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Valuation uncertainty, market sentiment and the informativeness of institutional trades

Lisa (Zongfei) Yang[a], Jeremy Goh[b,c,*], Chiraphol Chiyachantana[b]

[a] Jake Jabs College of Business & Entrepreneurship, Montana State University, Bozeman, MT 59717, USA
[b] Lee Kong Chian School of Business, Singapore Management University, 50 Stamford Road, 178899 Singapore
[c] Cass Business School, City University of London, 106 Bunhill Row, London EC1Y 8TZ, United Kingdom

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ABSTRACT

Prior studies indicate that institutional investors are informed, in the sense that their trades predict price changes. In this study we show that return predictive ability of institutions arises (after controlling for size, book-to-market, and momentum) mainly from institutional sales of hard-to-value stocks during periods of positive market sentiment. These results support the notion that these stocks tend to be overvalued during periods of bullish market sentiment, and institutions contribute to market efficiency by identifying and trading on these overpriced stocks.

> "Security analysis would be used not to discover undervalued securities about to undergo a rapid price increase (an activity which competition should prevent from yielding appreciable returns over cost), but to avoid purchasing (or to sell if already owned) the occasional overvalued security which less informed investors have bid up".
>
> —- Miller (1977)

In the span of five decades, institutional ownership in the US equity market has increased from 8 to more than 68%, and institutional trades account for more than 96% of NYSE trading volume in the recent data.[1] This has resulted in increased research focusing on the role of institutions in facilitating market liquidity and affecting price formation.

There have been numerous studies providing evidence that institutions are informed. For example, Alexander et al. (2007) find that the stocks purchased by mutual funds earn significantly higher returns than the stocks they sell. Yan and Zhang (2009) report that the trades of institutional investors with short investment horizons exhibit higher levels of return predictive ability. Several studies, including in particular Chordia et al. (2011) and Boehmer and Kelley (2009) present evidence that increased institutional trading has improved market efficiency. Consistent with the reasoning that enhanced competition among institutions has reduced mispricing, Barras et al. (2010) show that the superior predictive ability of institutional trades for future price changes has declined since the 1990s.

In this paper, we assess whether institutional trades continue to display predictive ability, and, if so, whether the predictive ability varies with stock characteristics and across market states. We focus in particular on institutional sales during periods of positive market sentiment. This is because, as Miller (1977) has noted, uninformed investors may occasionally bid up share prices beyond fundamental value, and the overvaluation is most likely to occur for stocks with high *valuation uncertainty* (VU). Such overvaluation would present profit opportunities. Moreover, as Pontiff (2006) emphasizes, firm specific risk creates costs that impede arbitrage.[2] Such risk will be particularly pronounced for those securities with high VU, especially during periods when market

* Corresponding author at: Lee Kong Chian School of Business, Singapore Management University, 50 Stamford Road, 178899 Singapore. Fax: +65 6828 0427.
E-mail addresses: lisayang@montana.edu (L. Yang), jeremygoh@smu.edu.sg, gohchooyong@yahoo.com (J. Goh), chiraphol@smu.edu.sg (C. Chiyachantana).

[1] According to the Federal Reserve Board's Flow of Funds (2009) report and Boehmer and Kelley (2009).

[2] Several studies find evidence that firm specific idiosyncratic volatility makes it risky for risk-averse arbitrageur to take positions. For example, Mendenhall (2004) finds that magnitude of post-earnings-announcement drift is strongly pos-

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sentiments are overly optimistic. We therefore assess separately the predictive ability of institutional purchases versus sales of stocks with different levels of VU. In addition, we also distinguish whether the trades are completed during periods of high versus low market sentiment.

Our analysis is also related to the existing literature on valuation uncertainty and market sentiment. Baker and Wurgler (2006) show that the prices of high VU stocks are bid up during periods of optimistic market sentiment, resulting in lower future stock returns. Stambaugh et al. (2012) combine market sentiment with Miller (1977)'s short sale argument and show that the return on the short leg of several long-short strategies is lower during high sentiment periods.

In light of these findings, we hypothesize that well-informed institutional investors should be able to profit from selling high VU stocks during periods of high investor sentiment. In other words, we assess whether institutional traders take advantage of the aforementioned overvaluation.

To test this hypothesis, we obtain institutional trading data from the CDA/Spectrum quarterly institutional holdings database (13F). The 13F dataset contains the universe of all large institutions with greater than $100 million of securities under management.[3] We consider eight VU proxies used in the related literature: firm age (inverse), stock return volatility, idiosyncratic risk, turnover, cash flow volatility, firm size, book-to-market (inverse), and analyst forecast dispersion (Baker and Wurgler (2006), Zhang (2006a,b), and Kumar (2009)). We also derive the first principal component (FCP) of all the eight VU proxies as a combined VU measure. We categorize a trading portfolio formation quarter as a positive or negative sentiment quarter based on the composite investor sentiment index developed by Baker and Wurgler (2006). We then track the performance of the stocks that institutions intensively buy or sell during each quarter, and report subsequent stock returns adjusted by the Daniel et al. (1997) characteristics. We report abnormal returns for stocks sorted by the levels of VU, and during high versus low sentiment periods, respectively.[4]

Largely consistent with our main hypothesis, our results indicate that the predictive ability of institutional trades is mainly found in stocks with high VU and more so during periods of positive market-wide investor sentiment. Specifically, high VU stocks that institutions intensively sell significantly underperform stocks with similar firm sizes, book-to-market values, and past returns. In contrast, there are no consistently significant positive abnormal returns following institutional buys. We further find that the predictive ability is usually confined to institutional sales of high VU stocks during periods of high market sentiment. In contrast, there is little consistent predictive ability in institutional sales of high VU stock during low sentiment periods. This finding is consistent with the notion that market sentiment is the key driver of the overvaluation of high VU stocks. Interestingly, institutional sales in the high VU stocks during high sentiment periods predict significantly negative subsequent quarter's earnings surprise. We do not observe this for sales of low VU stocks or for sales completed during low sentiment periods. These results indicate that it is possible that institutions' informational advantage may be due to their ability to forecast earnings-related fundamentals.

In light of the evidence reported by Barras et al. (2010) that institutional trading performance declines since the mid-1990s, we partition our sample into pre-1996 and post-1996 periods to examine whether our main findings remain robust post mid-1990s. We find equally strong predictive power of institutional trades for both subsamples. In the post-1996 sample, we find that institutional selling in high VU stocks during optimistic market sentiment periods continues to predict statistically significant negative future returns.

This paper extends and refines the literature on the informational content of institutional trades. Our paper is the first to show evidence that institutional trades' significant predictive power is largely confined to sell trades. This evidence is consistent with the reasoning of Miller (1977) that potentially successful security analysis should be derived from selling or avoiding buying overvalued stocks, especially for stocks with high VU. Further, by documenting that the predictive ability of institutions usually comes from the trading of high VU stocks during periods of optimistic market sentiment, our results support and extends the findings of Baker and Wurgler (2006).[5]

In our opinion, this study is most closely related to Stambaugh et al. (2012), who argue that impediments to short selling are the major obstacle to eliminating overpricing in the presence of market-wide sentiment. They examine a broad set of well-documented anomalies relative to the Fama and French three-factor model. And they document that adjusted profits from a long-short strategy are confined to months following high investor sentiment periods, and that the profit from exploiting the anomalies are attributable to the short-leg portfolio. A key difference between our study and theirs is that we focus on institutional trades. Specifically, we focus on assessing whether institutional investors are able to exploit and correct the overpricing. To the extent that institutional investors are dominant players in today's stock market, our results on the informativeness of institutional investors' trades will also shed light on the stock market efficiency. In this regard, our paper compliments that of Stambaugh et al. (2012).

The remainder of the paper is structured as follows. Section 1 develops the hypothesis; Section 2 describes the data and variables constructed. In Section 3 we present our empirical findings, and Section 4, robustness checks. Section 5 concludes the paper.

1. Related literature and hypothesis development

Existing research findings on the informativeness of institutional trades are mixed. Proponents of efficient markets argue that given the fierce competitiveness of institutions in the equity market, any mispricing will be arbitraged away instantaneously. Studies supporting this notion include Gompers and Metrick (2001), Barras et al. (2010), and Lewellen (2011).

However, there are numerous studies that find evidence suggesting that market may not be efficient, as there are occasionally mispriced stocks in the market. One particular explanation for mispricing is by Miller (1977), who proposes that if pessimists face binding short-sales constraints, then the price of an asset will reflect the valuation of optimists and as a result, he predicts that stocks with higher uncertainty will tend to be overpriced. Empirical evidence supporting Miller's (1977) assertions include Chen et al. (2002), Diether et al. (2002), and Zhang (2006a,b). These studies documented empirical evidence suggesting that young, volatile, stocks with higher analyst dispersion, and other "valuation uncertain" (VU) stocks are subjected to overvaluation.[6]

itively related to the idiosyncratic risk. Mashruwala et al. (2006) find accrual anomaly is concentrated in firms with high idiosyncratic stock return volatility.

[3] Using quarterly institutional holding data from 13F may underestimate institutional investors' stock selection skills and therefore will bias against the tests of our hypothesis.

[4] For the sake of brevity, we report results for firm age (inverse), stock return volatility, analyst forecast dispersion and the first principal component in the main tables and the rest of the results are available in the online appendix.

[5] Our finding is also consistent with Yan and Zhang (2009), and Schultz (2010), who suggest that profitable trading opportunities are more likely to arise for small and growth (which are highly uncertain) stocks in general.

[6] Valuation uncertainty refers to information *sparsity* or *ambiguity*. The concept of valuation uncertainty dates to the revolutionary work by Knight (1921). Uncertainty is distinguished from risk in that risk reflects randomness with known probability while uncertainty is randomness with unknown probabilities.

In the next two sections, we will review the literature on the effect of VU and market sentiment on stock returns. We will then use implications from these two strands of research to develop our main hypothesis.

1.1. Valuation uncertainty (VU) and stock returns

The concept of VU originates from Miller (1977), who argues that when uncertainty is high, disagreement among investors regarding stock value will widen. Combining this uncertainty with binding short-sale constraints will keep pessimistic opinions from being reflected in price, and prevent informed traders from arbitraging it away instantaneously. Hence, the combination of uncertainty and binding short-sale constraints may lead to overpricing.

It is further argued that overpricing, or mispricing in general, is a result of an uninformed demand shock caused by sentiment investors and the informed arbitrage against these investors can be costly and risky.[7] Sentiment investors are presumed to be "overconfident" as they tend to overweight their private information and underweight public information when updating beliefs about stock values. [8] If the market contains both sentiment and informed investors, then one can expect divergence of opinions about security value. Under greater uncertainty, the disagreement is more pronounced because investors' private valuations are more diffused and feedback on the quality of their private signal is more difficult to obtain (Daniel et al. (1998, 2001), Hirshleifer (2001), and Kumar (2009)). Further, such highly uncertain stocks also tend to be difficult to arbitrage, due to elevated information risk and cost associated with trading against mispricing (Baker and Wurgler (2006), Shleifer and Vishny (1997), and Pontiff (2006)). Consequently, highly uncertain stocks will earn lower subsequent returns as the uncertainty is resolved and negative valuations are eventually priced (Chen et al. (2002)). [9]

1.2. Market sentiment and stock returns

Baker and Wurgler (2006) add another dimension to this hypothesis by proposing that market sentiment plays an important role.[10] They find that the overpricing of highly uncertain stocks is particularly prominent during episodes of high market sentiment. Specifically, when beginning period of sentiment is high, highly uncertain stocks will earn significantly lower subsequent returns. Baker and Wurgler's reasoning is as follows. Since mispricing is the result of both a demand shock by uninformed investors and limits of arbitrage, uninformed investors exhibit increased systematic optimism and speculative demand during periods of optimistic sentiment. Further, with binding short-sales constraint, informed arbitrage against these investors become riskier and more costly. Indeed, they document that highly uncertain stocks traded during periods when investors are optimistic earn lower subsequent returns. In a recent study, Stambaugh et al. (2012) examine a broad set of well documented anomalies relative to the Fama and French three-factor model and find results that are consistent with Baker and Wurgler (2006).

1.3. Hypothesis development – market sentiment and institutional trades

Empirical evidence reported by Zhang (2006a,b) and Barker and Wurgler (2006) suggest that highly uncertain stocks are subject to overvaluation during periods of high market sentiment. Their findings have both cross sectional and inter-temporal implications for informed trading strategies by institutional investors. As Miller (1977) pointed out, any profit from skilled analysis should be derived from *selling* the overvalued securities with high VU. This is due to the fact that less informed investors have bid the prices significantly higher than their fundamental values.

Given these findings, we hypothesize that any distinctive informational advantages of institutional investors, either due to their access to more precise information or to their expertise in interpreting public information, will be manifested in their ability to identify and sell overvalued stocks, especially during high sentiment periods. As such, high VU stocks that institutions intensively sell during periods of high market optimism are expected to earn significantly negative subsequent returns.[11]

2. Data, methodology, and variables construction

Our sample consists of common stocks (share code equals 10 or 11) listed on the NYSE, AMEX and NASDAQ (exchange code equals 1, 2, or 3). We form the institutional trading portfolios during the period from the second quarter of 1981 to the fourth quarter of 2010. We are restricted to the 1981 through 2010 sample period due to the availability of the market sentiment index developed by Baker and Wurgler (2006). We then track the subsequent returns till the fourth quarter of 2013. We also obtain analyst forecast data to construct one of our valuation uncertainty proxies from Institutional Brokers' Estimate System (I/B/E/S), spanning the period from year 1984 to 2010.

We obtain quarterly institutional holdings for all common stocks from the CDA/Spectrum Institutional (13F) database.[12] We obtain monthly stock returns from the Centre for Research in Security Prices (CRSP) monthly tapes, and daily returns and trading volume from daily tapes, respectively. We require at least 12 months of data since the first appearance of a stock's return in CRSP to exclude firms in the stage of initial IPO. In line with previous studies, stocks with a price less than $5 are excluded from the sample Zhang (2006a,b). After implementing the deletion criteria, the remaining sample has a minimum of 2397 firms and a maximum of 5036 firms with an average of 3606 firms per quarter in our sample.

We obtain book value of equity and quarterly earnings announcement data from Compustat. The Daniel et al. (1997) benchmark returns and portfolio assignments are obtained from Professor Wermers' data library.[13] DGTW abnormal returns control for firms' size, book-to-market, and past performance. We use the index of market sentiment developed by Baker and Wurgler (2006) to derive our quarterly sentiment measure.[14]

[7] For detailed discussion, see De Long et al. (1990), Shleifer and Vishny (1997), Barberis and Thaler (2003, p. 1056), and Baker and Wurgler (2006).

[8] The "overconfidence" bias is argued in Odean (1998) to explain excess trading activities, in Hong and Stein (2003) and Scheinkman, and Xiong (2003) to explain investors' disagreement and excess trading volume, in Daniel et al. (1998) to theorize market underreaction and overreaction.

[9] Extant empirical studies have largely confirmed Miller's (1977) hypothesis by documenting negative relationship between binding short sale constraints, divergence of opinion, and subsequent stock returns, such as Desai et al. (2002), Diether et al. (2002), Danielsen and Sorescu (2001), Boehme et al. (2006), Zhang (2006), and Jiang et al. (2005).

[10] Sentiment, broadly defined, refers to whether an individual feels excessively optimistic or pessimistic about a situation: a bullish (bearish) investor overestimates (underestimates) asset value (Baker and Wurgler (2006) and Antoniou et al. (2010)).

[11] We do not expect institutional buys in highly uncertain stocks will be associated with significant positive abnormal returns. If there is any mispricing or undervaluation, it will be arbitraged away instantaneously due to fierce competition among these informed investors.

[12] All investment managers with discretion over securities worth $100 million or more are required to report all equity positions greater than 10,000 shares or $200,000 to the SEC at the end of each quarter.

[13] We wish to thank Professor Russ Wermers for making the data available at http://www.smith.umd.edu/faculty/rwermers/ftpsite/Dgtw/coverpage.htm.

[14] We wish to thank Professors Malcolm Baker and Jeffrey Wurgler for making the index available to researchers at http://pages.stern.nyu.edu/~jwurgler/.

2.1. Institutional trading portfolios

We follow the Nofsinger and Sias's (1999) methodology to construct ownership-stratified institutional trading portfolios. This approach enables the calculation of changes in institutional ownership while controlling for initial ownership at the beginning of each quarter. Specifically, at the beginning of each quarter, all firms are first sorted into 5 quintiles based on institutional ownership, which is defined as the ratio of the sum of shares held by total institutional investors at the end of prior quarter to the total number of shares outstanding. Firms within each initial institutional-ownership-sorted portfolio are then further sorted into 5 quintiles based on the change in institutional ownership over the quarter, resulting in 25 portfolios.

Firms in the quintile of stocks experiencing the largest increase (decrease) in institutional ownership within each initial ownership quintile are then re-aggregated across the initial ownership-sorted quintiles to form an Intense Buy (Intense Sell) portfolio. Our sample period starts from the first quarter of 1981 and ends in the fourth quarter of 2010. Since institutional trading is calculated as the change in institutional ownership from the prior quarter to the current quarter, the first eligible observation for trading is from the second quarter of 1981. We examine the subsequent returns for the three-month, six-month, one-year and three-year holding period. As a result, even though our portfolio formation period ends in the fourth quarter of 2010, our evaluation of the holding period returns ends in the fourth quarter of 2013.

2.2. Proxies for valuation uncertainty (VU)

Past empirical research papers on VU include studies by Zhang (2006a,b), Jiang et al. (2005) and Kumar (2009). Collectively, these papers have discussed comprehensively the rationale behind the adoption of various VU proxies. We adopt eight commonly used proxies for VU in the analysis. These eight proxies are:

(1) *1/firm age*. Firms with a long history tend to have more information available to the market (Barry and Brown (1985) and Zhang (2006a,b), and Jiang et al. (2005)). Therefore, younger firms' valuation tends to be highly uncertain as compared to older ones. Firm age is measured as the number of months since the first appearance of a stock's return in CRSP. We take the inverse of the firm age in our empirical analysis, so that a higher value represents higher uncertainty.

(2) *Return volatility*. Zhang (2006a,b) and Jiang et al. (2005) argue that stock volatility captures information signal variation of a firm's fundamental value. Hence, it is reasonable to use return volatility as a viable VU measure. We follow Zhang (2006a,b) and calculate return volatility as the standard deviation of weekly returns over the year, ending at the beginning of portfolio formation quarter.

(3) *Analyst dispersion.* Dispersion in analyst earnings forecasts is a widely used proxy for the uncertainty regarding future earnings. Analyst dispersion captures the degree of consensus among analysts and market participants (e.g., Barron et al. (1998), Barron and Stuerke (1998), Diether et al. (2002), Imhoff and Lobo (1992), Lang and Lundholm (1996), and Zhang (2006a,b)). Similar to these studies, we adopt analyst forecast dispersion, which is the standard deviation of the individual analyst forecasts of the firm's quarterly earnings prior to the portfolio formation. However, using analyst dispersion comes with a cost as it will restrict our sample to firms with analyst coverage which tends to be larger firms.

(4) *Idiosyncratic risk*. Stocks with high idiosyncratic risk have been argued to have higher levels of VU and hence, harder to value (Baker and Wurgler (2006), Kumar (2009), and Hirshleifer (2001)). Idiosyncratic risk is defined as the average monthly idiosyncratic volatility during the prior quarter before portfolio formation. Following Fu (2009) and Chua et al. (2010), we define monthly idiosyncratic volatility as the product of (a) the standard deviation of the regression residuals of excess daily returns on the daily Fama–French three factors (FF3), and (b) the square root of the number of observations in the month.

(5) *Stock turnover*. As postulated by Hong and Stein (2006), greater disagreement among investors may spur larger trading volume. Hence, a higher level of stock turnover may reflect a wider dispersion of opinion among investors, which is more prominent in stocks with high VU (Jiang et al. (2005)). Stock turnover is calculated as the quarterly average of the daily turnover of the stock prior to the portfolio formation quarter. To address the issue of inflated trading volumes on NASDAQ, we use the exchange-adjusted turnover in our calculation, which is defined as a stock's turnover minus the average turnover of all stocks listed on the same exchange (either NYSE/AMEX or NASDAQ).

(6) *Cash flow volatility*. Zhang (2006a,b) argues that cash flow measure is indirectly calculated from financial statements and it is more likely to capture the underlying volatility. Therefore, following Zhang (2006a,b), we measure cash flow volatility as the standard deviation of cash flow from operations in the past 5 years (with a minimum of 3 years). Cash flow from operations is earnings before extraordinary items minus total accruals, scaled by average total assets, where total accruals are equal to changes in current assets minus changes in cash, changes in current liabilities and depreciation expense plus changes in short-term debt.

(7) *1/market capitalization (1/size).* We consider size as an alternative proxy for uncertainty, as larger firms tend to have lower valuation uncertainty. We divide the sample into three groups corresponding to the tertiles of the outstanding equity value at the end of the prior quarter for all NYSE stocks. Zhang (2006a,b) noted that though firm size can be a useful measure of VU, it is likely to capture other confounding effects which could potentially bias any inferences about VU.

(8) *1/book-to-market.* Book-to-market ratio is highly likely to reflect VU as firms with lower book-to-market tend to be growth firms, which are, in general, harder to value. Book-to-market is calculated as book value for the fiscal year, divided by market capitalization during that fiscal year. However, similar to market capitalization (Size), book-to-market is likely to capture other confounding effects which could potentially bias any inferences about VU. For example, some firms with high book-to-market are in financially distress and these firms are most likely associated with higher VU.

In addition to the eight VU proxies, we also use a combined VU measure based on the first principal component (FPC) of all eight VU proxies. Each quarter, we perform FPC for all of the eight VU variables to extract the common variation among the variables. Specifically, we derive the FPC of 1/firm age, return volatility, turnover, idiosyncratic volatility, cash flow volatility, 1/size, 1/book-to-market, and analyst dispersion and use FPC as a new proxy for VU.[15]

[15] We also considered using analyst coverage as a proxy but given that the correlation between analyst coverage and firm size is very high (Pearson correlation is 0.39 and Spearman correlation is 0.71), we decided not to report results on analyst coverage.

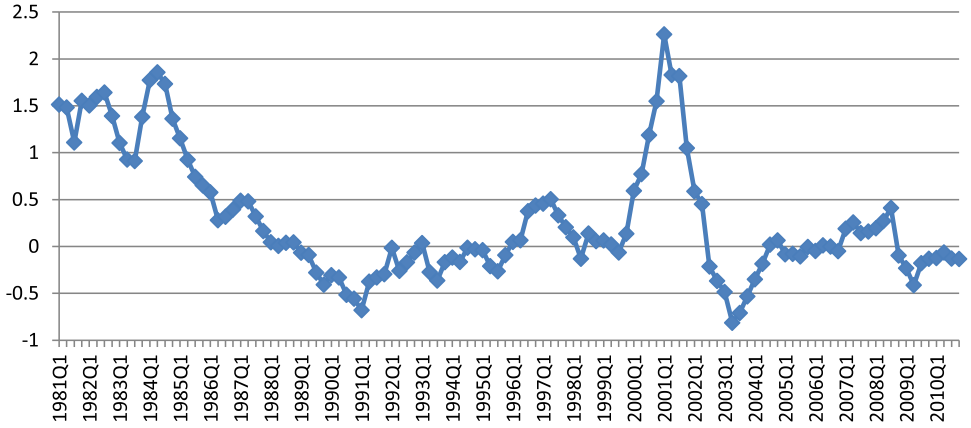

Fig. 1. Market sentiment.
Quarterly market sentiment index during the portfolio formation quarter is constructed by averaging the three months the monthly composite index of market sentiment developed by Baker and Wurgler (2006).

For the sake of brevity and readability, we report in the main article the results for the first three VU proxies: 1/firm age, volatility, and analyst dispersion, and the FPC of the eight VU proxies. We report results for the other VU proxies in the online appendix.

2.3. Market sentiment measure

We rely on the monthly composite index of market sentiment developed by Baker and Wurgler (2006) as our sentiment measure. The index is based on the first principal component of six variables associated with market sentiment level. The six variables are share turnover, IPO volume, IPO first-day returns, equity share in new issues, the closed-end fund discount, and the dividend premium. Variables positively associated with sentiment levels include share turnover, IPO volume, IPO first-day returns, and the equity share in new issues, and those negatively associated are the closed-end fund discount and the dividend premium.

Since our trading portfolios are formed at the end of each quarter, we average the monthly sentiment index during the portfolio formation quarter and treat it as our measure of market sentiment. We then dichotomize the sample period as positive versus negative sentiment periods (quarters). Depiction for our quarterly average of the monthly Baker–Wurgler sentiment index is presented in Fig. 1.

2.4. Summary statistics

Table 1 reports the summary statistics of our sample. Panel A presents descriptive statistics for VU variables and major firm characteristics. The average market capitalization is $1.82 billion and the book-to-market is 0.66, which are comparable to previous studies on valuation uncertainty (Zhang (2006a,b)). All VU proxies have sufficient cross-sectional variation. The firm age ranges from 12 months (our minimum requirement) to 1019 months (85 years), with an average age of 211 months and a median of 154 months. The average return volatility is 10.15% and institutional ownership is 40.15%. The institutional ownership is higher than those reported in earlier studies, which could be due to the fact that institutional ownership increases dramatically over time. The idiosyncratic volatility is slightly lower than previous studies (Fu (2009)). This is to be expected as the firms in this study are relatively larger, as in Zhang (2006a,b).

Panel B presents the correlation matrix for VU variables (Pearson correlations are shown above the diagonal with the Spearman correlations below). As expected, VU measures are largely positively correlated. Volatility, idiosyncratic risk, turnover, analyst dispersion, and cash flow volatility are positively correlated and they are negatively correlated with firm age, size and book-to-market. The correlations among VU variables are moderate, which suggests that each of these variables may capture some different aspects of valuation uncertainty. The Pearson correlation coefficient on institutional ownership is positively correlated with firm age, size and turnover but negatively correlated to idiosyncratic risk, suggesting that institutions tend to hold stocks with a longer history, larger in size, and higher liquidity, and that they avoid holding stocks with greater firm specific risks.

Panel C presents the average institutional ownership and the average number of stocks held by institutions for the VU-based tertile sorts. Notably, institutional ownership is higher for lower VU stocks, for example, firms with longer history, firms with lower idiosyncratic risk and lower cash flow volatility. However, we observe larger institutional ownership for higher VU stocks using proxies such as turnover and 1/book-to-market.

3. Empirical results

3.1. Overall return predictive ability of institutions

We begin by presenting the general return predictive ability of institutions. Table 2 reports the buy-and-hold returns on institutional trading portfolios in the first three, six, and twelve months after portfolio formation. We report the raw returns as well as the DGTW-adjusted returns on the portfolios of stocks with intense institutional buying (Intense Buy) and intense institutional selling (Intense Sell). We also report the difference in returns between the Intense Buy and Intense Sell portfolios (Intense Buy-Sell).

The DGTW-adjusted returns allow us to control for the size, book-to-market, and momentum effect, and by doing so, allows for inferences on the abnormal trading performance of institutions. We compute the returns on each portfolio over a given horizon as the time-series average of the cross sectional mean returns. The reported t-statistics are based on Newey and West (1987) standard errors to account for serial correlation.

Results from Table 2 suggest that there is only weak evidence of predictive ability of institutional trading in general, which is consistent with prior studies that used the same institutional data (Gompers and Metrick (2001), Yan and Zhang (2009)). The raw portfolio return between the Intense Buy and Intense Sell portfolios are 0.43%, 0.93%, and 1.01% for the three-, six-, and twelve-month holding periods, respectively and statistically significant for the three- and six-month holding periods. The magnitude of the portfolio returns are reduced after controlling for the DGTW benchmark. However, statistical inference for DGTW-adjusted

Table 1
Descriptive statistics.
Panel A reports the summary statistics for the key variables. Size is the market capitalization at the end of each quarter. Book-to-market is calculated as book value for the fiscal year ending before the most recent June 30, divided by market capitalization of December 31 during that fiscal year. Institutional ownership is defined as the ratio of the sum of shares held by institutional investors at the end of a given quarter to the total number of shares outstanding. Firm age is the number of months since the firm appears in CRSP. Return volatility is the standard deviation of weekly returns over the year ending at the beginning of the portfolio formation quarter, where weekly return is measured from Thursday to Wednesday. Idiosyncratic volatility is the quarterly average of idiosyncratic volatility, calculated as the product of (a) the standard deviation of the regression residuals of excess daily returns on the daily Fama–French three factors (FF3), and (b) the square root of the number of observations in the month. Daily turnover is calculated as the quarterly average of the daily turnover of the stock during the trading quarter (NASDAQ adjusted). Cash flow volatility is measured as the standard deviation of cash flow from operations in the past 5 years (with a minimum of 3 years). Analyst dispersion is the standard deviation of analyst forecasts of the firm's EPS during the trading quarter. Panel B presents the pair-wise correlations between key variables, Pearson Correlation coefficients are shown above the diagonal, while Spearman correlation coefficients are shown below the diagonal. Panel C presents the average institutional ownership and the average number of institutions holding the stocks in each tertile based on the level of VU measure at the end of the quarter prior to portfolio formation.

Panel A: summary statistics

	Stock-quarters	Mean	Std. dev.	Min	Q1	Median	Q3	Max
Size ($MM)	356,430	1816.70	5346.53	8.92	75.3000	253.34	999.75	39613.72
Book-to-market – BM	353,005	0.66	0.50	0.04	0.32	0.55	0.85	2.97
Institutional ownership – IO (%)	356,430	40.15	26.01	0.59	17.47	37.61	60.73	94.87
Firm age (Months)	356,430	211.40	184.32	12.00	80.01	154.98	277.90	1019.00
Return volatility (%)	356,417	10.15	5.50	2.56	6.14	8.86	12.77	30.18
Idiosyncratic volatility (%)	356,426	6.05	3.05	1.75	3.82	5.42	7.61	17.85
Daily turnover (%)	352,424	0.50	0.59	0.01	0.13	0.29	0.62	3.29
Cash flow volatility (%)	326,934	7.29	7.01	0.67	3.08	5.20	8.89	43.74
Analyst dispersion (%)	158,201	3.90	7.33	0.00	1.00	2.00	4.00	54.00

Panel B: correlation

Variable	IO	Firm age	Volatility	Idiosyncratic	Turnover	Cash flow volatility	Size	BM	Dispersion
IO	1	0.17	−0.02	−0.17	0.28	−0.01	0.14	−0.13	−0.01
Firm age	0.24	1	−0.04	−0.23	−0.06	−0.01	0.09	0.06	−0.01
Volatility	0.00	−0.27	1	0.23	0.10	0.01	−0.02	0.00	0.00
Idiosyncratic	−0.17	−0.35	0.73	1	0.25	0.03	−0.11	0.00	0.01
Turnover	0.54	−0.08	0.42	0.24	1	0.01	0.02	−0.11	0.00
Cash flow volatility	−0.10	−0.20	0.36	0.37	0.17	1	−0.01	−0.01	0.00
Size	0.68	0.33	−0.13	−0.34	0.40	−0.27	1	−0.07	0.00
BM	−0.17	0.14	−0.23	−0.11	−0.35	−0.14	−0.32	1	0.00
Dispersion	0.04	0.16	−0.01	−0.02	0.08	0.01	0.08	0.25	1

Panel C: institutional ownership and number of institutions holding

	High VU		Mid VU		Low VU	
	Ownership (%)	No. held	Ownership (%)	No. held	Ownership (%)	No. held
1/Age	32.71	45.79	36.48	59.73	44.38	131.10
Volatility	35.77	57.66	40.76	72.71	36.98	105.34
Idiosyncratic	30.71	38.95	40.57	69.99	42.27	126.92
Turnover	50.17	106.46	42.40	105.83	22.11	26.74
Cash flow volatility	36.83	59.58	42.70	88.34	42.77	122.16
1/size	29.14	27.43	50.56	94.16	57.42	286.87
1/BM	43.12	112.01	39.68	84.66	34.63	51.37
Dispersion	54.12	143.12	53.72	139.63	53.30	124.66

Table 2
Institutional trades and future stock returns.
This table reports the subsequent returns on portfolios sorted by the quarterly initial-ownership-stratified changes in institutional ownership. Specifically, all eligible NYSE/AMEX/NASDAQ stocks are sorted into quintiles based on the fraction of shares owned by institutional investors (IO) at the end of prior quarter. Stocks within each initial IO-sorted portfolio are further sorted into quintiles based on changes in IO during current quarter. Stocks in the quintile of largest increase (decrease) in IO within each initial-IO quintile are then aggregated across the initial-IO-sorted quintiles to form 5 initial-ownership-stratified, largest increase (decrease) in IO portfolios. Intense Buy represents the largest increase in institutional ownership. Intense Sell represents the largest decrease in institutional ownership. The time-series average of buy-and-hold returns for the top and bottom quintiles as well as the difference between the top and bottom quintiles (Intense Sell–Buy) are reported. Raw returns and DGTW benchmark-adjusted returns are reported. All returns are in percentage. T-statistics in parentheses are adjusted by Newey–West serial correlation up to 4 lags. Returns statistically significant at 10% are in bold.

	Raw return			DGTW-adjusted return		
	Three months	Six months	One year	Three months	Six months	One year
Intense Buy	**3.37**	**6.99**	**14.20**	0.06	0.16	−0.36
	(3.22)	**(3.90)**	**(4.43)**	(0.46)	(0.71)	(−0.81)
Intense Sell	**2.94**	**6.06**	**13.19**	−0.20	**−0.67**	**−1.16**
	(3.00)	**(3.60)**	**(4.48)**	(−1.28)	**(−2.24)**	**(−2.01)**
Intense	**0.43**	**0.93**	1.01	0.26	**0.83**	0.82
Buy–Sell	**(1.70)**	**(1.97)**	(1.22)	(1.13)	**(1.84)**	(1.03)

Table 3
Valuation uncertainty and return predictability of institutional trading.
This table reports the return predictive ability of institutional trading, conditional on different levels of valuation uncertainty. At the end of each quarter, all eligible NYSE/AMEX/NASDAQ stocks are sorted based on their rankings of the initial-ownership-stratified changes in institutional ownership and independently sorted into tertiles by the level of VU measure at the end of the quarter prior to portfolio formation. Within each VU tertile, time series average of the buy-and-hold DGTW-adjusted returns of the top and bottom quintiles of institutional trading as well as the differences of top and bottom institutional trading quintiles are reported. All returns are in percentage. T-statistics are adjusted by Newey–West serial correlation up to 4 lags. Returns statistically significant at 10% are in bold.

	Three months				Six months				One year			
	High VU	Mid VU	Low VU	High–Low	High VU	Mid VU	Low IU	High–Low	High VU	Mid VU	Low VU	High–Low
Valuation uncertainty proxied by 1/firm age												
Intense Buy	−0.21	0.27	0.06	−0.27	−0.33	**0.64**	0.31	−0.65	−1.20	0.56	0.07	−1.27
	(−0.56)	(1.49)	(0.20)	(−0.43)	(−0.45)	**(2.03)**	(0.56)	(−0.53)	(−0.81)	(0.90)	(0.06)	(−0.50)
Intense Sell	**−0.89**	0.08	0.49	**−1.38**	**−1.94**	−0.07	0.35	**−2.29**	**−3.00**	−0.18	0.13	**−3.13**
	(−2.75)	(0.34)	(1.54)	**(−2.50)**	**(−3.59)**	(−0.14)	(0.56)	**(−2.25)**	**(−3.34)**	(−0.20)	(0.10)	**(−1.70)**
Intense	**0.68**	0.18	**−0.43**	**1.11**	**1.60**	0.70	−0.04	**1.64**	1.81	0.74	−0.06	1.86
Buy-Sell	**(1.80)**	(0.73)	**(−2.26)**	**(2.83)**	**(2.16)**	(1.47)	(−0.14)	**(2.32)**	(1.34)	(0.97)	(−0.12)	(1.54)
Valuation uncertainty proxied by volatility												
Intense Buy	0.05	−0.07	0.14	−0.09	0.07	0.34	0.21	−0.15	−0.66	0.32	−0.07	−0.59
	(0.13)	(−0.32)	(0.43)	(−0.14)	(0.09)	(0.92)	(0.33)	(−0.11)	(−0.44)	(0.47)	(−0.05)	(−0.22)
Intense Sell	**−0.99**	0.29	0.49	**−1.48**	**−1.98**	−0.03	0.50	**−2.48**	**−3.25**	−0.18	0.57	**−3.83**
	(−2.70)	(1.21)	(1.25)	**(−2.19)**	**(−3.31)**	(−0.05)	(0.67)	**(−2.07)**	**(−3.36)**	(−0.17)	(0.39)	**(−1.74)**
Intense	**1.04**	**−0.36**	**−0.35**	**1.39**	**2.05**	0.36	−0.29	**2.34**	**2.59**	0.49	−0.65	**3.23**
Buy-Sell	**(2.84)**	**(−1.71)**	**(−1.78)**	**(3.71)**	**(2.81)**	(0.96)	(−0.90)	**(3.55)**	**(2.10)**	(0.66)	(−1.36)	**(3.04)**
Valuation uncertainty proxied by analyst dispersion												
Intense Buy	**−0.90**	−0.03	**1.59**	**−2.48**	**−1.48**	−0.31	**4.00**	**−5.48**	**−3.89**	**−1.15**	**7.92**	**−11.81**
	(−3.12)	(−0.12)	**(4.40)**	**(−5.23)**	**(−3.10)**	(−0.73)	**(5.99)**	**(−6.52)**	**(−3.96)**	**(−2.00)**	**(6.44)**	**(−7.09)**
Intense Sell	**−1.26**	−0.07	**1.77**	**−3.03**	**−2.86**	−0.43	**3.21**	**−6.07**	**−4.62**	−0.81	**6.92**	**−11.55**
	(−4.35)	(−0.23)	**(5.57)**	**(−7.27)**	**(−5.02)**	(−1.08)	**(7.03)**	**(−8.64)**	**(−5.51)**	(−1.06)	**(8.56)**	**(−9.19)**
Intense	0.37	0.03	−0.18	0.55	**1.38**	0.12	0.79	0.59	0.74	−0.34	1.00	−0.26
Buy-Sell	(1.04)	(0.08)	(−0.43)	(1.10)	**(2.04)**	(0.20)	(1.19)	(0.75)	(0.83)	(−0.32)	(1.01)	(−0.23)
Valuation uncertainty proxied by first principal component of the eight variables												
Intense Buy	0.02	−0.13	−0.01	0.03	0.37	0.37	0.15	0.21	0.32	0.26	0.64	−0.32
	(0.04)	(−0.46)	(−0.02)	(0.04)	(0.43)	(0.87)	(0.33)	(0.17)	(0.18)	(0.34)	(0.90)	(−0.14)
Intense Sell	**−0.84**	0.24	0.19	−1.03	**−1.83**	0.21	0.22	**−2.05**	−1.68	0.98	0.79	−2.47
	(−1.84)	(0.91)	(0.70)	(−1.59)	**(−2.61)**	(0.39)	(0.47)	**(−1.97)**	(−1.33)	(1.03)	(0.90)	(−1.27)
Intense	**0.86**	−0.37	−0.19	**1.05**	**2.19**	0.16	−0.07	**2.26**	2.00	−0.72	−0.15	2.15
Buy-Sell	**(1.78)**	(−1.20)	(−0.81)	**(1.91)**	**(2.62)**	(0.27)	(−0.21)	**(2.52)**	(1.49)	(−0.97)	(−0.28)	(1.64)

return for the same portfolio is insignificant for three- and twelve-month holding periods.

A closer inspection of the DGTW-adjusted returns on the Intense Buy and Sell portfolios reveals an interesting pattern. It appears that the abnormal return predictive ability of institutions is mainly concentrated on the sell side. The DGTW-adjusted returns on the Intense Sell portfolio are statistically significant at the 1% level six months and one year after the portfolio formation quarter. In contrast, the Intense Buy portfolio exhibits no evidence of significant positive abnormal returns. For the sake of brevity, we report only DGTW-adjusted returns hereafter.

3.2. Predictive ability of institutional trades across different levels of VU

Next, we investigate how VU contributes to institutional return predictability. We construct initial ownership-stratified institutional trading portfolios following the method described in Section 2, and then independently sort the sample of stocks into tertiles based on the level of VU measure at the end of the quarter prior to portfolio formation (using different proxies). The intersections from the two independent rankings result in 15 institutional trading-VU portfolios.

Table 3 reports the three-, six-, and twelve-month DGTW-adjusted buy-and-hold returns of the Intense Buy and Intense Sell portfolios and their differences. It is interesting to note that the differences between the two portfolios are positive and statistically significant in the High-VU category for most of our VU proxies. As exemplified by the 1/firm age proxy, the three months DGTW–adjusted return difference between the Intense Buy and Intense Sell portfolios among high-VU stocks is 0.68% and statistically significant and remains significant till six months after. In contrast, the return differences between the Intense Buy and Intense Sell portfolios among Low-VU stocks are statistically insignificant or even negative.

More importantly, the return predictive ability of institutions for high VU stocks is mainly restricted to institutional Intense Sell portfolios. Specifically, the Intense Sell portfolio of high VU stocks significantly underperforms their DGTW matched firms for all holding periods. Exemplified by the 1/firm age proxy, the DGTW–adjusted return is –0.89% for three months holding period, and the underperformance cumulates to –3.00% after one year and remains statistically significant. In contrast, there is no consistent evidence of positive abnormal returns on the Intense Buy portfolios of high VU stocks. Nor is there any evidence suggesting superior stock selection skill by institutions for Mid VU or low VU stocks. Hence, our findings are consistent with our hypothesis that the main source of institutional return predictability comes from the selling of highly uncertain stocks that tend to become overpriced, as Miller (1977) suggests.

3.3. Future return predictability in each subsequent quarter and long-term evidence

In this section, we examine the quarterly returns after the portfolio formation date. In the previous section, we have shown the return predictability of institutional trades stems from selling in high VU stocks by using the buy-and-hold returns (BHARs). However, BHARs may result in false inferences of the price adjustments to events as the BHARs can grow with the holding period even though there is no evidence of abnormal returns after the first

Table 4
Subsequent quarterly returns and long-run returns on institutional trading portfolios: high valuation uncertainty stocks only.
This table reports the subsequent quarterly returns and long term returns on portfolios sorted by initial-institutional-ownership-stratified changes in institutional ownership. At the end of each quarter, all eligible NYSE/AMEX/NASDAQ stocks are sorted based on initial-ownership-stratified change in institutional ownership and independently sorted into tertiles by the level of VU measure at the end of the quarter prior to portfolio formation. Quarterly buy-and-hold DGTW benchmark adjusted returns during the second, third and fourth quarter after the formation date as well as two-year holding period from one year after portfolio formation are reported for the top and bottom quintiles of institutional trading, and the differences of the top and bottom quintiles of institutional trading. We report the portfolios for the top VU tertile stocks only. All returns are in percentage. Returns statistically significant at 10% are in bold.

	QTR+1	QTR+2	QTR+3	QTR+4	QTR+5 through QTR+12
			Valuation uncertainty proxied by 1/firm age		
Intense Buy	0.10	−0.28	**−0.75**	**−0.57**	−2.08
	(0.35)	(−0.96)	**(−2.85)**	**(−1.72)**	(−1.15)
Intense Sell	**−0.88**	**−1.04**	**−0.73**	**−0.57**	−2.28
	(−3.31)	**(−3.64)**	**(−2.41)**	**(−1.67)**	(−1.24)
Intense	**0.98**	**0.77**	−0.02	0.00	0.21
Buy-Sell	**(2.60)**	**(2.22)**	(−0.07)	(−0.01)	(0.12)
			Valuation uncertainty proxied by volatility		
Intense Buy	0.05	−0.06	−0.38	−0.34	−0.71
	(0.13)	(−0.14)	(−0.92)	(−0.78)	(−0.26)
Intense Sell	**−0.99**	**−0.94**	−0.57	−0.47	−0.57
	(−2.70)	**(−2.26)**	(−1.32)	(−1.08)	(−0.29)
Intense	**1.04**	**0.88**	0.19	0.12	−0.14
Buy-Sell	**(2.84)**	**(2.43)**	(0.67)	(0.39)	(−0.07)
			Valuation uncertainty proxied by analyst dispersion		
Intense Buy	**−0.86**	−0.51	**−0.74**	**−1.22**	**−6.53**
	(−3.04)	(−1.47)	**(−1.83)**	**(−2.78)**	**(−2.85)**
Intense Sell	**−1.26**	**−1.59**	**−1.10**	**−0.75**	**−5.19**
	(−4.46)	**(−4.07)**	**(−3.07)**	**(−1.86)**	**(−2.11)**
Intense	0.41	**1.08**	0.36	−0.47	−1.35
Buy-Sell	(1.17)	**(2.11)**	(0.87)	(−1.08)	(−1.11)
			Valuation uncertainty proxied by first principal component of the eight variables		
Intense Buy	0.02	0.22	0.00	−0.06	3.94
	(0.04)	(0.54)	(−0.01)	(−0.13)	(1.20)
Intense Sell	**−0.84**	−0.66	−0.03	0.41	**4.17**
	(−1.84)	(−1.27)	(−0.05)	(0.86)	**(1.77)**
Intense	**0.86**	**0.89**	0.02	−0.47	−0.24
Buy-Sell	**(1.78)**	**(2.09)**	(0.06)	(−1.19)	(−0.08)

period (Fama (1998). To address this concern, we follow Wermers (1999) by reporting the quarterly buy–and–hold returns over the four quarters after portfolio formation separately. By doing so, it allows the examination of the institutional return predictive ability in each quarter following the portfolio formation. In addition, it allows us to investigate the subsequent long term returns to examine whether there is evidence of return reversals.

Table 4 breaks down the buy-and-hold DGTW-adjusted returns reported in Table 3 for the top VU tertile stocks into subsequent quarterly returns. Not surprisingly, the quarterly return difference between the Intense Buy and Intense Sell portfolios for the high VU stocks decreases as the holding period extends. But the negative abnormal returns remain significant beyond two quarters for stocks in the Intense Sell portfolios. For example, when using 1/firm age as proxy, high VU stocks that institutions intensively sell underperforms the DGTW benchmark by 0.88% for the first quarter and continues to underperform for the second and third quarter. Even during the fourth quarter after the portfolio formation date, the high VU stocks underperform the DGTW benchmark by 0.57% and statistically significant.

Importantly, we also find no evidence of return reversals for the negative returns on the Intense Sell portfolios in the long run (QTR+5 through QTR+12), which suggests that stock price adjustments following institutional selling is permanent.

3.4. Market sentiment and institutional return predictability

To further test whether institutional investors are able to exploit the overpricing of high VU stocks especially during periods of high market sentiment, we examine their predictive ability during optimistic versus pessimistic sentiment periods, respectively. Table 5 Panels A and B report the return predictive ability of intuitional trading across VU tertiles during the optimistic and pessimistic market sentiment periods, respectively.

Table 5 shows that institutional return predictive ability in high VU (top VU tertile) stocks is sensitive to market sentiment. As shown in Panel A, the return predictive ability of institutional sell of high VU stocks during optimistic periods is significant over all holding periods. In contrast, the results in Panel B show that return predictability of institutional sell of high VU stocks is insignificant during pessimistic periods. Take 1/firm age as example, for high VU stocks with Intense Sell during optimistic sentiment periods, the three-month DGTW return is statistically significant at –1.37%. In contrast, the three-month DGTW return is –0.23% and statistically insignificant for high VU stocks with intense institutional sell during pessimistic periods. Recall in Table 3, the DGTW return on the overall Intense Sell portfolio is –0.89%, which is notably less negative than the –1.37% return on the Intense Sell portfolio during optimistic periods. The predictive ability of institutional Intense Sell of high VU stocks during high sentiment periods is significant across all our VU proxies, expect for 1/Size (reported in online appendix).

Overall, the findings suggest that institutional return predictive ability for high VU stocks is mainly concentrated in sales completed during optimistic market sentiment periods. These results are consistent with our hypothesis that prices of high VU stocks are bid up by sentiment investors during optimistic periods and institutional investors are able to exploit such mispricing by selling these stocks during periods of high market sentiment.

Table 5
Market sentiment and informativeness of institutional trades.
This table reports the informativeness of institutional trades across VU tertiles during optimistic versus pessimistic market sentiment periods. At the end of each quarter, all eligible NYSE/AMEX/NASDAQ stocks are sorted based on their rankings of the initial-ownership-stratified changes in institutional ownership and independently sorted into tertiles by the level of VU measure at the end of the quarter prior to portfolio formation. Within each VU tertile, time series average of the buy-and-hold DGTW-adjusted returns of the top and bottom quintiles of institutional trading as well as the differences of top and bottom institutional trading quintiles are reported. Panel A reports results for optimistic and Panel B reports results for pessimistic sentiment periods. T-statistics are adjusted by Newey–West serial correlation up to 4 lags. All returns are in percentage. Returns statistically significant at 10% are in bold.

Panel A: optimistic market sentiment periods

	Three months				Six months				One year			
	High VU	Mid VU	Low VU	High–Low	High VU	Mid VU	Low VU	High–Low	High VU	Mid VU	Low VU	High–Low
Valuation uncertainty proxied by 1/firm age												
Intense Buy	−0.04	0.26	−0.19	0.15	−0.80	**0.93**	−0.12	−0.68	−1.93	**1.40**	**−1.04**	−0.89
	(−0.08)	(1.19)	(−0.80)	(0.31)	(−1.15)	**(2.68)**	(−0.33)	(−0.91)	(−1.38)	**(2.06)**	**(−1.70)**	(−0.51)
Intense Sell	**−1.37**	0.03	0.31	**−1.68**	**−2.24**	−0.31	0.13	**−2.36**	**−3.88**	−0.34	−0.18	**−3.70**
	(−3.85)	(0.11)	(1.31)	**(−3.71)**	**(−4.58)**	(−0.62)	(0.32)	**(−3.60)**	**(−4.28)**	(−0.38)	(−0.19)	**(−3.19)**
Intense	**1.33**	0.23	**−0.50**	**1.83**	**1.44**	**1.24**	−0.24	**1.68**	1.95	1.74	−0.85	2.80
Buy-Sell	**(2.67)**	(0.67)	**(−1.67)**	**(3.76)**	**(1.85)**	**(1.97)**	(−0.45)	**(2.34)**	(1.17)	(1.52)	(−0.80)	(1.61)
Valuation uncertainty proxied by volatility												
Intense Buy	−0.59	0.12	**0.84**	**−1.43**	−1.37	0.59	**2.00**	**−3.37**	−2.06	0.45	2.32	−4.38
	(−1.11)	(0.43)	**(2.06)**	**(−1.62)**	(−1.35)	(1.28)	**(2.85)**	**(−2.05)**	(−0.89)	(0.55)	(1.25)	(−1.08)
Intense Sell	**−1.72**	**0.56**	**1.07**	**−2.79**	**−3.27**	0.38	**1.86**	**−5.13**	**−5.23**	0.01	2.79	**−8.02**
	(−3.21)	**(1.86)**	**(2.03)**	**(−2.87)**	**(−4.29)**	(0.69)	**(1.96)**	**(−3.35)**	**(−4.55)**	(0.01)	(1.32)	**(−2.66)**
Intense	**1.13**	−0.44	−0.23	**1.36**	**1.90**	0.21	0.13	**1.77**	**3.18**	0.44	−0.47	**3.64**
Buy-Sell	**(2.31)**	(−1.42)	(−0.81)	**(2.52)**	**(2.00)**	(0.41)	(0.30)	**(1.98)**	**(1.90)**	(0.42)	(−0.63)	**(2.49)**
Valuation uncertainty proxied by analyst dispersion												
Intense Buy	**−1.10**	−0.21	**1.32**	**−2.42**	**−2.02**	−0.60	**3.55**	**−5.57**	**−4.41**	**−1.87**	**6.99**	**−11.39**
	(−2.60)	(−0.54)	**(2.55)**	**(−3.71)**	**(−3.32)**	(−0.93)	**(3.49)**	**(−5.01)**	**(−3.02)**	**(−2.23)**	**(4.48)**	**(−4.94)**
Intense Sell	**−1.84**	0.05	**1.99**	**−3.83**	**−3.99**	−0.48	**3.30**	**−7.29**	**−5.54**	−1.13	**6.86**	**−12.40**
	(−4.81)	(0.13)	**(3.99)**	**(−6.17)**	**(−5.49)**	(−1.00)	**(5.76)**	**(−8.37)**	**(−4.67)**	(−1.17)	**(5.38)**	**(−7.44)**
Intense	0.73	−0.26	−0.68	**1.41**	**1.97**	−0.13	0.25	1.72	1.13	−0.74	0.13	1.00
Buy-Sell	(1.41)	(−0.50)	(−0.98)	**(1.76)**	**(2.17)**	(−0.16)	(0.24)	(1.48)	(0.91)	(−0.59)	(0.11)	(0.56)
Valuation uncertainty proxied by first principal component of the eight variables												
Intense Buy	−0.84	−0.03	0.33	−1.18	−1.39	0.77	1.06	−2.45	−1.80	0.79	1.72	−3.53
	(−1.19)	(−0.06)	(0.81)	(−1.17)	(−1.17)	(1.02)	(1.59)	(−1.46)	(−0.68)	(0.61)	(1.51)	(−1.02)
Intense Sell	**−1.37**	0.30	0.42	**−1.78**	**−3.50**	−0.08	1.08	**−4.58**	**−3.91**	0.43	**2.52**	**−6.44**
	(−1.81)	(0.94)	(1.00)	**(−1.68)**	**(−3.49)**	(−0.11)	(1.48)	**(−2.90)**	**(−2.00)**	(0.28)	**(2.02)**	**(−2.17)**
Intense	0.52	−0.33	−0.08	0.61	**2.11**	0.85	−0.01	**2.12**	2.11	0.36	−0.80	**2.91**
Buy-Sell	(0.76)	(−0.63)	(−0.24)	(0.76)	**(2.18)**	(0.87)	(−0.03)	**(2.06)**	(1.28)	(0.34)	(−0.93)	**(1.83)**

Panel B: pessimistic market sentiment periods

	Three months				Six months				One year			
	High VU	Mid VU	Low VU	High–Low	High VU	Mid VU	Low VU	High–Low	High VU	Mid VU	Low VU	High–Low
Valuation uncertainty proxied by 1/firm age												
Intense Buy	0.29	0.35	**−0.40**	0.69	0.94	0.58	**−1.02**	**1.96**	0.11	0.12	**−2.12**	2.23
	(0.74)	(1.25)	**(−1.79)**	(1.30)	(1.49)	(1.16)	**(−2.54)**	**(2.32)**	(0.10)	(0.13)	**(−2.79)**	(1.55)
Intense Sell	−0.23	−0.02	−0.29	0.05	**−1.18**	−0.31	−0.66	−0.52	−1.73	−0.24	−1.62	−0.11
	(−0.61)	(−0.07)	(−0.80)	(0.11)	**(−2.00)**	(−0.52)	(−0.96)	(−0.75)	(−1.55)	(−0.23)	(−1.32)	(−0.12)
Intense	0.52	0.37	−0.12	0.64	**2.11**	0.89	−0.36	**2.47**	1.84	0.36	−0.50	**2.34**
Buy-Sell	(0.90)	(0.82)	(−0.32)	(0.99)	**(2.19)**	(1.03)	(−0.55)	**(2.93)**	(1.10)	(0.30)	(−0.55)	**(1.69)**
Valuation uncertainty proxied by volatility												
Intense Buy	**0.90**	−0.31	−0.78	**1.68**	**1.96**	0.00	**−2.14**	**4.10**	1.18	0.14	**−3.23**	**4.41**
	(1.71)	(−1.05)	(−1.55)	**(1.74)**	**(2.24)**	(0.01)	**(−2.46)**	**(2.62)**	(1.03)	(0.15)	**(−2.12)**	**(2.01)**
Intense Sell	−0.03	−0.06	−0.27	0.24	−0.29	−0.56	−1.30	1.01	−0.64	−0.41	−2.35	1.71
	(−0.07)	(−0.14)	(−0.48)	(0.28)	(−0.35)	(−0.70)	(−1.41)	(0.68)	(−0.48)	(−0.32)	(−1.59)	(0.79)
Intense	**0.93**	−0.26	**−0.51**	**1.44**	**2.25**	0.56	**−0.84**	**3.09**	1.81	0.55	**−0.88**	**2.70**
Buy-Sell	**(1.66)**	(−0.96)	**(−1.94)**	**(2.82)**	**(2.02)**	(1.01)	**(−2.18)**	**(3.13)**	(1.09)	(0.61)	**(−2.36)**	**(1.77)**
Valuation uncertainty proxied by analyst dispersion												
Intense Buy	**−0.68**	0.15	**1.87**	**−2.55**	−0.92	0.00	**4.46**	**−5.38**	**−3.34**	−0.40	**8.89**	**−12.24**
	(−1.76)	(0.40)	**(3.70)**	**(−3.65)**	(−1.38)	(−0.01)	**(4.84)**	**(−4.11)**	**(−3.02)**	(−0.54)	**(4.89)**	**(−5.13)**
Intense Sell	−0.67	−0.19	**1.53**	**−2.20**	**−1.69**	−0.39	**3.11**	**−4.80**	**−3.67**	−0.48	**6.99**	**−10.66**
	(−1.57)	(−0.45)	**(3.94)**	**(−4.11)**	**(−2.12)**	(−0.61)	**(4.64)**	**(−4.72)**	**(−2.89)**	(−0.41)	**(7.22)**	**(−5.75)**
Intense	−0.01	0.34	0.34	−0.35	0.77	0.38	1.36	−0.59	0.33	0.08	1.90	−1.57
Buy-Sell	(−0.02)	(0.54)	(0.72)	(−0.62)	(0.91)	(0.42)	(1.51)	(−0.57)	(0.32)	(0.05)	(1.34)	(−1.37)
Valuation uncertainty proxied by first principal component of the eight variables												
Intense Buy	0.87	−0.24	−0.34	1.21	**2.09**	−0.02	−0.74	**2.82**	2.41	−0.25	−0.42	2.82
	(1.40)	(−0.68)	(−1.16)	(1.48)	**(2.12)**	(−0.04)	(−1.28)	**(2.00)**	(1.44)	(−0.43)	(−0.57)	(1.33)
Intense Sell	−0.33	0.18	−0.04	−0.29	−0.19	0.50	−0.62	0.43	0.51	1.53	−0.91	1.42
	(−0.63)	(0.43)	(−0.13)	(−0.39)	(−0.22)	(0.68)	(−1.12)	(0.37)	(0.42)	(1.59)	(−0.99)	(0.85)
Intense	**1.20**	−0.42	−0.30	**1.49**	**2.28**	−0.51	−0.12	**2.39**	1.89	**−1.78**	0.49	1.40
Buy-Sell	**(1.75)**	(−1.16)	(−0.92)	**(1.94)**	**(1.84)**	(−0.83)	(−0.23)	**(1.79)**	(1.05)	**(−1.94)**	(0.73)	(0.75)

3.5. Sub-period analysis

To the extent that recent studies find evidence of diminishing return predictive ability of institutional investors (Barras et al. (2010)), we conduct sub-period analysis by splitting the sample into two sub-samples and report institutional return predictive ability during periods of high market sentiment. Results are presented in Table 6, with Panel A reporting results for 1981 to June 1996 and Panel B for July 1996 to 2010.

For both sub-periods, the return predictive ability remains significant for sells of high VU stocks during high sentiment periods. Take volatility as example, the three months DGTW-return on Intense Sell portfolio during optimistic period is –1.10% for the period from 1981 to June 1996 and –1.73% for July 1996 to 2010 period. Therefore, the return predictability of institutional sells in high VU stocks during high sentiment periods remains significant over time.

4. Robustness tests

In this section, we conduct tests to verify that our main results from the previous sections are robust. We also investigate whether there are any relationship between institutional trading and future earnings news. This is to ascertain whether institutions' abnormal trading performance is due to their access to information on earnings fundamentals. We also test whether institutions obtain information about stock fundamentals from analysts.

4.1. Institutional trading and future earnings news

In their study on mutual fund managers' stock-picking ability, Baker et al. (2010) find that the average fund's recent buys significantly outperform its recent sells around the next earnings announcement. Their finding suggests that institutional investors' informational advantage may come from their ability to forecast earnings-related fundamentals.

To further investigate institutional investors' informational advantage, we examine the relationship between institutional trading and future earnings news. We do so by examining the 3-day window returns surrounding the earnings announcement date during the quarter subsequent to trading portfolio formation date, and the subsequent quarter's earnings surprises.

We obtain quarterly earnings announcement dates from COMPUSTAT. The earnings announcement abnormal return is defined as the cumulative DGTW-adjusted abnormal return over a 3-day window [–1, +1] around the earnings announcement date. As in the above tests, for each quarter, we group stocks into five portfolios based on ownership-stratified institutional trading quintiles then independently sort them into high, middle, and low level of VU. For each portfolio, we then calculate the mean announcement window abnormal returns for the quarter subsequent to institutional trading formation quarter.

We use two measures of earnings surprises. The first measure is the subsequent quarter's earnings surprise, Standard Unexpected Earnings (SUE), which is based on a rolling seasonal random walk model after exclusion of special items, scaled by quarter-end stock price (Livnat and Mendenhall (2006). Specifically, the SUE of a stock j in quarter t is $SUE_{jt}=(X_{jt}-X_{jt-4})/P_{jt}$, where X_{jt} is primary Earnings Per Share (EPS) after exclusion of extraordinary items for firm j in quarter t, and P_{jt} is the price per share for firm j at the end of quarter t.

The second earnings surprise measure is based on analyst forecast errors. We measure analyst forecast errors as the difference between actual earnings and the mean analyst forecast earnings scaled by quarter-end stock price. However, using analyst forecast errors will restrict our sample to relatively large firms that have analyst coverage. In addition, analysts may also be subjected to market sentiment and may have systematic errors in predicting firm's earnings performance. For example, Hribar and McInnis (2012) documents evidence that when market sentiment is high (optimistic), analysts' forecasts of one-year-ahead earnings and long-term earnings growth are relatively more optimistic for uncertain or difficult-to-value firms. They conclude that investor sentiment affects the earnings expectations of hard-to-value firms.

Table 7 reports the subsequent quarter's (1) earnings announcement abnormal returns and (2) earnings surprise (SUE), and (3) analyst forecast errors, conditioned on institutional trading for both high and low sentiment periods. Our results show that institutional sell in the high VU stocks during high sentiment periods predict significantly negative 3-day abnormal returns and negative earnings surprise (measured by both SUEs and analyst forecast errors) around the subsequent earnings announcements. In contrast, there is little consistent predictive power for institutional buys, and for low VU stocks or for low sentiment periods. These results suggest that institutions are not necessarily timing the market sentiment but rather have predictive ability for stock fundamentals.

4.2. Calendar time portfolio alpha

So far, we report DGTW-adjusted buy-and-hold abnormal returns (BHARs) in our main results. To address the concern that BHARs give a false inference of the price adjustment to an event (Fama, 1998), we have also reported the quarterly buy–and–hold returns over the four quarters after portfolio formation separately in Table 4, following Wermers (1999).

However, to account for the possibility that the DGTW adjustment may be imprecise, we therefore report calendar-time portfolio alphas. Specifically, once stocks are assigned into 15 portfolios at the quarter-end, the stocks are held in the portfolios for the next 3, 6 and 12 months, corresponding to the holding periods that we report in Table 3. We then derive the portfolio alpha from Fama and French (1993) three-factor model and Carhart (1997) four-factor model.

In Table 8, we report the monthly calendar-time portfolio alphas (abnormal returns) for the top and bottom quintiles of institutional trading, i.e., Intense Buy and Intense Sell for top and bottom tertiles of VU groups. We also report the alphas on the hedge portfolios (Intense Buy minus Intense Sell). We report monthly alphas for both the three- and four-factor models.[16]

Table 8 shows that the alphas from both the three- and four-factor models are significantly negative for Intense Sell portfolios for high VU stocks. When using volatility as VU proxy, for three-month holding period, the monthly alpha from the three-factor model is –0.59 ($t=-4.42$) on high VU Intense Sell portfolio and the monthly alpha from the four-factor model is –0.39 ($t=-3.47$). In addition, the alphas on the hedge portfolios are significantly positive. Specifically, the alpha from three-factor model is 0.28 ($t=2.16$) and the alpha from four-factor model is 0.12 ($t=2.14$). These results suggest that the main finding using DGTW-adjusted returns presented in Table 3 is robust using three-factor and four-factor abnormal returns.

4.3. Regressions of return predictability

To further verify that our results are not due to misspecification in the DGTW-adjusted returns or other factors that are found to be related to future returns, we run pooled regressions of raw returns on institutional "Intense Sell" as a main explanatory (dummy) variable, along with a set of predictors used by Yan and

[16] To save space, we omit the middle portfolios but results are available upon request.

Table 6
Sub-period analysis for optimistic market sentiment periods.
This table reports sub-period analysis for the informativeness of institutional trades completed during optimistic sentiment periods only. At the end of each quarter, all eligible NYSE/AMEX/NASDAQ stocks are sorted based on their rankings of the initial-ownership-stratified changes in institutional ownership and independently sorted into tertiles by the level of VU measure at the end of the quarter prior to portfolio formation. Within each VU tertile, time series average of the buy-and-hold DGTW-adjusted returns of the top and bottom quintiles of institutional trading as well as the differences of top and bottom institutional trading quintiles are reported. Panel A reports results for year 1981 through June 1996. Panel B reports results for July 1996 through year 2010. T-statistics are adjusted by Newey–West serial correlation up to 4 lags. All returns are in percentage. Returns statistically significant at 10% are in bold.

Panel A: 1981-June 1996

	Three months				Six months				One year			
	High VU	Mid VU	Low VU	High–Low	High VU	Mid VU	Low VU	High–Low	High VU	Mid VU	Low VU	High–Low
Valuation uncertainty proxied by 1/firm age												
Intense Buy	−0.45	0.11	−0.12	−0.33	−1.01	**0.82**	0.24	−1.26	−2.52	**2.02**	0.93	**−3.45**
	(−0.90)	(0.40)	(−0.41)	(−0.51)	(−1.07)	**(1.95)**	(0.57)	(−1.17)	(−1.56)	**(2.67)**	(1.47)	**(−1.81)**
Intense Sell	−0.49	0.27	−0.09	−0.40	**−1.53**	−0.27	−0.42	−1.11	**−2.75**	−0.36	−1.25	−1.50
	(−0.91)	(1.02)	(−0.22)	(−0.61)	**(−2.18)**	(−0.43)	(−0.62)	(−1.10)	**(−3.08)**	(−0.53)	(−1.17)	(−0.96)
Intense	0.04	−0.16	−0.03	0.08	0.51	**1.08**	0.66	−0.15	0.23	**2.38**	**2.18**	−1.95
Buy-Sell	(0.07)	(−0.60)	(−0.08)	(0.11)	(0.55)	**(1.81)**	(1.26)	(−0.16)	(0.16)	**(3.68)**	**(2.74)**	(−0.93)
Valuation uncertainty proxied by volatility												
Intense Buy	−0.43	−0.33	0.52	−0.96	−0.60	−0.14	**1.51**	−2.10	**−2.32**	0.68	**3.85**	**−6.17**
	(−0.89)	(−0.94)	(1.25)	(−1.24)	(−0.64)	(−0.33)	**(2.26)**	(−1.47)	**(−3.00)**	(1.26)	**(5.04)**	**(−4.50)**
Intense Sell	**−1.10**	0.31	1.14	**−2.24**	**−2.67**	−0.18	**1.91**	**−4.59**	**−5.15**	−0.59	**3.98**	**−9.13**
	(−2.40)	(0.79)	(2.15)	**(−2.78)**	**(−4.20)**	(−0.25)	**(2.46)**	**(−4.10)**	**(−7.97)**	(−0.52)	**(3.71)**	**(−5.68)**
Intense	0.67	−0.64	**−0.61**	**1.28**	**2.08**	0.04	−0.41	**2.48**	**2.83**	1.27	−0.14	**2.96**
Buy-Sell	(1.05)	(−1.32)	**(−1.84)**	**(1.70)**	**(1.81)**	(0.07)	(−0.75)	**(1.91)**	**(4.05)**	(1.56)	(−0.13)	**(2.26)**
Valuation uncertainty proxied by analyst dispersion												
Intense Buy	−0.66	−0.43	**1.12**	**−1.78**	−0.92	−1.04	**2.23**	**−3.15**	−1.16	−1.92	**5.27**	**−6.42**
	(−1.37)	(−0.71)	**(1.92)**	**(−2.16)**	(−1.33)	(−1.01)	**(2.32)**	**(−2.20)**	(−0.81)	(−1.44)	**(2.89)**	**(−2.43)**
Intense Sell	**−0.85**	**−0.92**	**0.90**	**−1.75**	**−2.99**	**−1.64**	**2.21**	**−5.20**	**−4.98**	**−4.29**	**3.27**	**−8.25**
	(−1.65)	**(−1.71)**	**(1.91)**	**(−2.44)**	**(−3.04)**	**(−2.13)**	**(4.00)**	**(−5.19)**	**(−2.14)**	**(−4.59)**	**(3.97)**	**(−3.15)**
Intense	0.19	0.49	0.22	−0.03	**2.06**	0.61	0.02	2.05	**3.82**	**2.37**	1.99	1.83
Buy-Sell	(0.31)	(0.54)	(0.28)	(−0.04)	**(2.89)**	(0.52)	(0.03)	(1.49)	**(2.03)**	**(1.83)**	(0.89)	(0.63)
Valuation uncertainty proxied by first principal component of the eight variables												
Intense Buy	−0.38	0.10	−0.07	−0.31	−0.38	0.56	0.30	−0.68	0.33	**1.70**	**1.62**	−1.29
	(−0.54)	(0.27)	(−0.15)	(−0.32)	(−0.36)	(0.75)	(0.56)	(−0.51)	(0.16)	**(1.90)**	**(2.22)**	(−0.57)
Intense Sell	**−2.08**	−0.08	0.09	**−2.17**	**−3.63**	−0.11	−0.16	**−3.47**	**−6.06**	−1.02	**1.93**	**−7.99**
	(−3.82)	(−0.19)	(0.22)	**(−2.90)**	**(−2.98)**	(−0.20)	(−0.23)	**(−2.14)**	**(−3.20)**	(−1.12)	**(2.21)**	**(−3.40)**
Intense	**1.70**	0.18	−0.16	**1.86**	**3.24**	0.67	0.45	**2.79**	**6.39**	**2.72**	−0.31	**6.70**
Buy-Sell	**(2.36)**	(0.36)	(−0.31)	**(2.41)**	**(3.13)**	(0.88)	(0.83)	**(2.53)**	**(3.09)**	**(3.05)**	(−0.44)	**(2.96)**

Panel B: July 1996–2010

	Three months				Six months				One year			
	High VU	Mid VU	Low VU	High–Low	High VU	Mid VU	Low VU	High–Low	High VU	Mid VU	Low VU	High–Low
Valuation uncertainty proxied by 1/firm age												
Intense Buy	−0.13	0.24	−0.31	0.18	−0.94	0.68	−0.57	−0.36	−1.22	0.49	**−2.61**	1.39
	(−0.22)	(0.68)	(−0.81)	(0.24)	(−0.93)	(1.56)	(−0.99)	(−0.30)	(−0.50)	(0.59)	**(−3.25)**	(0.46)
Intense Sell	**−1.20**	−0.02	**0.70**	**−1.91**	**−1.90**	−0.15	0.86	**−2.76**	**−3.06**	−0.24	1.24	**−4.30**
	(−2.35)	(−0.03)	**(1.96)**	**(−2.75)**	**(−2.76)**	(−0.17)	(1.60)	**(−2.96)**	**(−2.50)**	(−0.15)	(0.86)	**(−3.15)**
Intense	**1.07**	0.26	**−1.02**	**2.09**	0.96	0.83	**−1.43**	**2.40**	1.83	0.73	**−3.85**	**5.69**
Buy-Sell	**(1.66)**	(0.44)	**(−2.17)**	**(3.27)**	(0.83)	(0.86)	**(−1.93)**	**(2.08)**	(0.60)	(0.43)	**(−3.83)**	**(2.17)**
Valuation uncertainty proxied by volatility												
Intense Buy	−1.02	0.48	1.08	−2.10	−2.48	0.99	**2.51**	**−4.99**	−2.48	0.15	1.39	−3.87
	(−1.11)	(1.03)	(1.44)	(−1.31)	(−1.51)	(1.32)	**(1.96)**	**(−1.77)**	(−0.58)	(0.12)	(0.40)	(−0.51)
Intense Sell	**−1.73**	0.84	1.07	−2.80	**−2.92**	0.65	2.32	**−5.24**	**−3.98**	0.49	2.52	−6.50
	(−1.73)	(1.57)	(1.13)	(−1.54)	**(−2.06)**	(0.67)	(1.44)	**(−1.84)**	**(−1.95)**	(0.18)	(0.70)	(−1.19)
Intense	0.71	−0.36	0.01	0.70	0.44	0.34	0.19	0.25	1.50	−0.34	−1.13	2.63
Buy-Sell	(0.91)	(−0.78)	(0.03)	(0.78)	(0.34)	(0.41)	(0.30)	(0.18)	(0.58)	(−0.20)	(−1.34)	(1.03)
Valuation uncertainty proxied by analyst dispersion												
Intense Buy	**−1.36**	−0.09	**1.43**	**−2.79**	**−2.65**	−0.35	**4.31**	**−6.96**	**−6.28**	**−1.84**	**7.98**	**−14.26**
	(−2.23)	(−0.17)	**(1.91)**	**(−3.04)**	**(−3.16)**	(−0.42)	**(2.91)**	**(−4.82)**	**(−3.43)**	**(−1.66)**	**(3.72)**	**(−5.00)**
Intense Sell	**−2.41**	0.61	**2.62**	**−5.03**	**−4.57**	0.20	**3.93**	**−8.50**	**−5.87**	0.69	**8.92**	**−14.79**
	(−4.79)	(1.15)	**(3.64)**	**(−6.10)**	**(−4.69)**	(0.35)	**(4.83)**	**(−7.39)**	**(−4.62)**	(0.70)	**(5.67)**	**(−9.14)**
Intense	1.04	−0.70	−1.20	**2.24**	1.92	−0.55	0.38	1.54	−0.41	−2.53	−0.94	0.53
Buy-Sell	(1.41)	(−1.10)	(−1.21)	**(1.99)**	(1.39)	(−0.51)	(0.26)	(0.92)	(−0.29)	(−1.63)	(−0.71)	(0.23)
Valuation uncertainty proxied by first principal component of the eight variables												
Intense Buy	−1.11	−0.10	0.57	−1.68	−1.97	0.89	1.50	−3.47	−3.04	0.26	1.78	−4.82
	(−1.06)	(−0.14)	(0.95)	(−1.13)	(−1.12)	(0.80)	(1.51)	(−1.38)	(−0.76)	(0.13)	(1.01)	(−0.91)
Intense Sell	−0.96	0.52	0.61	−1.56	**−3.43**	−0.06	**1.79**	**−5.21**	−2.68	1.26	2.87	−5.54
	(−0.83)	(1.18)	(0.98)	(−0.96)	**(−2.40)**	(−0.07)	**(1.72)**	**(−2.26)**	(−0.95)	(0.53)	(1.50)	(−1.24)
Intense	−0.16	−0.62	−0.04	−0.12	1.46	0.95	−0.28	1.74	−0.36	−1.00	−1.09	0.73
Buy-Sell	(−0.17)	(−0.81)	(−0.09)	(−0.10)	(1.05)	(0.64)	(−0.48)	(1.16)	(−0.19)	(−0.72)	(−0.84)	(0.41)

Table 7
Institutional trading and future earnings news.
This table reports the DGTW-adjusted abnormal returns over the three days around the subsequent earnings announcement dates and the earnings surprises during the quarter subsequent to trading portfolio formation quarter. SUE is Standard Unexpected Earnings based on a rolling seasonal random walk model after exclusion of special items, scaled by prior quarter-end stock price. Forecast error is measured as actual earnings minus mean analyst earnings forecast scaled by prior quarter-end stock price. All returns and earnings surprise measures are in percentage, and statistically significant at 10% are in bold.

	Optimistic sentiment periods						Pessimistic sentiment periods					
	High VU			Low VU			High VU			Low VU		
	CAR (−1,+1)	SUE	Forecast error	CAR (−1,+1)	SUE	Forecast error	CAR (−1,+1)	SUE	Forecast error	CAR (−1,+1)	SUE	Forecast error
Valuation uncertainty proxied by 1/firm age												
Intense Buy	−0.08	0.13	−0.07	−0.01	0.04	**−0.21**	0.09	**0.57**	−0.09	**−0.15**	0.83	−0.02
	(−0.72)	(1.51)	(−1.24)	(−0.14)	(0.61)	**(−2.74)**	(1.07)	**(3.35)**	(−1.38)	**(−1.68)**	(2.05)	(−0.87)
Intense Sell	**−0.28**	**−0.43**	**−0.45**	−0.07	−0.16	−0.08	−0.15	**−0.26**	**−0.32**	−0.07	−0.16	−0.10
	(−2.33)	**(−4.47)**	**(−4.04)**	(−0.78)	(−1.54)	(−1.29)	(−1.48)	**(−1.72)**	**(−4.37)**	(−1.01)	(−1.19)	(−1.14)
Intense	0.21	**0.57**	**0.39**	0.06	**0.21**	**−0.13**	**0.25**	**0.83**	**0.23**	−0.07	**0.99**	0.08
Buy-Sell	(1.15)	**(4.84)**	**(3.32)**	(0.46)	**(2.08)**	**(−1.71)**	**(1.91)**	**(4.90)**	**(2.48)**	(−0.65)	**(2.55)**	(0.90)
Valuation uncertainty proxied by volatility												
Intense Buy	−0.09	**0.17**	**−0.20**	0.06	0.12	**−0.08**	**−0.18**	3.13	−0.04	0.06	0.01	−0.10
	(−0.85)	**(1.90)**	**(−2.28)**	(0.78)	(1.62)	**(−1.70)**	**(−1.66)**	(1.45)	(−0.56)	(0.78)	(0.25)	(−1.01)
Intense Sell	**−0.43**	**−0.56**	**−0.37**	−0.01	−0.09	**−0.08**	**−0.24**	3.72	**−0.38**	**−0.12**	−0.01	0.01
	(−4.25)	**(−4.22)**	**(−5.00)**	(−0.14)	(−1.29)	**(−1.67)**	**(−2.29)**	(0.91)	**(−5.58)**	**(−1.81)**	(−0.29)	(0.13)
Intense	**0.34**	**0.73**	0.16	0.07	**0.20**	0.00	0.06	−0.59	**0.34**	**0.18**	0.02	−0.12
Buy-Sell	**(2.34)**	**(5.36)**	(1.37)	(0.81)	**(2.06)**	(0.11)	(0.44)	(−0.13)	**(4.82)**	**(1.92)**	(0.39)	(−0.87)
Valuation uncertainty proxied by analyst dispersion												
Intense Buy	−0.20	−0.27	**−0.36**	**0.66**	**0.10**	−0.03	−0.07	**0.56**	−0.10	**0.56**	**0.28**	**0.06**
	(−1.41)	(−1.60)	**(−2.62)**	**(4.28)**	**(1.91)**	(−1.09)	(−0.52)	**(2.06)**	(−1.34)	**(4.63)**	**(4.00)**	**(4.87)**
Intense Sell	**−0.47**	**−0.85**	**−0.54**	−0.03	−0.07	**−0.11**	−0.22	**−0.82**	**−0.48**	0.19	−0.05	**−0.08**
	(−3.51)	**(−4.11)**	**(−4.52)**	(−0.18)	(−0.92)	**(−2.28)**	(−1.60)	**(−3.68)**	**(−4.35)**	(1.14)	(−0.65)	**(−2.59)**
Intense	0.28	**0.57**	0.19	**0.69**	**0.17**	**0.08**	0.15	**1.38**	**0.38**	**0.36**	**0.34**	**0.14**
Buy-Sell	(1.38)	**(2.48)**	(1.13)	**(2.69)**	**(2.02)**	**(1.70)**	(0.80)	**(6.34)**	**(3.23)**	**(1.71)**	**(4.73)**	**(4.41)**
Valuation uncertainty proxied by first principal component of the eight variables												
Intense Buy	0.12	−0.06	−0.24	0.11	−0.04	**−0.07**	**0.27**	**0.54**	−0.08	−0.03	0.06	−0.02
	(0.82)	(−0.63)	(−2.42)	(1.14)	(−0.76)	**(−1.71)**	**(1.88)**	**(2.34)**	(−0.81)	(−0.35)	(1.05)	(−0.52)
Intense Sell	−0.07	**−0.93**	**−4.33**	0.00	−0.08	−0.07	−0.18	−0.19	**−0.45**	−0.09	−0.14	0.00
	(−0.54)	**(−5.29)**	**(−2.16)**	(0.01)	(−0.94)	(−1.63)	(−1.17)	(−0.52)	**(−5.50)**	(−1.16)	(−1.08)	(0.25)
Intense	0.20	**0.87**	**4.08**	0.11	0.04	0.00	**0.45**	**0.73**	**0.37**	0.05	**0.21**	−0.02
Buy-Sell	(1.00)	**(5.60)**	**(4.12)**	(0.92)	(0.37)	(−0.02)	**(2.16)**	**(2.49)**	**(2.89)**	(0.46)	**(1.88)**	(−0.65)

Zhang (2009) and Gompers and Metrick (2001). To verify whether institutional Intense Sell can still predict future returns after controlling for other market anomalies, we also include accrual and asset growth in the previous year to the portfolio formation year as explanatory variables. We also include the consensus analyst earnings forecast revision ("Prior FR") over the prior three months to the portfolio formation quarter to check if institutional sell's predictive ability is driven by changes in analyst forecast. To save space, we only report the results for high VU stocks (top tertile VU stocks) based on the level of VU measure at the end of the quarter prior to portfolio formation. The results are reported in Table 9.

For specification (1), the estimated coefficients on the "Intense Sell" dummy for high VU stocks are significantly negative for most VU proxies. When using return volatility as the VU proxy, the coefficient on the "Intense Sell" dummy for 3-month return regression for high VU stocks is –0.0139 and statistically significant (t=–3.90). T-statistics are based on firm and month double clustered errors. And the coefficient on the "Intense Sell" dummy for 12-month return regression is –0.0267 (t=–3.61). In un-tabulated results, we find the coefficients on "Intense Sell" are not significant for low VU stocks. These results suggest that our main finding is not driven by potentially mixing up mispricing with factor risk from the DGTW adjustment.

In specification (2), we also include optimistic market sentiment dummy ("Highsent") that takes on values zero for pessimistic and one for optimistic market sentiment periods, and the "Highsent" and "Intense Sell" interaction term ("Highsent*Sell"). We expect this interaction term to be negative, as suggested by our main argument that the predictive ability of institutional trading mainly comes from institutional sells of high VU stocks during high sentiment periods. Consistently, we find that the interaction terms are negative, and statistically significant across all the VU proxies. For example, using return volatility as the VU proxy, the estimated coefficient on the interaction term "Highsent*Sell" for 3-month return of high VU stocks is –0.0800 and statistically significant (t=–12.56). And the coefficient on the interaction term for 12-month return regression is –0.2442 (t=–19.79). Further, the estimated coefficients on the "Intense Sell" become insignificant in specification (2), which suggests that when Highsent takes on values zero (during low sentiment periods), institutional sells of high VU stocks do not predict significantly negative returns. This finding is consistent with the results in Table 5 that Intense Sell portfolios of high VU stocks during optimistic sentiment periods predict significantly negative future returns, whereas Intense Sell portfolios during pessimistic sentiment periods have no consistent return predictive ability. Collectively, the results are consistent with our central argument that market sentiment is the key driver of the overvaluation of high VU stocks, and that the predictive ability of institutions is mainly from their sells of high uncertainty stocks during high sentiment periods.

4.4. Institutional trading and analyst forecast revisions

So far, we have shown consistent evidence that institutional investors are informed and their informational advantage is mainly from their ability to identify and sell overvalued, high VU stocks, especially during periods of high market sentiment. Their informational advantages can be due either to their access to more precise information or to their expertise in interpreting public information. In this section, we investigate how institutions obtain information regarding the future fundamentals of high VU stocks. In particular,

Table 8
Alpha from Fama–French three-factor and Carhart four-factor models.
This table reports the monthly calendar-time portfolio alphas (abnormal returns) from Fama–French three-factor and Carhart four-factor models. Stocks are assigned into 15 portfolios at the quarter-end and hold for 3, 6 and 12 months. Monthly alphas for the top and bottom quintiles of institutional trading as well as the differences of top and bottom institutional trading quintiles are reported, within each VU tertile based on the level of VU measure at the end of the quarter prior to portfolio formation. Heteroskedasticity consistent t-statistics are reported and returns statistically significant at 10% are in bold.

	Fama–French 3-factor model						Carhart 4-factor model					
	Three months		Six months		12 months		Three months		Six months		12 months	
	High VU	Low VU	High VU	Low VU	High VU	Low VU	High VU	Low VU	High VU	Low VU	High VU	Low VU
Valuation uncertainty proxied by 1/firm age												
Intense Buy	−0.07	0.10	−0.08	0.11	−0.10	0.09	−0.06	0.13	0.00	**0.16**	0.01	**0.14**
	(−0.85)	(1.44)	(−1.01)	(1.56)	(−1.21)	(1.45)	(−0.61)	(1.63)	(0.02)	**(2.10)**	(0.10)	**(2.34)**
Intense Sell	**−0.43**	−0.01	**−0.43**	0.00	**−0.36**	0.00	**−0.29**	0.11	**−0.23**	0.12	−0.13	0.11
	(−3.94)	(−0.10)	**(−4.14)**	(−0.06)	**(−3.29)**	(−0.03)	**(−3.18)**	(1.23)	**(−2.29)**	(1.52)	(−1.13)	(1.55)
Intense	**0.36**	0.11	**0.31**	**0.11**	**0.26**	**0.09**	**0.23**	0.02	**0.23**	0.04	**0.14**	0.03
Buy-Sell	**(2.96)**	(1.50)	**(3.85)**	**(2.27)**	**(3.34)**	**(2.18)**	**(1.90)**	(0.59)	**(2.57)**	(0.98)	**(1.71)**	(1.47)
Valuation uncertainty proxied by volatility												
Intense Buy	**−0.31**	**0.25**	**−0.26**	**0.26**	**−0.24**	**0.26**	**−0.27**	**0.24**	−0.08	**0.25**	−0.03	**0.27**
	(−2.68)	**(3.25)**	**(−2.40)**	**(3.40)**	**(−2.21)**	**(3.21)**	**(−2.77)**	**(2.54)**	(−0.78)	**(2.80)**	(−0.25)	**(3.11)**
Intense Sell	**−0.59**	**0.33**	**−0.59**	**0.31**	**−0.51**	**0.29**	**−0.39**	**0.37**	**−0.30**	**0.32**	−0.19	**0.31**
	(−4.42)	**(3.72)**	**(−4.58)**	**(3.84)**	**(−3.72)**	**(3.67)**	**(−3.47)**	**(3.25)**	**(−2.45)**	**(3.19)**	(−1.36)	**(3.28)**
Intense	**0.28**	**−0.08**	**0.33**	−0.05	**0.27**	−0.03	**0.12**	**−0.13**	**0.22**	−0.07	**0.16**	−0.04
Buy-Sell	**(2.16)**	**(−2.31)**	**(3.74)**	(−1.10)	**(3.06)**	(−0.65)	**(2.14)**	**(−2.64)**	**(2.51)**	(−1.50)	**(2.18)**	(−1.23)
Valuation uncertainty proxied by analyst dispersion												
Intense Buy	**−0.47**	**0.70**	**−0.45**	**0.66**	**−0.45**	**0.57**	**−0.40**	**0.66**	**−0.29**	**0.66**	**−0.28**	**0.58**
	(−3.71)	**(5.43)**	**(−3.45)**	**(5.56)**	**(−3.62)**	**(5.42)**	**(−3.91)**	**(6.03)**	**(−2.78)**	**(5.73)**	**(−2.90)**	**(5.66)**
Intense Sell	**−0.79**	**0.49**	**−0.75**	**0.47**	**−0.65**	**0.48**	**−0.53**	**0.65**	**−0.48**	**0.63**	**−0.36**	**0.64**
	(−5.73)	**(4.13)**	**(−5.72)**	**(4.21)**	**(−4.94)**	**(4.81)**	**(−5.27)**	**(5.18)**	**(−4.34)**	**(5.92)**	**(−3.11)**	**(6.69)**
Intense	**0.32**	0.21	**0.30**	0.19	**0.20**	0.09	**0.13**	0.01	**0.19**	0.03	**0.08**	−0.06
Buy-Sell	**(2.70)**	(1.30)	**(3.39)**	(1.21)	**(3.46)**	(0.46)	**(1.78)**	(0.18)	**(2.85)**	(−0.19)	**(2.17)**	(−1.39)
Valuation uncertainty proxied by first principal component of the eight variables												
Intense Buy	**−0.30**	0.08	**−0.23**	0.11	**−0.20**	0.10	**−0.31**	0.08	−0.07	0.12	−0.03	0.11
	(−2.08)	(0.85)	**(−1.76)**	(1.18)	**(−1.69)**	(1.10)	**(−2.04)**	(0.76)	(−0.56)	(1.22)	(−0.28)	(1.24)
Intense Sell	**−0.54**	0.07	**−0.53**	0.14	**−0.35**	**0.14**	**−0.28**	**0.19**	**−0.23**	**0.21**	−0.05	**0.20**
	(−3.52)	(0.70)	**(−3.57)**	(1.46)	**(−2.44)**	**(1.67)**	**(−2.00)**	**(1.89)**	**(−1.86)**	**(2.28)**	(−0.40)	**(2.47)**
Intense	**0.24**	0.01	**0.30**	−0.03	**0.15**	−0.04	0.03	**−0.11**	**0.16**	−0.09	0.02	−0.09
Buy-Sell	**(2.75)**	(1.40)	**(1.87)**	(−1.15)	**(2.43)**	(−1.37)	(0.97)	**(−1.71)**	**(2.07)**	(−1.28)	(0.38)	(−1.40)

we investigate whether or not institutions may be receiving the information from analysts.

In Table 10, we report the analyst forecast revisions over the prior quarter, current quarter and subsequent quarter relative to the trading portfolio formation quarter for the top and bottom VU tertiles stocks. Following Zhang (2006a,b) and Kasznik and Mcnichols (2002), we calculate current analyst revision as the change from the mean analyst forecast in the current quarter (institutional trading portfolio formation quarter) to the mean analyst forecast in the prior quarter, scaled by prior quarter-end stock price. Similarly, we calculate prior analyst revision as the change from the mean analyst forecast in the prior quarter to the two quarters before the trading portfolio formation quarter, scaled by prior two quarter-end price. We calculate subsequent analyst revision as the change from the mean analyst forecast in the subsequent quarter to the mean analyst forecast in the current quarter, scaled by the current quarter-end price.

We partition these revisions based on institutional Intense Buy and Intense Sell portfolios. From Table 10, we observe that analysts significantly revise their forecast downward during the current quarter and subsequent quarter for firms in the Intense Sell portfolio. However, for the quarter prior to the portfolio formation date, we find that analysts forecast revision is negative but statistically insignificant, and the magnitude of negative revision is much smaller as compared to the current and subsequent quarters. These results seem to suggest that institutions' ability to predict future earnings fundamentals (reported in Table 7) are not likely due to institutions receiving earnings information from analysts.

To further investigate whether institutions (in their sale of high VU stocks) obtained "tips" by analysts, we include in the pooled regression reported in Table 9 the consensus earnings forecast revision from the prior quarter. The coefficient on the Prior FR (prior quarter's Forecast Revision) is positive but statistically insignificant. The institutional "Intense Sell" dummy remains significantly negative even after adding in analyst forecast revisions in the regression. Overall, these findings suggest that institutions may have additional and perhaps, unique resources to forecast stock fundamentals in addition to the information that is contained in analyst earnings forecasts.

4.5. Return predictability by institutional type

Yan and Zhang (2009) documented evidence that short-term institutional investors, who have higher portfolio turnover rate, are generally more informed than long-term institutional investors. Given their findings, we test whether the institutional investors' predictive ability varies across institutional types. More specifically, whether some institutions are better informed than others in exploiting mispriced stocks.

We follow Bushee (2001) to classify institutions into "transient", "quasi-indexer", and "dedicated" institutions. The classification is based on their past investment patterns in terms of portfolio turnover and diversification.[17] Bushee (2001) argues that transient institutions are engaged in frequent trading and therefore are more active in security analysis and trading activities. Dedicated institutions behave like long-term value investors, who typically have a large stake in the firms they invest. Quasi-indexers are passive investors who hold highly diversified portfolios and therefore are not likely to engage in active security analysis.

[17] We wish to thank Professor Brian Bushee for making the data available at http://acct.wharton.upenn.edu/faculty/bushee/IIclass.html.

Table 9
Regressions of subsequent returns of high VU stocks.
Table reports pooled regressions of raw buy-and-hold returns of stocks that are in the top tertile of VU measure at the end of the quarter prior to portfolio formation. Size is the market capitalization calculated at the end of each quarter. Book-to-market is calculated as book value for the fiscal year ended before the most recent June 30, divided by market capitalization of December 31 during that fiscal year. Return (−6,−3) is the cumulative three months return prior to portfolio formation and Return (−12,−3) is the cumulative nine months return prior to portfolio formation. S&P 500 is a dummy variable, equal to one if a firm is included in the S&P 500 index. Dividend yield calculated as cash dividend divided by prior quarter-end share price. Lag IO is institutional ownership calculated as the ratio of the sum of shares held by total institutional investors at the end of last quarter to the total number of shares outstanding. Accrual and asset growth are in the previous year to the portfolio formation year. Prior FR is the consensus analyst earnings forecast revision over the prior three months to the portfolio formation quarter. Intense_Sell is a dummy variable equal to one if a stock experiences intense sell by institutional investors. High_Sent is a dummy variable that takes on values zero for pessimistic and one for optimistic market sentiment. High_Sent∗Intense_Sell is an interaction between high sentiment dummy and intense sell dummy. T-statistics are based on firm and month double clustered errors, as suggested by Petersen (2009) and Thompson (2011). T-stats that are significant for Intense_Sell or High_Sent∗Intense_Sell are in bold.

	Specification (1)				Specification (2)			
	Three months		12 months		Three months		12 months	
	Coefficient	*t* -value	Coefficient	*t* -value	Coefficient	*t* -value	Coefficient	*t* -value
Valuation uncertainty proxied by 1/firm age								
Intercept	0.0936	5.52	0.3202	8.92	0.0891	5.26	0.3052	8.53
Size	−0.0038	−2.25	−0.0119	−3.51	−0.0033	−1.98	−0.0104	−3.08
Book to market	3.1310	1.86	11.6322	5.35	2.9852	1.76	11.1544	5.2
Stock price	−0.0043	−1.39	−0.0258	−3.89	−0.0044	−1.41	−0.0260	−3.93
Return (−6,−3)	0.0332	4.49	0.0185	1.16	0.0321	4.36	0.0149	0.94
Return (−12,−3)	−0.0123	−5.63	−0.0207	−5.69	−0.0124	−5.67	−0.0209	−5.76
S&P 500 dummy	0.0371	5.74	0.1168	8.91	0.0368	5.72	0.1159	8.91
Dividend yield	−0.0208	−6.35	−0.0394	−6.11	−0.0209	−6.43	−0.0397	−6.28
Lag IO	−0.0070	−1.12	0.0438	3.37	−0.0095	−1.52	0.0356	2.75
Accrual	−0.0216	−1.18	−0.1628	−4.4	−0.0220	−1.21	−0.1641	−4.49
Asset growth	−0.0078	−3.62	−0.0352	−7.45	−0.0073	−3.44	−0.0333	−7.38
Prior FR	0.0960	1.01	0.1957	1.12	0.0961	1.01	0.1961	1.13
Intense_Sell	**−0.0073**	**−3.05**	**−0.0271**	**−4.96**	−0.0230	−0.54	−0.0078	−0.79
High_Sent					−0.0092	−0.92	−0.0103	−0.65
High_Sent∗Intense_Sell					**−0.0676**	**−9.74**	**−0.2210**	**−16.12**
Valuation uncertainty proxied by volatility								
Intercept	0.0784	4.52	0.2989	8.03	0.0664	3.84	0.2623	7.07
Size	−0.0010	−0.61	−0.0105	−2.98	0.0000	−0.02	−0.0074	−2.13
Book to market	6.3308	3.45	23.1325	7.08	6.1004	3.31	22.4291	7.03
Stock price	−0.0113	−3.49	−0.0321	−4.71	−0.0111	−3.42	−0.0314	−4.63
Return (−6,−3)	0.0274	5.02	−0.0082	−0.72	0.0259	4.75	−0.0128	−1.13
Return (−12,−3)	−0.0155	−8.77	−0.0246	−8.25	−0.0156	−8.85	−0.0250	−8.37
S&P 500 dummy	0.0357	6.74	0.0951	8.73	0.0354	6.71	0.0944	8.7
Dividend yield	−0.0202	−6.6	−0.0277	−4.85	−0.0209	−6.88	−0.0298	−5.31
Lag IO	−0.0007	−0.1	0.0875	6.13	−0.0036	−0.52	0.0785	5.53
Accrual	−0.0058	−0.33	−0.1378	−3.95	−0.0057	−0.33	−0.1377	−3.98
Asset growth	−0.0089	−4.31	−0.0395	−8.67	−0.0082	−4.07	−0.0374	−8.61
Prior FR	0.0480	0.78	0.0746	0.67	0.0491	0.8	0.0779	0.70
Intense_Sell	**−0.0139**	**−3.900**	**−0.0267**	**−3.61**	−0.0053	−1.22	−0.0108	−1.12
High_Sent					**−0.0158**	**−2.20**	−0.0237	−1.64
High_Sent∗Intense_Sell					**−0.0800**	**−12.56**	**−0.2442**	**−19.79**
Valuation uncertainty proxied by analyst dispersion								
Intercept	−0.0221	−1.12	−0.0518	−1.31	−0.0257	−1.3	−0.0624	−1.59
Size	0.0068	3.8	0.0128	3.67	0.0072	4.03	0.0140	4.06
Book to market	16.5228	4.25	77.9996	9.54	16.0823	4.21	76.6606	9.54
Stock price	−0.0103	−3.8	−0.0269	−4.95	−0.0104	−3.84	−0.0271	−5.01
Return (−6,−3)	0.0274	3.46	0.0020	0.13	0.0256	3.25	−0.0034	−0.22
Return (−12,−3)	−0.0168	−5.67	−0.0164	−2.76	−0.0166	−5.62	−0.0159	−2.68
S&P 500 dummy	0.0249	7.29	0.0602	8.38	0.0253	7.43	0.0616	8.61
Dividend yield	−0.0212	−9.06	−0.0340	−7.55	−0.0216	−9.27	−0.0351	−7.92
Lag IO	−0.0292	−4.35	0.0172	1.21	−0.0321	−4.8	0.0082	0.58
Accrual	0.0340	1.63	−0.0708	−1.71	0.0309	1.5	−0.0803	−1.97
Asset growth	−0.0197	−6.8	−0.0564	−8.37	−0.0188	−6.56	−0.0536	−8.07
Prior FR	0.0486	0.59	0.2030	1.39	0.0464	0.57	0.1965	1.37
Intense_Sell	−0.0016	−0.44	−0.0081	−1.14	0.0282	0.80	0.0080	0.90
High_Sent					**−0.0399**	**−3.22**	−0.0399	−1.56
High_Sent∗Intense_Sell					**−0.0717**	**−10.83**	**−0.2178**	**−17.24**
Valuation uncertainty proxied by first principal component of the eight variables								
Intercept	0.0868	3.66	0.1858	3.12	0.0741	3.13	0.1423	2.40
Size	−0.0030	−1.37	−0.0071	−1.39	−0.0018	−0.83	−0.0031	−0.60
Book to market	11.4781	3.17	61.4799	8.59	10.6281	2.97	58.5454	8.36
Stock price	−0.0078	−2.12	−0.0091	−1.11	−0.0076	−2.07	−0.0084	−1.03
Return (−6,−3)	0.0322	4.9	0.0179	1.28	0.0303	4.61	0.0112	0.80
Return (−12,−3)	−0.0133	−6.13	−0.0234	−6.63	−0.0135	−6.22	−0.0243	−6.82
S&P 500 dummy	0.0347	4.52	0.0711	4.27	0.0356	4.64	0.0741	4.46
Dividend yield	−0.0454	−8.55	−0.0916	−9.01	−0.0450	−8.54	−0.0905	−9.07
Lag IO	−0.0087	−1.09	0.0222	1.16	−0.0136	−1.69	0.0054	0.28
Accrual	0.0035	0.2	−0.1772	−4.77	0.0023	0.13	−0.1814	−4.97
Asset growth	−0.0066	−2.68	−0.0377	−7.48	−0.0060	−2.50	−0.0357	−7.43
Prior FR	0.1451	1.58	0.1518	0.96	0.1445	1.58	0.1496	0.95
Intense_Sell	**−0.0084**	**−2.59**	**−0.0174**	**−2.32**	−0.0016	−0.33	0.0052	0.48
High_Sent					−0.0018	−0.23	−0.0177	−1.07
High_Sent∗Intense_Sell					**−0.0693**	**−9.72**	**−0.2390**	**−16.82**

Table 10
Analyst forecast revisions and institutional trading.
This table reports the average consensus earnings forecast revision over the prior, current, and subsequent quarter to the trading portfolio formation quarter, conditional on market sentiment and on top and bottom tertiles by the level of VU measure at the end of the quarter prior to portfolio formation. Consensus analyst forecast revisions are in percentage, and statistically significant at 10% are in bold.

	Optimistic sentiment periods						Pessimistic sentiment periods					
	Prior quarter		Current quarter		Subsequent quarter		Prior quarter		Current quarter		Subsequent quarter	
	High VU	Low VU	High VU	Low VU	High VU	Low VU	High VU	Low VU	High VU	Low VU	High VU	Low VU
Valuation uncertainty proxied by 1/firm age												
Intense Buy	−0.02	−0.03	0.07	**−0.08**	**−0.15**	**−0.10**	**0.16**	**0.20**	**0.15**	**0.12**	−0.01	−0.05
	(−0.54)	(−0.63)	(1.02)	**(−2.03)**	**(−2.91)**	**(−2.39)**	**(3.03)**	**(2.77)**	**(3.83)**	**(2.09)**	(−0.18)	(−0.87)
Intense Sell	−0.04	−0.02	**−0.10**	−0.01	**−0.46**	**−0.33**	0.05	0.00	−0.01	**0.09**	−0.04	**−0.12**
	(−0.74)	(−0.44)	**(−1.69)**	(−0.24)	**(−3.87)**	**(−3.95)**	(0.79)	(−0.03)	(−0.27)	**(2.07)**	(−0.39)	**(−2.17)**
Intense	0.02	−0.01	**0.17**	−0.06	**0.31**	**0.23**	0.11	**0.20**	**0.17**	0.03	0.03	0.07
Buy-Sell	(0.23)	(−0.19)	**(2.34)**	(−0.92)	**(2.94)**	**(2.54)**	(1.33)	**(2.72)**	**(2.78)**	(0.50)	(0.30)	(0.92)
Valuation uncertainty proxied by volatility												
Intense Buy	**0.12**	**−0.07**	0.01	**−0.07**	**−0.22**	−0.02	**0.31**	0.05	**0.25**	−0.02	−0.03	0.03
	(2.00)	**(−1.89)**	(0.15)	**(−2.22)**	**(−2.94)**	(−0.47)	**(2.67)**	(0.71)	**(2.86)**	(−0.34)	(−0.37)	(0.75)
Intense Sell	−0.07	0.00	**−0.16**	−0.03	**−0.68**	−0.04	0.05	0.04	−0.04	0.05	−0.11	0.01
	(−0.78)	(−0.04)	**(−2.61)**	(−0.53)	**(−5.48)**	(−0.93)	(0.54)	(1.23)	(−0.55)	(1.23)	(−1.04)	(0.20)
Intense	**0.20**	−0.07	**0.17**	−0.04	**0.46**	0.03	**0.26**	0.01	**0.29**	−0.07	0.07	0.02
Buy-Sell	**(1.95)**	(−1.17)	**(2.24)**	(−0.94)	**(3.72)**	(0.49)	**(2.87)**	(0.24)	**(2.74)**	(−1.35)	(0.69)	(0.29)
Valuation uncertainty proxied by analyst dispersion												
Intense Buy	−0.09	−0.08	0.01	−0.01	**−0.41**	−0.01	**0.33**	0.07	**0.31**	0.04	−0.10	0.01
	(−1.19)	(−1.31)	(0.13)	(−0.26)	**(−4.07)**	(−0.12)	**(2.29)**	(1.30)	**(2.52)**	(1.34)	(−0.84)	(0.28)
Intense Sell	−0.16	0.05	**−0.35**	**0.08**	**−0.90**	**−0.11**	0.03	0.07	0.01	0.05	**−0.29**	**−0.11**
	(−1.12)	(1.07)	**(−3.91)**	**(2.37)**	**(−4.90)**	**(−1.82)**	(0.46)	(1.48)	(0.16)	(1.04)	**(−2.18)**	**(−1.76)**
Intense	0.06	−0.13	**0.36**	**−0.09**	**0.49**	**0.10**	**0.30**	0.00	**0.30**	−0.01	**0.19**	**0.12**
Buy-Sell	(0.47)	(−1.81)	**(3.74)**	**(−1.71)**	**(2.90)**	**(1.77)**	**(2.59)**	(0.03)	**(2.49)**	(−0.10)	**(2.01)**	**(1.85)**
Valuation uncertainty proxied by first principal component of the eight variables												
Intense Buy	−0.03	**−0.07**	0.00	−0.03	**−0.12**	−0.02	0.19	0.04	**0.26**	0.01	−0.05	0.03
	(−0.63)	**(−1.78)**	(−0.09)	(−0.89)	**(−1.71)**	(−0.35)	(1.63)	(0.80)	**(3.37)**	(0.11)	(−0.54)	(0.54)
Intense Sell	−0.06	−0.04	**−0.15**	0.01	**−0.51**	−0.07	0.04	−0.03	0.00	**0.10**	**−0.25**	0.00
	(−0.64)	(−0.69)	**(−2.40)**	(0.19)	**(−4.75)**	(−1.21)	(0.63)	(−0.90)	(−0.02)	**(2.68)**	**(−2.95)**	(−0.01)
Intense	0.03	−0.02	**0.15**	−0.04	**0.40**	0.05	**0.15**	0.08	**0.26**	**−0.10**	**0.20**	0.04
Buy-Sell	(0.29)	(−0.39)	**(2.26)**	(−1.07)	**(3.22)**	(1.00)	**(1.75)**	(1.23)	**(3.06)**	**(−2.27)**	**(2.69)**	(0.45)

In Table 11, we present the return predictability by different types of institutional investors. Panel A reports the results for transient institutions, Panel B for quasi-indexers and Panel C for dedicated institutions. The table shows that both transient and dedicated institutions have predictive ability when they sell high VU stocks, and that transient institutions are even better informed than dedicated institutions. In contrast, we see little return predictive ability of quasi-indexers. When proxied by 1/firm age, transient institutional sell of high VU stocks predicts –1.27% (t=–4.63) for 3-month DGTW returns and dedicated institutional sell predicts –0.90% (t=–3.77) for 3-month DGTW returns. In contrast, quasi-indexers sell does not predict significant future returns.

4.6. Institutional ownership and market efficiency

So far, we have shown that institutional trading, especially their selling of high VU stocks during high sentiment periods predicts negative future returns. As such, their selling helps correct overvaluation of those high VU stocks and thereby improve price efficiency. This implies that intuitions may be contributing to increased market efficiency in general. Hence, we investigate whether stocks held by institutional agents are more efficient. In particular, we explore whether high VU stocks with high level of institutional ownership are less likely to get overvalued in the first place during high sentiment periods.[18] For high sentiment periods, we sort stocks into quintiles based on levels of institutional ownership and track the subsequent returns for 3-month, 6-month, and 12-month respectively.

Table 12 reports the results. We can see that stocks with higher level of institutional ownership are less likely to get overvalued during periods of high sentiment, as the subsequent returns are not consistently significantly negative. In contrast, high VU stocks with low institutional ownership during high sentiment tend to have significantly negative returns for most of the VU proxies. For example, using volatility as proxy, the 3-month subsequent returns on high VU portfolio during high sentiment with low institutional ownership is –1.64% (t=–2.79). In contrast, for high VU stocks with high institutional ownership stocks the 3-month subsequent returns is –0.14% and statistically insignificant (t=–0.14).

5. Conclusion

If institutional investors have information advantage, they should be able to take advantage of their skilled security analysis to exploit any mispricing. Paradoxically, as institutional investors, who are the presumably sophisticated investors, have become the dominant investors in the equity market, equity market should become more efficient over time. Then it raises the question whether institutional investors in a more competitive market, still possess superior informational advantages or are better skilled in predicting stock returns.

It has been documented that mispricing is generally attributed to market impediment to short selling. As such, mispriced stocks are mainly overpriced stocks resulting from investor optimism combined with short sale constraints. Given significant variation in market sentiments, overpricing will be more pronounced during periods when market sentiments are high. Specifically, highly valuation uncertain firms such as young, volatile firms are found to be more overpriced during periods of high investor sentiment and consequently will earn significantly lower subsequent returns. As a result, the sentiment-driven overvaluation in highly uncertain stocks provides both cross sectional and inter temporal implications for skilled security analysis.

[18] The authors would like to thank an anonymous reviewer for suggesting this line of reasoning.

Table 11
Return predictability and institutional investor type.
This table reports the return predictive ability of different types of institutional investors, by Bushee's classification. At the end of each quarter, all eligible NYSE/AMEX/NASDAQ stocks are sorted based on their rankings of the initial-ownership-stratified changes in a certainty type of institutional investors' ownership and independently sorted into tertiles by the level of VU measure at the end of the quarter prior to portfolio formation. Within each VU tertile, time series average of the buy-and-hold DGTW-adjusted returns of the top and bottom quintiles of the type of institutional trading as well as the differences of top and bottom institutional trading quintiles are reported. All returns are in percentage. T-statistics are adjusted by Newey–West serial correlation up to 4 lags. Returns statistically significant at 10% are in bold.

Panel A: transient institutional investors

	Three months				Six months				One year			
	High VU	Mid VU	Low VU	High–Low	High VU	Mid VU	Low VU	High–Low	High VU	Mid VU	Low VU	High–Low
Valuation uncertainty proxied by 1/firm age												
Intense Buy	0.39	**0.69**	**0.29**	0.10	0.30	**1.28**	0.32	−0.02	−0.86	1.14	−0.39	−0.47
	(1.13)	**(4.10)**	**(1.76)**	(0.25)	(0.54)	**(3.89)**	(1.09)	(−0.03)	(−0.81)	(1.80)	(−0.72)	(−0.45)
Intense Sell	**−1.27**	−0.22	0.01	**−1.28**	**−2.41**	**−0.73**	−0.22	−2.20	**−4.07**	−0.64	−0.93	**−3.14**
	(−4.63)	(−0.96)	(0.06)	**(−3.94)**	**(−6.73)**	**(−1.81)**	(−0.50)	(−4.47)	**(−6.06)**	(−1.00)	(−1.00)	**(−3.25)**
Intense	**1.66**	**0.90**	0.28	**1.38**	**2.71**	**2.01**	0.53	2.18	**3.21**	**1.78**	0.54	**2.67**
Buy-Sell	**(4.00)**	**(3.08)**	(1.06)	**(3.98)**	**(4.35)**	**(3.44)**	(1.04)	(4.66)	**(2.85)**	**(1.91)**	(0.50)	**(3.57)**
Valuation uncertainty proxied by volatility												
Intense Buy	0.49	**0.39**	0.44	0.05	0.69	**0.76**	0.52	0.17	−0.33	0.82	0.47	−0.80
	(1.14)	**(1.91)**	(1.29)	(0.07)	(0.87)	**(2.01)**	(0.78)	(0.12)	(−0.20)	(1.26)	(0.36)	(−0.29)
Intense Sell	**−1.19**	0.07	0.15	**−1.34**	**−2.42**	−0.10	−0.03	**−2.39**	**−3.60**	−0.29	−0.28	−3.32
	(−3.11)	(0.31)	(0.40)	**(−2.01)**	**(−4.18)**	(−0.21)	(−0.04)	**(−2.16)**	**(−3.44)**	(−0.30)	(−0.19)	(−1.48)
Intense	**1.68**	0.32	0.29	**1.39**	**3.11**	**0.86**	**0.55**	**2.56**	**3.27**	1.12	0.75	**2.52**
Buy-Sell	**(3.96)**	(1.19)	(1.57)	**(3.43)**	**(3.87)**	**(2.02)**	**(1.73)**	**(3.40)**	**(2.41)**	(1.34)	(1.49)	**(2.29)**
Valuation uncertainty proxied by analyst dispersion												
Intense Buy	**−0.50**	0.37	**2.42**	**−2.91**	−0.88	0.04	**4.88**	**−5.76**	**−3.31**	−0.39	**9.48**	**−12.79**
	(−1.80)	(1.32)	**(6.72)**	**(−7.13)**	(−1.79)	(0.10)	**(6.19)**	**(−7.12)**	**(−3.58)**	(−0.51)	**(5.18)**	**(−6.92)**
Intense Sell	**−1.08**	−0.39	**1.36**	**−2.44**	**−2.59**	−0.61	**2.67**	**−5.26**	**−4.42**	−0.61	**6.43**	**−10.85**
	(−3.48)	(−1.54)	**(4.20)**	**(−5.76)**	**(−4.95)**	(−1.31)	**(5.15)**	**(−7.20)**	**(−5.27)**	(−0.83)	**(6.59)**	**(−8.06)**
Intense	0.58	0.76	**1.06**	−0.48	**1.71**	0.65	**2.21**	−0.50	1.10	0.22	**3.05**	**−1.94**
Buy-Sell	(1.49)	(1.99)	**(2.35)**	(−1.09)	**(2.47)**	(0.91)	**(2.57)**	(−0.70)	(1.26)	(0.18)	**(2.11)**	**(−1.70)**
Valuation uncertainty proxied by first principal component of the eight variables												
Intense Buy	0.61	0.30	0.35	0.26	1.25	0.40	0.50	0.75	1.98	1.01	0.79	1.19
	(1.13)	(1.25)	(1.40)	(0.37)	(1.26)	(1.11)	(1.15)	(0.58)	(0.85)	(1.33)	(1.08)	(0.42)
Intense Sell	**−0.89**	−0.01	0.16	−1.06	**−2.22**	0.26	0.45	**−2.67**	−1.90	0.66	0.65	−2.56
	(−1.84)	(−0.02)	(0.59)	(−1.60)	**(−3.32)**	(0.49)	(1.02)	**(−2.85)**	(−1.65)	(0.72)	(0.72)	(−1.39)
Intense	**1.50**	0.30	0.19	**1.31**	**3.47**	0.13	0.05	**3.42**	**3.88**	0.35	0.14	**3.74**
Buy-Sell	**(2.80)**	(0.89)	(0.83)	**(2.48)**	**(3.76)**	(0.23)	(0.14)	**(3.94)**	**(2.42)**	(0.37)	(0.25)	**(2.76)**

Panel B: quasi-indexer institutional investors

	Three months				Six months				One year			
	High VU	Mid VU	Low VU	High–Low	High VU	Mid VU	Low VU	High–Low	High VU	Mid VU	Low VU	High–Low
Valuation uncertainty proxied by 1/firm age												
Intense Buy	−0.31	0.11	−0.05	−0.26	−0.45	0.33	−0.22	−0.23	**−1.48**	−0.03	−1.30	−0.17
	(−1.22)	(0.68)	(−0.31)	(−0.77)	(−1.11)	(1.31)	(−0.76)	(−0.41)	**(−2.14)**	(−0.06)	(−1.93)	(−0.15)
Intense Sell	−0.35	0.33	−0.04	−0.31	**−0.79**	0.43	−0.22	−0.56	**−1.60**	0.70	−0.57	−1.03
	(−1.55)	(1.75)	(−0.21)	(−1.02)	**(−2.10)**	(1.25)	(−0.60)	(−1.15)	**(−2.13)**	(1.19)	(−0.77)	(−1.06)
Intense	0.04	−0.22	−0.01	0.05	0.33	−0.10	0.00	0.33	0.12	−0.73	−0.73	0.85
Buy-Sell	(0.14)	(−0.93)	(−0.05)	(0.16)	(0.61)	(−0.26)	(0.01)	(0.59)	(0.13)	(−1.14)	(−1.04)	(0.75)
Valuation uncertainty proxied by volatility												
Intense Buy	−0.21	−0.08	0.08	−0.30	−0.41	0.18	0.10	−0.50	−1.82	−0.06	−0.28	−1.53
	(−0.56)	(−0.45)	(0.27)	(−0.45)	(−0.62)	(0.48)	(0.16)	(−0.42)	(−1.49)	(−0.08)	(−0.21)	(−0.61)
Intense Sell	−0.39	0.25	0.36	−0.74	−0.81	0.22	0.34	−1.15	−1.52	0.35	0.41	−1.93
	(−1.15)	(1.08)	(0.98)	(−1.17)	(−1.38)	(0.49)	(0.49)	(−0.98)	(−1.27)	(0.41)	(0.28)	(−0.79)
Intense	0.17	−0.33	−0.27	0.45	0.40	−0.04	−0.25	0.65	−0.30	−0.41	−0.69	0.39
Buy-Sell	(0.60)	(−1.69)	(−1.53)	(1.52)	(0.70)	(−0.12)	(−0.85)	(1.20)	(−0.33)	(−0.69)	(−1.58)	(0.47)
Valuation uncertainty proxied by analyst dispersion												
Intense Buy	−0.36	−0.19	0.05	−0.42	−0.58	0.10	0.20	−0.78	−1.71	−0.63	−0.42	−1.29
	(−1.05)	(−0.77)	(0.23)	(−1.00)	(−1.17)	(0.28)	(0.57)	(−1.24)	(−2.17)	(−1.15)	(−0.64)	(−1.17)
Intense Sell	−0.19	0.14	−0.03	−0.16	−0.26	0.06	0.21	−0.47	−0.29	0.67	0.64	−0.93
	(−0.56)	(0.59)	(−0.11)	(−0.35)	(−0.48)	(0.13)	(0.50)	(−0.66)	(−0.32)	(0.75)	(0.77)	(−0.70)
Intense	−0.18	−0.33	0.08	−0.25	−0.32	0.04	−0.01	−0.32	−1.42	−1.30	−1.06	−0.37
Buy-Sell	(−0.56)	(−1.19)	(0.25)	(−0.63)	(−0.55)	(0.09)	(−0.01)	(−0.45)	(−1.44)	(−1.37)	(−1.15)	(−0.28)
Valuation uncertainty proxied by first principal component of the eight variables												
Intense Buy	−0.56	−0.18	−0.19	−0.37	−0.76	−0.16	0.10	−0.85	−2.11	−0.92	−0.44	−1.67
	(−1.33)	(−0.66)	(−0.79)	(−0.65)	(−1.20)	(−0.36)	(0.20)	(−0.86)	(−1.84)	(−0.94)	(−0.49)	(−0.89)
Intense Sell	−0.53	0.32	0.04	−0.56	−0.64	0.41	−0.02	−0.62	0.34	1.30	0.50	−0.15
	(−1.25)	(1.15)	(0.14)	(−0.90)	(−0.92)	(0.83)	(−0.05)	(−0.61)	(0.20)	(1.62)	(0.67)	(−0.07)
Intense	−0.03	−0.50	−0.22	0.19	−0.12	−0.57	0.12	−0.24	−2.45	−2.22	−0.93	−1.52
Buy-Sell	(−0.10)	(−1.61)	(−1.00)	(0.47)	(−0.21)	(−1.17)	(0.30)	(−0.34)	(−2.21)	(−3.02)	(−1.57)	(−1.47)

(*continued on next page*)

Table 11 (*continued*)

Panel C: dedicated institutional investors

	Three months				Six months				One year			
	High VU	Mid VU	Low VU	High–Low	High VU	Mid VU	Low VU	High–Low	High VU	Mid VU	Low VU	High–Low
Valuation uncertainty proxied by 1/firm age												
Intense Buy	0.37	**0.55**	0.22	0.15	0.55	**0.87**	0.32	0.22	−0.35	**1.65**	0.26	−0.61
	(1.33)	**(3.00)**	(1.34)	(0.40)	(1.15)	**(2.83)**	(1.01)	(0.34)	(−0.41)	**(3.22)**	(0.46)	(−0.51)
Intense Sell	**−0.90**	0.03	0.23	**−1.12**	**−1.90**	0.12	0.15	**−2.06**	**−2.85**	0.16	−0.43	**−2.42**
	(−3.77)	(0.21)	(1.39)	**(−3.34)**	**(−4.56)**	(0.35)	(0.64)	**(−3.85)**	**(−3.71)**	(0.28)	(−0.86)	**(−2.51)**
Intense	**1.26**	**0.52**	−0.01	**1.27**	**2.45**	**0.75**	0.17	**2.28**	**2.50**	**1.50**	**0.69**	**1.81**
Buy-Sell	**(4.68)**	**(2.62)**	(−0.04)	**(3.84)**	**(5.09)**	**(2.01)**	(0.57)	**(4.22)**	**(2.98)**	**(2.30)**	**(1.78)**	**(2.29)**
Valuation uncertainty proxied by volatility												
Intense Buy	0.43	0.33	0.11	0.31	0.44	**0.76**	0.25	0.19	−0.39	**1.48**	0.60	−0.99
	(1.15)	(1.60)	(0.41)	(0.51)	(0.69)	**(1.85)**	(0.47)	(0.17)	(−0.30)	**(2.19)**	(0.56)	(−0.44)
Intense Sell	−0.47	0.01	0.20	−0.66	−0.95	−0.18	0.17	−1.12	−1.82	−0.49	−0.08	−1.74
	(−1.27)	(0.07)	(0.67)	(−1.05)	(−1.48)	(−0.47)	(0.29)	(−0.96)	(−1.39)	(−0.65)	(−0.07)	(−0.75)
Intense	**0.89**	0.32	−0.08	**0.98**	**1.39**	**0.95**	0.08	**1.31**	**1.43**	**1.97**	0.68	0.75
Buy-Sell	**(4.07)**	(1.52)	(−0.53)	**(3.71)**	**(3.97)**	**(2.62)**	(0.36)	**(3.29)**	**(1.97)**	**(3.68)**	(1.65)	(0.91)
Valuation uncertainty proxied by analyst dispersion												
Intense Buy	0.23	0.38	0.17	0.06	0.53	**0.96**	0.44	0.09	0.81	**1.72**	0.96	−0.15
	(0.58)	(1.37)	(0.82)	(0.12)	(0.86)	**(2.41)**	(1.17)	(0.11)	(0.71)	**(2.19)**	(1.49)	(−0.11)
Intense Sell	−0.41	0.01	**0.53**	**−0.95**	**−0.97**	−0.18	**0.72**	**−1.68**	**−1.88**	−0.28	0.62	**−2.50**
	(−1.17)	(0.06)	**(2.53)**	**(−2.08)**	**(−1.93)**	(−0.52)	**(2.33)**	**(−2.60)**	**(−2.01)**	(−0.49)	(0.99)	**(−2.05)**
Intense	**0.64**	0.37	−0.36	**1.01**	**1.50**	**1.14**	−0.27	**1.77**	**2.69**	**2.00**	0.34	**2.35**
Buy-Sell	**(1.74)**	(1.40)	(−1.39)	**(2.14)**	**(2.98)**	**(3.20)**	(−0.67)	**(2.50)**	**(2.91)**	**(2.93)**	(0.56)	**(2.26)**
Valuation uncertainty proxied by first principal component of the eight variables												
Intense Buy	0.09	0.07	0.07	0.01	0.54	0.48	0.34	0.20	1.37	1.03	1.35	0.02
	(0.18)	(0.28)	(0.28)	(0.02)	(0.75)	(1.08)	(0.84)	(0.21)	(0.85)	(1.42)	(1.87)	(0.01)
Intense Sell	−0.45	0.22	0.19	−0.64	−1.05	0.01	0.39	−1.44	−1.28	−0.13	0.35	−1.63
	(−1.02)	(0.83)	(0.77)	(−1.02)	(−1.43)	(0.01)	(0.95)	(−1.33)	(−0.79)	(−0.16)	(0.45)	(−0.73)
Intense	0.54	−0.15	−0.11	0.65	1.59	0.47	−0.06	1.65	2.65	1.16	1.00	1.65
Buy-Sell	(1.60)	(−0.53)	(−0.53)	(1.57)	(3.54)	(1.27)	(−0.14)	(2.50)	(3.25)	(2.20)	(1.48)	(1.58)

Table 12

Institutional ownership and market efficiency.

For optimistic market sentiment periods only, at the end of each quarter, all eligible NYSE/AMEX/NASDAQ stocks are sorted into quintiles based on their rankings of the level of institutional ownership and independently sorted into tertiles by the level of VU measure at the end of the quarter prior to portfolio formation. Within each VU tertile, time series average of the buy-and-hold DGTW-adjusted returns of the top and bottom quintiles of the institutional ownership as well as the differences of top and bottom institutional ownership quintiles are reported. All returns are in percentage. T-statistics are adjusted by Newey–West serial correlation up to 4 lags. Returns statistically significant at 10% are in bold.

	Three months				Six months				One year			
	High VU	Mid VU	Low VU	High–Low	High VU	Mid VU	Low VU	High–Low	High VU	Mid VU	Low VU	High–Low
Valuation uncertainty proxied by 1/firm age												
High IO	−0.54	0.31	0.04	−0.58	**−1.31**	0.57	−0.05	**−1.27**	**−2.81**	1.10	−0.26	**−2.55**
	(−1.38)	(1.08)	(0.15)	(−1.34)	**(−2.23)**	(1.20)	(−0.11)	**(−1.83)**	**(−2.25)**	(1.32)	(−0.31)	**(−1.81)**
Low IO	−0.59	0.34	−0.24	−0.35	−0.88	0.83	−0.77	−0.11	−2.22	0.47	−3.06	0.84
	(−1.05)	(0.70)	(−0.50)	(−0.80)	(−0.91)	(0.97)	(−0.85)	(−0.12)	(−1.05)	(0.20)	(−1.44)	(0.47)
High–Low	0.06	−0.03	0.28	−0.23	−0.44	−0.26	0.72	−1.15	−0.59	0.63	2.80	−3.39
	(0.07)	(−0.05)	(0.47)	(−0.34)	(−0.33)	(−0.25)	(0.66)	(−0.98)	(−0.20	(0.23)	(1.22)	(−1.61)
Valuation uncertainty proxied by volatility												
High IO	−0.14	−0.08	0.46	−0.59	−1.07	−0.09	**1.08**	**−2.15**	−1.61	−0.22	1.23	−2.84
	(−0.23)	(−0.31)	(1.61)	(−0.75)	(−1.38)	(−0.18)	**(2.44)**	**(−1.97)**	(−0.93)	(−0.26)	(1.15)	(−1.11)
Low IO	**−1.64**	0.69	1.11	**−2.75**	**−3.24**	1.44	2.30	**−5.54**	**−6.39**	0.55	3.45	**−9.84**
	(−2.79)	(1.36)	(1.40)	**(−2.59)**	**(−3.40)**	(1.56)	(1.63)	**(−3.04)**	**(−3.70)**	(0.24)	(0.95)	**(−2.38)**
High–Low	**1.51**	−0.77	−0.65	**2.16**	**2.16**	−1.53	−1.22	**3.39**	**4.78**	−0.77	−2.22	**7.00**
	(1.87)	(−1.37)	(−0.99)	**(2.67)**	**(1.72)**	(−1.58)	(−1.04)	**(2.49)**	**(1.91)**	(−0.34)	(−0.74)	**(2.91)**
Valuation uncertainty proxied by analyst dispersion												
High IO	**−1.56**	0.02	**1.95**	**−3.51**	**−3.25**	−0.44	**4.35**	**−7.60**	**−6.69**	−1.20	**9.12**	**−15.81**
	(−3.34)	(0.05)	**(4.03)**	**(−5.79)**	**(−4.26)**	(−0.76)	**(4.34)**	**(−5.86)**	**(−6.15)**	(−1.25)	**(3.63)**	**(−4.99)**
Low IO	**−1.58**	−0.21	**1.23**	**−2.81**	**−3.11**	−0.89	**3.42**	**−6.53**	**−5.14**	−1.99	**5.82**	**−10.96**
	(−2.73)	(−0.44)	**(2.23)**	**(−3.54)**	**(−3.44)**	(−1.25)	**(4.06)**	**(−5.25)**	**(−2.61)**	(−1.39)	**(4.08)**	**(−4.11)**
High–Low	0.02	0.23	0.72	−0.70	−0.14	0.44	0.93	−1.08	−1.54	0.79	3.30	−4.85
	(0.02)	(0.31)	(0.98)	(−0.73)	(−0.12)	(0.41)	(0.76)	(−0.64)	(−0.62)	(0.41)	(1.15)	(−1.04)
Valuation uncertainty proxied by first principal component of the eight variables												
High IO	−0.46	0.08	−0.01	−0.44	−1.15	−0.11	0.16	−1.31	−0.05	−0.35	−0.03	−0.03
	(−0.58)	(0.20)	(−0.04)	(−0.49)	(−0.98)	(−0.16)	(0.28)	(−0.95)	(−0.02)	(−0.31)	(−0.02)	(−0.01)
Low IO	**−1.33**	0.42	0.62	−1.95	**−2.58**	0.68	1.39	**−3.97**	−3.44	0.02	2.11	−5.55
	(−2.15)	(0.60)	(0.76)	(−1.57)	**(−2.31)**	(0.59)	(1.11)	**(−1.85)**	(−1.54)	(0.01)	(0.88)	(−1.23)
High–Low	0.88	−0.34	−0.41	1.51	1.43	−0.80	−1.82	**2.66**	3.39	−0.37	−2.20	5.52
	(1.09)	(−0.42)	(−0.50)	(1.59)	(1.26)	(−0.65)	(−1.33)	**(1.72)**	(1.35)	(−0.15)	(−0.97)	(1.61)

We hypothesize and provide evidence that stock selection skills of institutional investors are mainly concentrated in their trading in high VU stocks, particularly during periods of optimistic market sentiment. Specifically, we find that intense institutional sells of high VU stocks predict significantly negative subsequent returns, whereas we find no significant positive returns for stocks with intense institutional buys. Further, this predictive ability is largely concentrated in sells of high VU stocks completed during optimistic market sentiment periods. Sub-period analysis suggests that these results hold for more recent times, even though some studies have reported diminished superior trading skills of institutions. Our results also suggest that institutional trading improves equity market efficiency as their selling of uncertain stocks during high sentiment periods helps correct sentiment-driven overvaluation.

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