instead of using complicated models and data sources. Generally, from the news sentiment effect on trading behavior, it can be inferred that the predictive ability between news sentiment and stock market trading activities can be traced back to the irrational decisions that react to and are motivated by news. Since the advantage of news information is that it can respond to market states and attract investor attention rapidly, news sentiment exhibits a better ability to capture market trading behavior.

References

Akhtar, S., Faff, R., Oliver, B. and Subrahmanyam, A., 2011. The power of bad: The negativity bias in Australian consumer sentiment announcements on stock returns. *Journal of Banking and Finance* 35, pp.1239-1249.

Aman, H., 2011. Firm-specific volatility of stock returns, the credibility of management forecasts, and media coverage: Evidence from Japanese firms. *Japan and the World Economy* 23, pp. 28-39.

Aman, H., 2013. An analysis of the impact of media coverage on stock price crashes and jumps: Evidence from Japan. *Pacific-Basin Financial Journal* 24, pp. 22-38.

Antoniou, C., J. A. Doukas and A. Subrahmanyam (2013), "Cognitive Dissonance, Sentiment, and Momentum," *Journal of Financial and Quantitative Analysis*, Vol. 48, No. 1, 245-275.

Antweiler, W. and M. Z. Frank (2004), Is all that talk just noise? The Information Content of Internet Stock Message Boards, *Journal of Finance*, Vol. 59, 1259-1293.

Ben-Rephael, Da and Israelsen (2017), It Depends on Where You Search: Institutional Investor Attention and Underreaction to news, *Reviews of Financial Studies*, 15(2), pp. 3009-3047.

Bae, S.C., Min, J.H. and Jung, S., 2011. Trading behavior, Performance, and stock preference of foreigners, local institutions, and individual investors: Evidence from the Korea stock market. *Asia-Pacific of Financial Studies* 40, 199-239.

Baker, S. R., N. Bloom and S. J. Davis (2016), "Measuring Economic Policy Uncertainty," *The Quarterly Journal of Economics*, Vol. 131, No. 4, 1593-1636.

Baker, M. and Stein, J., 2004. Market liquidity as a sentiment indicator. *Journal of Financial Market* 7, pp.1645-1680.

Baker, M. and Wurgler, J., 2006. Investor sentiment and the cross-section of stock returns. *Journal of Finance* 61(4), pp.1645-1680.

Baker, M. and Wurgler, J., 2007. Investor sentiment in the stock market. *Journal of Economic Perspectives* 21, pp.129-151.

Barber, B. M. and T. Odean., 2008. All that glitters: The effect of attention and news on the buying behavior of individual and institutional investors. *Review of Financial Studies* 2, pp.785-818.

Berger, D. and Turtle, H.J., 2015. Sentiment bubbles. *Journal of Financial Markets* 23, pp. 59-74.

Brown, G.W. and Cliff, M.T., 2004. Investor sentiment and the near-term stock market. *Journal of Empirical Finance* 11, pp.1-27.

Brown, G.W. and Cliff, M.T., 2005. Investor sentiment and asset valuation. *Journal of Business* 78, pp.405-440.

Cao, H.H., Coval, J.D. and Hirshleifer, D. (2002). Sidelined Investors, Trading-Generated News, and Security Returns. *Reviews of Financial Studies*, 15(2), pp. 615-648.

Chan, W. S., 2003. Stock price reaction to news and no-news: drift and reversal after headlines. *Journal of Financial Economics* 70, pp.223-260.

Chung, S. L., Hung, C. H. and Yeh, C. Y., 2012. When does investor sentiment predict stock returns? *Journal of Empirical Finance* 19, pp.217-240.

Da, Z., Engelberg, J. and Gao, P., 2015. The sum of all FEARS investor sentiment and asset prices. *Review of Financial Studies* 28(1), pp.1-32.

Demers, E. and Vega, C. Understanding The Role of Managerial Optimism and Uncertainty in the Price Formation Process: Evidence from the Textual Content of Earnings Announcements (March 24, 2014). Available at SSRN: https://ssrn.com/abstract=1152326 or http://dx.doi.org/10.2139/ssrn.1152326

Engelberg, J. E. and Parsons, C. A., 2011. The causal impact of media in financial markets. *Journal of Finance* 66, pp.67-97.

Engelberg, J. E., Reed, A.V. and Ringgenberg, M.C., 2012. Shorts sellers, news, and information processing. *Journal of Financial Economics* 105, pp.260-278.

Fang, L. and Peress, J., 2009. Media coverage and the cross-section of stock returns. *Journal of Finance* 64(5), pp.2023-2052.

García, D., 2013. Sentiment during recessions, *Journal of Finance* 68(3), pp. 1267-1300.

Griffin, J.M., Hirschey, N.H. and Kelly, P.J., 2011. How important is the financial media in global markets? *Review of Financial Studies* 24(12), pp.3941-3992.

Groß-Klußmann, A. and Hautsch, N., 2011. When machines read the news: Using automated text analytics to quantify high frequency news-implied market reactions. *Journal of Empirical Finance* 18, pp.321-340.

Hung, P. H., 2016. Investor Sentiment, Order Submission, and Investment Performance on the Taiwan Stock Exchange, *Pacific-Basin Finance Journal* 39,

pp.124-140.

Kumar, A. and Lee, C.M.C., 2006. Retail investor sentiment and return comovements. *Journal of Finance* 61(6), pp.2451-2486.

Lee, W.Y., Jiang, C.X. and Indro, D.C., 2002. Stock market volatility, excess returns and the role of investor sentiment. *Journal of Banking and Finance* 26, pp.2277-2299.

Lemmom, M. and Portniaguina, E., 2006. Consumer confidence and asset prices: some empirical evidence. *The Reviews of Financial Studies* 19(4), pp.1499-1529.

Lu, Y. C. and Wei, Y. C., 2014. Media impacts around earnings announcement dates with consideration of investor types and market scenarios, *Journal of Financial Studies*, 22(3), pp.73-104.

Nofsinger, J.R., 2001. The impact of public information on investors. *Journal of Banking and Finance* 25, pp.1339-1366.

Stambaugh, R. F., Yu, J. and Yuan, Y., 2012. The short of it: Investor sentiment and anomalies. *Journal of Financial Economics* 104, pp.288-302.

Tetlock, P. C., 2007. Giving content to investor sentiment: The role of media in the stock market. *Journal of Finance* 62, pp.1139-1168.

Tetlock, P. C., Saar-Tsechansky, M. and Macskassy, S., 2008. More than words: Quantifying language to measure firms' fundamentals. *Journal of Finance* 63(3), pp.1437-1467.

Vega, C., 2006. Stock price reaction to public and private information. *Journal of Financial Economics* 82, pp.103-133.

Wu, C.H. and Lin, C.J., 2017. The impact of media coverage on investor trading behavior and stock returns. *Pacific-Basin Finance Journal* 43, pp. 151-172.

Yuan, Y., 2015. Market-wide attention, trading, and stock returns. *Journal of Financial Economics* 116, pp.548-564.

Table 1 Summary statistics and correlation analysis of sentiment variables

Panel A Summary statistics

Variable	Mean	Median	Std	Max	Min	Skewness	Kurtosis
TURN	9.5621	8.3757	4.2056	26.1677	3.5348	1.3478	5.1517
ADVDEC	2.5127	1.0389	4.2388	25.2593	0.0142	3.5355	16.9662
ARMS	2.218	0.7418	5.3954	51.3212	0.0349	6.6365	56.0793
MARGIN	-0.0045	-0.0034	0.0378	0.0949	-0.1234	-0.275	3.7568
SHORT	0.038	0.022	0.3125	1.6864	-0.5633	1.6259	9.2022
SSR	-0.2997	0.1879	8.083	39.9877	-74.0662	-4.9287	59.2583
MANSI	2.561	2.6212	0.5671	3.5378	0.4512	-0.8911	4.2891

Panel B Correlation analysis

	TURN	*ADVDEC*	*ARMS*	*MARGIN*	*SHORT*	*SSR*	*MANSI*
TURN	1	0.3213***	0.2317***	0.4643***	0.047	0.1026	0.3143***
ADVDEC	0.3213***	1	0.851***	0.2197**	-0.0046	0.0481	0.2871***
ARMS	0.2317***	0.851***	1	0.1805**	-0.028	0.041	0.1732**
MARGIN	0.4643***	0.2197**	0.1805**	1	0.1871**	0.1872**	0.4893***
SHORT	0.047	-0.0046	-0.028	0.1871**	1	0.0515	-0.1017
SSR	0.1026	0.0481	0.041	0.1872**	0.0515	1	0.0639
MANSI	0.3143***	0.2871***	0.1732**	0.4893***	-0.1017	0.0639	1

Note: The table shows the summary statistics and correlation analysis of the sentiment proxies from January 2006 to December 2016. The sentiment proxies include the market turnover ratio (*TURN*), the ratio of advancing and declining issues (*ADVDE*C), *ARMS*, the ratio of the variation in margin loans (*MARGIN*), the ratio of the variation in stock loans (*SHORT*), and the short interest ratio (*SSR*); *MANSI* is the monthly aggregate news sentiment index. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

Table 2 The trading behaviors, investor types and news sentiment

Panel A Summary statistics

Variables	*Return*	*HL*	*Sigma*	*FTV*	*ITV*	*STV*	*SI*	*SIN*
Mean	0.4203	7.8695	17.3037	0.6577	-0.0405	0.019	0.0033	0.002
Median	0.8688	7.019	14.801	0.8063	-0.1061	0.0307	-0.1612	-0.1089
Std	5.5615	4.6032	8.4926	3.5275	0.4438	0.291	1.0063	0.8454
Min	-18.8307	2.5108	6.2376	-8.1651	-0.7339	-0.7582	-2.6345	-3.2537
Max	15.002	30.4918	47.8995	9.2797	2.6426	0.6424	3.643	2.5469
Skewness	-0.31	1.9807	1.3999	-0.1609	2.7309	-0.3987	1.0133	0.2909
Kurtosis	4.2535	8.3895	4.6155	2.7513	15.2599	2.9403	4.9523	4.9683

Panel B Correlation analysis

Variables	*Return*	*HL*	*Sigma*	*FTV*	*ITV*	*STV*	*SI*	*SIN*
Return	1	-0.2992***	-0.3982***	0.7044***	0.1255	0.3635***	0.3612***	0.3055***
HL	-0.2992***	1	0.8512***	-0.3767***	0.1551*	-0.0895	0.0915	-0.0253
Sigma	-0.3982***	0.8512***	1	-0.4994***	0.2223**	-0.1055	0.0817	-0.0622
FTV	0.7044***	-0.3767***	-0.4994***	1	-0.0832	0.2614***	0.2021**	0.1704*
ITV	0.1255	0.1551*	0.2223**	-0.0832	1	0.0315	0.2107**	0.136
STV	0.3635***	-0.0895	-0.1055	0.2614***	0.0315	1	-0.0839	-0.1753**
SI	0.3612***	0.0915	0.0817	0.2021**	0.2107**	-0.0839	1	0.9283***
SIN	0.3055***	-0.0253	-0.0622	0.1704*	0.136	-0.1753**	0.9283***	1
MANSI	0.5192***	-0.4619***	-0.5139***	0.5792***	-0.0734	-0.0524	0.3693***	0.4983***
SI_{t-1}	0.0212	0.1028	0.1536*	-0.0461	0.2129**	-0.2175**	0.3563***	0.415***
SIN_{t-1}	0.005	-0.0032	0.0395	-0.0329	0.1659*	-0.1924**	0.2726***	0.3919***
$MANSI_{t-1}$	-0.0028	-0.2979***	-0.3561***	0.0057	-0.0899	-0.3364***	0.2338***	0.5218***

Note: The table shows the summary statistics and correlation analysis from January 2006 to December 2016. The return is measured by the Taiwan Stock Exchange Capitalization Weighted Stock Index of the Taiwan Stock Exchange. HL is the ratio of the difference between the highest and lowest prices to the closing price on the previous trading day of the last month. Sigma is the annual standard deviation of the monthly return. FTV is the total trading value of foreign institutional investors, ITV is the total trading value of domestic institutional investors, and STV is the total trading value of dealers. SI is the sentiment index, which is constructed using principal components analysis with six sentiment proxies. SIN is the sentiment index with news, which is constructed using principal components analysis with six sentiment proxies, and the aggregate market news sentiment index (MANSI). MANSI is the monthly aggregate market news sentiment index. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

Table 3 Results of trading behavior and news sentiment

Panel A The contemporaneous analysis

	Return			*HL*			*Sigma*		
C	0.3995	0.4136	0.4403	2.7644***	2.8901***	3.648***	5.4938***	5.4495***	7.4309***
	(0.8555)	(0.8666)	(1.0305)	(4.2648)	(4.5538)	(5.9423)	(4.3776)	(4.33)	(6.0726)
SI_t	2.0553***			-0.3504			0.1511		
	(3.9066)			(1.0745)			(0.2752)		
SIN_t		2.0827***			-0.3348			0.0977	
		(3.0803)			(0.8908)			(0.1495)	
$MANSI_t$			3.0423***			-1.3841***			-2.5941***
			(6.5323)			(4.4427)			(4.7578)
Y_{t-1}	-0.0191	-0.0189	-0.0633	0.6512***	0.635***	0.5395***	0.6858***	0.6885***	0.5747***
	(0.2011)	(0.184)	(0.7588)	(9.1194)	(9.1648)	(7.9603)	(10.5501)	(10.5643)	(8.9591)
R^2	13.10%	9.37%	27.30%	40.41%	40.24%	48.06%	47.42%	47.40%	55.46%
$AdjR^2$	11.71%	7.92%	26.14%	39.46%	39.28%	47.23%	46.58%	46.56%	54.74%

Panel B The lead-lag analysis

	Return			*HL*			*Sigma*		
C	0.3484	0.3485	0.3257	2.9408***	2.9093***	2.9582***	5.5912***	5.371***	5.5756***
	(0.7049)	(0.7055)	(0.6612)	(4.6193)	(4.5712)	(4.235)	(4.4937)	(4.3072)	(3.9268)
SI_{t-1}	-0.2283			0.2018			0.7977		
	(0.4353)			(0.6354)			(1.4662)		
SIN_{t-1}		-0.3155			0.0668			0.8025	
		(0.5162)			(0.1771)			(1.2381)	
$MANSI_{t-1}$			-0.643			-0.0563			-0.102
			(1.124)			(0.1565)			(0.1595)
Y_{t-1}	0.1726*	0.1723*	0.2174**	0.628***	0.6323***	0.6262***	0.6797***	0.6926***	0.6812***
	(1.8239)	(1.8598)	(2.1174)	(9.0271)	(9.1043)	(7.9875)	(10.5477)	(10.7338)	(9.0341)
R^2	2.64%	2.69%	3.46%	40.05%	39.88%	39.87%	48.28%	48.03%	47.40%
$AdjR^2$	1.08%	1.14%	1.92%	39.09%	38.91%	38.91%	47.45%	47.20%	46.56%

Note: This table shows the results of regressions of trading behavior on the sentiment index and aggregate news sentiment index from January 2006 to December 2016. Panel A is the contemporaneous analysis, and Panel B is the lead-lag analysis. The dependent variables are the monthly return (*Retur*n), the ratio of the difference between the highest and the lowest prices to the closing price on previous trading day of last month (*HL*) and the annual standard deviation of monthly returns (*Sigma*). *SI* is the sentiment index, which is constructed using principal components analysis with six sentiment proxies. *SIN* is the sentiment index with news, which is constructed using principal components analysis with six sentiment proxies and the aggregate market news sentiment index (*MANSI*). *MANSI* is the monthly aggregate market news sentiment index. Figures in parentheses are t-statistics. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

Table 4 The relationship of trading behavior and news sentiment in expansion period

	Return			*HL*			*Sigma*		
C	-1.2461	-1.4784*	-0.7226	3.6361***	3.4198***	3.2683***	6.6638***	6.3741***	5.6363***
	(1.4539)	(1.6573)	(0.9085)	(4.5961)	(4.3664)	(4.3863)	(4.3334)	(4.2626)	(3.8825)
SI_{t-1}	-1.2939			0.6246			0.9357		
	(1.3098)			(0.9689)			(0.8441)		
SIN_{t-1}		-1.7507			0.1122			0.7797	
		(1.5888)			(0.1522)			(0.6181)	
$MANSI_{t-1}$			-0.2874			-0.493			-1.593*
			(0.4042)			(0.9349)			(1.8121)
Exp_{t-1}	2.4841**	2.7995**	14.9772***	-1.0855	-0.9216	-7.8484**	-1.6539	-1.7348	-20.566***
	(2.2666)	(2.463)	(2.7906)	(1.5234)	(1.2393)	(2.1423)	(1.3412)	(1.3571)	(3.3809)
$Exp*SI_{t-1}$	0.9707			-0.3064			0.3208		
	(0.8355)			(0.3997)			(0.2452)		
$Exp*SIN_{t-1}$		1.1941			0.3623			0.8865	
		(0.8786)			(0.3936)			(0.5662)	
$Exp*MANSI_{t-1}$			-4.6897**			2.6954*			7.5271***
			(2.3352)			(1.9471)			(3.2918)
Y_{t-1}	0.1431	0.1437	0.2376**	0.6241***	0.6235**	0.605***	0.6658***	0.6788***	0.6552***
	(1.522)	(1.5703)	(2.3995)	(8.8852)	(8.7576)	(7.4652)	(10.2159)	(10.3128)	(8.7557)
R^2	6.57%	7.32%	11.96%	41.40%	41.06%	42.52%	48.93%	48.86%	51.56%
Adj R^2	3.56%	4.33%	9.12%	39.51%	39.16%	40.66%	47.28%	47.21%	50.00%

Note: This table shows the results of regressions of trading behavior considering the market state from January 2006 to December 2016. The dependent variables are the monthly return (*Retur*n), the ratio of the difference between the highest and the lowest prices to the closing price on previous trading day of last month (*HL*) and the annual standard deviation of monthly returns (*Sigma*). *SI* is the sentiment index, which is constructed using principal components analysis with six sentiment proxies. *SIN* is the sentiment index with news, which is constructed using principal components analysis with six sentiment proxies and the aggregate market news sentiment index (*MANSI*). *MANSI* is the monthly aggregate market news sentiment index. Exp is a dummy variable, which equals one when the market state is during the expansion period. Figures in parentheses are t-statistics. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

Table 5 Future returns of decile portfolios by *MANSI* and firm characteristics

Panel A Equally weighted returns (*MANSI* $_{t-1}$)

		Deciles										Comparison
		1	2	3	4	5	6	7	8	9	10	10-1
MANSI $_{t-1}$	*TURN*											
High		1.6503	1.3721	1.2232	1.0454	1.1044	0.8589	0.7391	0.8539	0.6905	-0.0754	-1.7257
Low		1.2357	1.3195	1.6022	1.4942	1.6382	1.6614	1.6424	1.5155	1.2623	0.3936	-0.8421
Difference		0.4146	0.0525	-0.3789	-0.4488	-0.5338	-0.8026	-0.9033	-0.6616	-0.5719	-0.4689	-0.8835
	Sigma											
High		1.0616	0.9277	0.9648	1.1496	1.0671	0.9895	0.9629	0.6491	0.9041	0.7235	-0.3381
Low		1.015	1.3655	1.5533	1.4101	1.7126	1.3562	1.4274	1.2628	1.2992	1.319	0.304
Difference		0.0466	-0.4378	-0.5886	-0.2605	-0.6456	-0.3667	-0.4645	-0.6137	-0.3951	-0.5955	-0.6421
	HL											
High		0.9286	1.0339	0.7629	0.9301	0.982	0.7204	1.1113	0.9527	1.131	0.8428	-0.0858
Low		0.9942	1.2905	1.3286	1.6324	1.4785	1.2303	1.4165	1.2608	1.2245	1.8893	0.8951
Difference		-0.0656	-0.2567	-0.5656	-0.7022	-0.4965	-0.5099	-0.3052	-0.3081	-0.0935	-1.0465	-0.9809
	Size											
High		2.4878	1.0642	0.9785	1.1528	0.7665	0.7682	0.6856	0.6016	0.3676	0.5712	-1.9166
Low		1.9763	1.6648	1.6496	1.2256	1.497	1.3836	1.4747	1.2373	0.8986	0.7319	-1.2443
Difference		0.5115	-0.6006	-0.6711	-0.0728	-0.7305	-0.6155	-0.7891	-0.6357	-0.531	-0.1607	-0.6723
	PB ratio											
High		1.9694	1.5828	1.1642	0.7961	1.1437	0.6986	0.6944	0.504	0.4665	0.4577	-1.5117
Low		2.4311	1.8418	1.4174	1.5359	1.2653	1.5601	1.3333	0.8252	1.0066	0.5954	-1.8357
Difference		-0.4617	-0.2589	-0.2533	-0.7398	-0.1216	-0.8615	-0.6388	-0.3212	-0.5401	-0.1377	0.324
	PE ratio											
High		0.9116	1.3995	1.2753	1.1408	1.2262	0.7756	0.7578	0.609	0.4045	0.6067	-0.305
Low		1.8748	1.5757	1.5916	1.6391	1.2422	1.3669	1.2471	1.1228	1.2423	1.1256	-0.7492
Difference		-0.9632	-0.1762	-0.3163	-0.4983	-0.016	-0.5913	-0.4893	-0.5138	-0.8378	-0.519	0.4442
	Revenue%											
High		-0.192	-0.3032	0.1288	0.2803	0.2757	0.8706	1.3748	2.0008	2.2062	2.7369	2.9289
Low		-0.0749	0.0777	0.5659	0.8624	0.9157	1.3214	1.8082	2.1064	2.618	3.5505	3.6255
Difference		-0.1171	-0.3809	-0.4372	-0.5821	-0.64	-0.4509	-0.4334	-0.1057	-0.4118	-0.8137	-0.6965
	Age											
High		0.5308	0.8013	0.8698	1.0105	1.1672	1.1489	1.1332	0.9067	0.9588	0.9309	0.4001
Low		0.8944	1.2553	1.3079	1.3664	1.0318	1.4988	1.593	1.5371	1.5877	1.6446	0.7502
Difference		-0.3636	-0.4540	-0.4381	-0.3558	0.13539	-0.3499	-0.4598	-0.6305	-0.6288	-0.7138	-0.3502

(-continued) Table 5 Future returns of decile portfolios by *MANSI* and firm characteristics

Panel B Valued-weighted returns (*MANSI* $_{t-1}$)

	Deciles										Comparison
	1	2	3	4	5	6	7	8	9	10	10-1
MANSI $_{t-1}$	*TURN*										
High	0.9785	0.5136	0.9619	1.1121	0.7009	0.4974	0.0798	0.6414	0.6832	-0.1594	-1.1379
Low	0.6268	1.1067	0.6762	0.912	1.1034	1.006	0.614	0.9078	0.526	0.127	-0.4998
Difference	0.3517	-0.5931	0.2857	0.2001	-0.4024	-0.5087	-0.5342	-0.2664	0.1572	-0.2863	-0.6381
	Sigma										
High	1.3014	0.805	0.4195	1.0748	0.7763	0.6653	0.5122	0.1549	0.4501	0.296	-1.0054
Low	0.6753	0.6212	0.6467	0.4156	0.6559	1.1988	0.5246	1.0037	0.5775	1.1419	0.4666
Difference	0.626	0.1838	-0.2272	0.6592	0.1204	-0.5335	-0.0124	-0.8489	-0.1274	-0.846	-1.472
	HL										
High	1.0178	0.8103	0.809	0.6125	0.4621	0.3444	0.582	0.4005	0.5532	0.6944	-0.3234
Low	0.7964	0.6482	0.6819	0.6436	1.1378	0.2177	0.8225	0.8735	0.7379	1.68	0.8837
Difference	0.2214	0.1621	0.1271	-0.0311	-0.6757	0.1267	-0.2405	-0.4729	-0.1847	-0.9856	-1.207
	Size										
High	2.0374	1.057	0.9704	1.154	0.7581	0.7584	0.6458	0.5985	0.3689	0.6108	-1.4266
Low	1.765	1.6928	1.6715	1.2185	1.4885	1.3584	1.4652	1.2449	0.912	0.6003	-1.1647
Difference	0.2724	-0.6357	-0.701	-0.0645	-0.7304	-0.6	-0.8194	-0.6463	-0.5431	0.0105	-0.2619
	PB										
High	1.4746	1.0698	0.447	0.3983	0.7875	0.7986	0.9342	0.4378	0.3415	0.8771	-0.5974
Low	1.8705	1.2276	1.2754	1.1081	1.1124	1.4359	1.0159	0.44	0.65	0.5977	-1.2728
Difference	-0.396	-0.1578	-0.8283	-0.7098	-0.3249	-0.6373	-0.0816	-0.0021	-0.3085	0.2794	0.6754
	PE										
High	0.8187	1.2991	0.7715	1.3745	1.0653	0.5525	0.2593	0.4382	0.0615	0.1591	-0.6596
Low	1.5763	1.3537	1.1868	1.0374	0.3887	1.3493	0.717	0.6309	0.0562	0.1464	-1.4299
Difference	-0.7575	-0.0546	-0.4153	0.337	0.6766	-0.7968	-0.4577	-0.1928	0.0053	0.0128	0.7703
	Revenue%										
High	-0.8802	-0.4146	0.0746	-0.0407	0.2469	0.7011	1.5108	1.0935	1.1291	1.365	2.2452
Low	0.1826	-0.4842	0.6619	0.7706	0.6109	1.2627	1.1473	1.1451	1.071	1.6913	1.5087
Difference	-1.0628	0.0696	-0.5872	-0.8113	-0.364	-0.5616	0.3634	-0.0516	0.0582	-0.3263	0.7365
	Age										
High	-0.8802	-0.4146	0.0746	-0.0407	0.2469	0.7011	1.5108	1.0935	1.1291	1.365	2.2452
Low	0.1826	-0.4842	0.6619	0.7706	0.6109	1.2627	1.1473	1.1451	1.071	1.6913	1.5087
Difference	-1.0628	0.0696	-0.5872	-0.8113	-0.364	-0.5616	0.3634	-0.0516	0.0582	-0.3263	0.7365

Note: This table reports the monthly equally weighted and value-weighted future returns on the 10 portfolios for 'monthly aggregate news sentiment index' (*MANSI*) and firm characteristic variables from January 2006 to December 2016. *TURN* is the turnover ratio, *Sigma* is the annual standard deviation of monthly returns, *HL* is the high-low ratio between the highest and the lowest prices to the closing price on previous trading day of last month, *Size* is the total value of stock market, *PB* is the ratio of price to book value, *PE* is the price to earnings ratio, *Revenue%* is the growth ratio of monthly revenue, and *Age* is measured from the establishment date.

Table 6 Predictive regressions on equally weighted long and short portfolio returns

		Model (1)		Model (2)		Model (3)		Model (4)	
		Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.
Panel A: Trading Behavior									
$R_{x=Quintile5}$-$R_{x=Quintile1}$	*TURN*	0.2736	(1.0233)	0.2691	(1.006)	0.0776	(0.2717)	0.1847	(0.5627)
	Sigma	1.0605***	(3.3794)	1.0811***	(3.6476)	0.8354**	(2.4891)	0.059	(0.2064)
	HL	0.9919***	(2.6528)	1.0145***	(2.8444)	0.6421	(1.6205)	0.9029***	(2.8334)
$R_{x=Decile10}$-$R_{x=Decile1}$	*TURN*	0.642*	(1.8759)	0.584	(1.8582)	0.4657	(1.1639)	0.3984	0.7146*
	Sigma	1.5243***	(3.6243)	(3.8841)	(3.5096)	1.4315***	(3.1458)	0.4018	(1.0955)
	HL	1.6244***	(2.9931)	(3.2116)	(4.6446)	1.1901**	(2.057)	1.5214***	(3.5132)
Panel B: Firm size									
$R_{x=Quintile5}$-$R_{x=Quintile1}$	*Size*	-0.6313***	(2.7942)	-0.6371***	(2.8341)	-0.8525***	(3.5687)	-0.8761***	(3.6956)
$R_{x=Decile10}$-$R_{x=Decile1}$	*Size*	-0.7387***	(2.6907)	-0.7531***	(2.8369)	-0.8324***	(2.807)	-0.8833***	(3.0856)
Panel C: Profitability and growth opportunity									
$R_{x=Quintile5}$-$R_{x=Quintile1}$	*PB ratio*	-0.3147	(1.1403)	-0.3399	(1.3926)	-0.4927*	(1.6653)	-0.5824**	(2.2546)
	PE ratio	-0.2483	(1.0756)	-0.2515	(1.0883)	-0.3111	(1.2466)	-0.3234	(1.2928)
	Revenue%	-0.3671*	(1.8011)	-0.3828**	(2.0403)	-0.4185*	(1.8986)	-0.4735**	(2.3399)
$R_{x=Decile10}$-$R_{x=Decile1}$	*PB ratio*	-0.2723	(0.7474)	-0.3043	(0.9347)	-0.4	(1.0169)	-0.5126	(1.4661)
	PE ratio	-0.2984	(1.0491)	-0.3032	(1.0655)	-0.444	(1.4502)	-0.4627	(1.5105)
	Revenue%	-0.5366**	(2.004)	-0.5461**	(2.0656)	-0.5581*	(1.9243)	-0.591**	(2.0622)
Panel D: Other									
$R_{x=Quintile5}$-$R_{x=Quintile1}$	*Age*	-0.3832	(1.0799)	-0.3198	(1.1055)	-0.3716	(1.1639)	-0.415	(1.3259)
$R_{x=Decile10}$-$R_{x=Decile1}$	*Age*	-0.3181	(0.7613)	-0.4416	(1.317)	-0.5108	(1.3659)	-0.5718	(1.5776)

Note: The table reports the results of the predictive regressions on equally weighted long and short portfolio returns. *ANSI* is the monthly 'aggregate news sentiment index'; Model (1) refers to $MANSI_{t-1}$ with controls for *RMRF*, *SMB* and *HML*; Model (2) refers to $MANSI_{t-1}$ with controls for *RMRF*, *SMB*, *HML* and *MTM*; Model (3) refers to $MANSI_{t-1}$ with controls for SI_{t-1}, *RMRF*, *SMB* and *HML*; and Model (4) refers to $MANSI_{t-1}$ with controls for SI_{t-1}, *RMRF*, *SMB*, *HML* and *MTM*. The risk factors are: *SI*, the sentiment index, which is constructed using principal component analysis; *RMRF*, the market portfolio excess return minus the riskless return; *SMB*, the size premium factor; *HML*, the book-to-market premium factor, which is constructed to isolate the difference between high and low book-value to market-value portfolios; and MTM, the momentum factor, which is the moving average monthly return from month -12 to -2. *TURN* is the turnover ratio, *Sigma* is the annual standard deviation of monthly returns, *HL* is the high-low ratio between the highest and the lowest prices to the closing price on the previous trading day of last month, *Size* is the total value of the stock market, *PB* is the ratio of price to book value, *PE* is the price to earnings ratio, *Revenue%* is the growth ratio of monthly revenue, and *Age* is measured from the establishment date. Figures in parentheses are t-statistics. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

Table 7 Predictive regressions on value-weighted long and short portfolio returns

		Model (1)		Model (2)		Model (3)		Model (4)	
		Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.
Panel A: Trading Behavior									
$R_{x=Quintile5}$-$R_{x=Quintile1}$	*TURN*	0.6849	(1.5287)	0.6935	(1.5489)	0.3388	(0.7086)	0.3631	(0.7578)
	Sigma	1.2494***	(2.8649)	1.2625***	(2.9179)	1.1659**	(2.4702)	1.2096***	(2.5782)
	HL	0.8608*	(1.822)	0.8726*	(1.8547)	0.8166	(1.596)	0.8566*	(1.6785)
$R_{x=Decile10}$-$R_{x=Decile1}$	*TURN*	1.4824***	(2.8691)	1.4825***	(2.8571)	1.2526**	(2.2489)	1.2491**	(2.2303)
	Sigma	1.9993***	(3.2068)	2.0164***	(3.2536)	2.1237***	(3.1476)	2.1845***	(3.2554)
	HL	1.8412**	(2.5285)	1.8655***	(2.5897)	1.6395**	(2.0824)	1.72**	(2.2034)
Panel B: Firm size									
$R_{x=Quintile5}$-$R_{x=Quintile1}$	*Size*	-0.2558	(1.5332)	-0.2633	(1.6155)	-0.4194**	(2.378)	-0.4477***	(2.6157)
$R_{x=Decile10}$-$R_{x=Decile1}$	*Size*	-0.3951	(1.6418)	-0.4107*	(1.8043)	-0.5088**	(1.9627)	-0.5643**	(2.3114)
Panel C: Profitability and growth opportunity									
$R_{x=Quintile5}$-$R_{x=Quintile1}$	*PB ratio*	0.0518	(0.1834)	0.0223	(0.0934)	-0.1142	(0.3768)	-0.2185	(0.8673)
	PE ratio	-0.4178	(1.089)	-0.4213	(1.0947)	-0.5502	(1.3279)	-0.5642	(1.3562)
	Revenue%	-0.0951	(0.327)	-0.1185	(0.4468)	-0.1376	(0.437)	-0.2191	(0.764)
$R_{x=Decile10}$-$R_{x=Decile1}$	*PB ratio*	-0.0316	(0.0858)	-0.0691	(0.2204)	-0.2295	(0.5798)	-0.0766	-0.3621
	PE ratio	-0.1097	(0.2341)	-0.1126	(0.2395)	-0.3889	(0.7732)	-0.4033	(0.7982)
	Revenue%	0.2368	(0.6312)	0.2093	(0.6005)	0.3183	(0.7843)	0.2247	(0.5944)
Panel D: Other									
$R_{x=Quintile5}$-$R_{x=Quintile1}$	*Age*	-0.2087	(0.7075)	-0.2175	(0.7428)	-0.2864	(0.8977)	-0.3178	(1.0033)
$R_{x=Decile10}$-$R_{x=Decile1}$	*Age*	-0.3244	(0.9185)	-0.3395	(0.9818)	-0.3351	(0.876)	-0.3874	(1.0333)

Note: The table reports the results of the predictive regressions on value-weighted long and short portfolio returns. *ANSI* is the monthly 'aggregate news sentiment index'; Model (1) refers to $MANSI_{t-1}$ with controls for *RMRF*, *SMB* and *HML*; Model (2) refers to $MANSI_{t-1}$ with controls for *RMRF*, *SMB*, *HML* and *MTM*; Model (3) refers to $MANSI_{t-1}$ with controls for SI_{t-1}, *RMRF*, *SMB* and *HML*; and Model (4) refers to $MANSI_{t-1}$ with controls for SI_{t-1}, *RMRF*, *SMB*, *HML* and *MTM*. The risk factors are: *SI*, the sentiment index, which is constructed using principal component analysis; *RMRF*, the market portfolio excess return minus the riskless return; *SMB*, the size premium factor; *HML*, the book-to-market premium factor, which is constructed to isolate the difference between high and low book-value to market-value portfolios; and MTM, the momentum factor, which is the moving average monthly return from month -12 to -2. *TURN* is the turnover ratio, *Sigma* is the annual standard deviation of monthly returns, *HL* is the high-low ratio between the highest and the lowest prices to the closing price on the previous trading day of last month, *Size* is the total value of the stock market, *PB* is the ratio of price to book value, *PE* is the price to earnings ratio, *Revenue%* is the growth ratio of monthly revenue, and *Age* is measured from the establishment date. Figures in parentheses are t-statistics. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

Table 8 The institutional investors' trading behaviors and news sentiments

Panel A The contemporaneous analysis

	FTV				*ITV*				*STV*			
C	0.7006**	0.711**	0.7383***	0.7386***	-0.0028	-0.0005	-0.0052	-0.0035	0.0252	0.0247	0.0255	0.0257
	(2.22)	(2.2404)	(2.8012)	(2.7909)	(0.0947)	(0.0177)	(0.1646)	(0.1175)	(1.0214)	(0.9989)	(1.0403)	(1.0454)
SI_t	0.5013			0.0282	0.1417***			0.1465***	0.0185			0.0112
	(1.4377)			(0.0942)	(4.2694)			(4.2957)	(0.6676)			(0.3938)
SIN_t		0.4479				0.1625***				-0.0013		
		(1.0145)				(3.8447)				(0.0374)		
$MANSI_t$			2.1238***	2.1179***			0.0102	-0.0212			0.0338	0.0312
			(7.5376)	(7.3095)			(0.2973)	(0.6418)			(1.247)	(1.1194)
Y_{t-1}	-0.1371	-0.1543	-0.1125	-0.1122	0.5953***	0.6116***	0.6081***	0.5914***	0.1895**	0.1926**	0.2108**	0.2075**
	(1.1029)	(1.2335)	(1.0839)	(1.0757)	(8.9592)	(9.0971)	(8.5273)	(8.8435)	(2.0929)	(2.1239)	(2.3123)	(2.2587)
$Return_{t-1}$	0.1349	0.1477*	0.0127	0.0106	-0.0276***	-0.0294***	-0.0163***	-0.0265***	-0.0208***	-0.0191***	-0.0221***	-0.0228***
	(1.5944)	(1.7326)	(0.1844)	(0.145)	(4.6017)	(4.5508)	(2.6224)	(4.2101)	(3.9579)	(3.4005)	(4.2327)	(4.1118)
R^2	5.99%	5.21%	34.46%	34.46%	45.83%	44.49%	37.91%	46.01%	12.39%	12.08%	13.17%	13.28%
Adj R^2	3.72%	2.92%	32.87%	32.33%	44.52%	43.14%	36.41%	44.26%	10.28%	9.95%	11.07%	10.46%

Panel B The lead-lag analysis

	FTV				*ITV*				*STV*			
C	0.694**	0.6941**	0.6591**	0.6752**	-0.0059	-0.0055	-0.0039	-0.0054	0.0245	0.0247	0.0228	0.0228
	(2.201)	(2.1935)	(2.0618)	(2.1167)	(0.1897)	(0.177)	(0.1226)	(0.1723)	(0.9979)	(1.0019)	(0.9388)	(0.9359)
SI_{t-1}	-0.4955			-0.4517	0.0798**			0.0775**	-0.0249			-0.0162
	(1.5055)			(1.3137)	(2.3973)			(2.2373)	(0.9275)			(0.6011)
SIN_{t-1}		-0.4527				0.083**				-0.0202		
		(1.1769)				(2.1553)				(0.6291)		
$MANSI_{t-1}$			-0.3297	-0.1829			0.0317	0.0093			-0.06**	-0.057*
			(0.8547)	(0.4567)			(0.857)	(0.2452)			(2.0329)	(1.896)
Y_{t-1}	-0.1611	-0.156	-0.1047	-0.1375	0.5748***	0.5902***	0.6158***	0.5785***	0.1718*	0.1735*	0.1365	0.1258
	(1.293)	(1.2484)	(0.7851)	(1.0163)	(8.1249)	(8.406)	(8.5834)	(7.9732)	(1.8465)	(1.8183)	(1.4631)	(1.3205)
$Return_{t-1}$	0.2209***	0.2073**	0.1942**	0.2245***	-0.0204***	-0.0192***	-0.0186***	-0.0212***	-0.0172***	-0.018***	-0.0126**	-0.0116**
	(2.6803)	(2.546)	(2.4267)	(2.7031)	(3.4583)	(3.3018)	(2.7859)	(3.1752)	(3.3184)	(3.4811)	(2.2169)	(1.9624)
R^2	6.14%	5.48%	4.99%	6.30%	40.62%	40.11%	38.23%	40.65%	12.69%	12.36%	14.92%	15.16%
Adj R^2	3.87%	3.20%	2.69%	3.25%	39.18%	38.66%	36.74%	38.72%	10.57%	10.24%	12.86%	12.41%

Note: This table shows the results of regressions of institutional investors with considerable market states from January 2006 to December 2016. The dependent variables are the total trading value of foreign institutional investors (*FTV*), the total trading value of domestic institutional investors (*ITV*) and the total trading value of dealers (*STV*). Panel A is the contemporaneous analysis, and Panel B is the lead-lag analysis. *SI* is the sentiment index, which is constructed using principal components analysis with six sentiment proxies. *SIN* is the sentiment index with news, which is constructed using principal components analysis with six sentiment proxies and the aggregate market news sentiment index (*MANSI*). *MANSI* is the monthly aggregate market news sentiment index. Figures in parentheses are t-statistics. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

Table 9 The relationship between institutional investors' trading behaviors and news sentiments in the expansion period

	FTV			*ITV*			*STV*		
C	1.0793**	0.8515*	1.8886***	-0.0474	-0.0376	-0.0567	0.0666*	0.0627*	0.0838**
	(2.5135)	(1.9244)	(5.1027)	(1.1506)	(0.8838)	(1.1672)	(1.9423)	(1.7398)	(2.2665)
SI_{t-1}	0.646*			0.1257***			0.0336		
	(1.786)			(3.6247)			(1.1556)		
SIN_{t-1}		0.5173			0.1429***			0.0182	
		(1.1067)			(3.1583)			(0.4866)	
$MANSI_{t-1}$			2.545***			-0.011			0.0482*
			(9.0499)			(0.2988)			(1.7323)
Exp_{t-1}	-0.0633	0.8132	-0.7172	0.0942	0.0495	0.1755*	-0.105*	-0.0878	0.0361
	(0.081)	(0.9739)	(0.9576)	(1.2589)	(0.608)	(1.7783)	(1.6803)	(1.3042)	(0.4843)
$Exp*SI_{t-1}$	-0.9549*			0.0079			0.0131		
	(1.7671)			(0.152)			(0.2918)		
$Exp*SIN_{t-1}$		-1.5819**			0.0445			0.0082	
		(2.1247)			(0.6099)			(0.1345)	
$Exp*MANSI_{t-1}$			-2.2418***			-0.0987			-0.1931***
			(2.9834)			(1.0604)			(2.7858)
$Return_{t-1}$	0.1759**	0.1839**	-0.0019	-0.0289***	-0.03***	-0.0164**	-0.0197***	-0.0185***	-0.016***
	(2.0432)	(2.1381)	(0.0299)	(4.708)	(4.5902)	(2.4921)	(3.5833)	(3.1876)	(2.9907)
Y_{t-1}	-0.1594	-0.1833	0.102	0.5848***	0.6041***	0.6018***	0.1764*	0.1569	0.1777**
	(1.2874)	(1.472)	(0.9573)	(8.683)	(8.8401)	(8.3613)	(1.8626)	(1.6272)	(1.9963)
R^2	9.30%	8.68%	45.19%	46.88%	45.30%	39.50%	14.65%	13.62%	20.57%
Adj R^2	5.58%	4.93%	42.95%	44.71%	43.06%	37.02%	11.15%	10.08%	17.32%

Note: This table shows the results of regressions of institutional investors with considering market states from January 2006 to December 2016. The dependent variables are the total trading value of foreign institutional investors (*FTV*), the total trading value of domestic institutional investors (*ITV*) and the total trading value of dealers (*STV*), respectively. *SI* is the sentiment index, which is constructed using principal components analysis with six sentiment proxies. *SIN* is the sentiment index with news, which is constructed using principal components analysis with six sentiment proxies and the aggregate market news sentiment index (*MANSI*). *MANSI* is the monthly aggregate market news sentiment index. Exp is a dummy variable, which equals one when the market state is during the expansion period. Figures in parentheses are t-statistics. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.

Table 10 Predictive regressions portfolio returns by considering institutional investors

	Model (1)		Model (2)		Model (3)		Model (4)	
	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.	Coeff.	t-stat.
Panel A: Equally weighted returns (Rx=Quintile3-Rx=Quintile1)								
FTV	-0.2604**	(2.182)	-0.2599**	(2.1693)	-0.3384***	(2.6454)	-0.3379***	(2.6271)
ITV	0.1626	(0.788)	0.1412	(0.8075)	0.0421	(0.1901)	-0.0334	(0.1807)
STV	0.2436	(1.3545)	0.2374	(1.3361)	0.1496	(0.773)	0.1265	(0.6628)
Panel B: Value-weighted returns (Rx=Quintile3-Rx=Quintile1)								
FTV	-0.0371	(0.2452)	-0.036	(0.2368)	-0.0349	(0.213)	-0.0309	(0.1877)
ITV	0.2727	(0.9523)	0.248	(0.9639)	0.1427	(0.4623)	0.0555	(0.2017)
STV	0.1885	(0.6056)	0.1847	(0.5919)	0.2559	(0.7599)	0.2437	(0.7207)

Note: The table reports the results of the predictive regressions on equally and value-weighted long and short portfolio returns by institutional investors. *ANSI* is the monthly 'aggregate news sentiment index'; Model (1) refers to $MANSI_{t-1}$ with controls for *RMRF*, *SMB* and *HML*; Model (2) refers to $MANSI_t$ with controls for *RMRF*, *SMB*, *HML* and *MTM*; Model (3) refers to $MANSI_t$ with controls for *SI*, *RMRF*, *SMB* and *HML*; and Model (4) refers to $MANSI_t$ with controls for *SI*, *RMRF*, *SMB*, *HML* and *MTM*. The risk factors are: *SI*, the sentiment index, which is constructed using principal component analysis; *RMRF*, the market portfolio excess return minus the riskless return; *SMB*, the size premium factor; *HML*, the book-to-market premium factor, which is constructed to isolate the difference between high and low book-value to market-value portfolios; and *MTM*, the momentum factor, which is the moving average monthly return from month -12 to -2. *FTV* is the total trading value of foreign institutional investors, *ITV* is the total trading value of domestic institutional investors, and *STV* is the total trading value of dealers. Figures in parentheses are t-statistics. *, ** and *** denote significance at the 10%, 5% and 1% levels, respectively.