Institutional Trading and Stock Anomalies: Hedge funds versus non-hedge funds

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Abstract

Inferring institutional trading from changes in quarterly holdings, previous studies show that institutions tend to buy stocks that are classified as overvalued based on anomaly characteristics and experience ex-post underperformance relative to stocks sold, thus exacerbating instead of mitigating anomalies. Differentiating between hedge-fund and non-hedge-fund institutions, we find that such tendency to trade contrary to anomaly prescriptions exist only for non-hedge-fund institutions, but not among hedge funds. Measuring actual trading profits based on ANcerno transaction data, we find that hedge funds profit from trading undervalued stocks, while non-hedge-fund institutions lose from trading overvalued stocks. Overall our findings provide evidence for hedge funds' superior trading skills in the context of well-known stock return anomalies.

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I. Introduction

Efficient market hypothesis assumes that institutional investors will trade in the direction to exploit anomaly return predictability such that stock mispricing is mitigated. However, prior research finds evidences that institutional investors trade in a way that exacerbates stock mispricing. Jiang (2010) shows that book to market anomaly is more pronounced among stocks with intense past institutional trading but nonexistent among stocks with moderate institutional trading. Jang and Kang (2019) find that institutional demand increases for overpriced stocks until the stock price reaches to the peak of overvaluation. Edelen, Ince, and Kadlec (2016) show that institutional investors trade contrary to anomaly prescriptions during the six-quarter horizon prior to portfolio formation and this institutional trading pattern is negatively related to future anomaly returns. These studies cast doubt on the role of institutional investors play in mitigating anomaly mispricing. Different types of institutional investors may play different roles in arbitraging market inefficiency. We extend Edelen, Ince, and Kadlec (2016)'s study and examine whether hedge funds and non-hedge funds differ in exploiting anomaly mispricing over the period when stocks are realizing anomaly-defined characteristics.

Hedge funds are different from non-hedge funds in many ways. First, hedge fund engages intensively in academic research based quantitative modelling when making investment decisions (Cao, Liang, Lo, and Petrasek (2018)). Second, hedge fund has shorter trading horizons and hence trading turnover is higher than non-hedge funds. Higher turnover enables hedge funds to arbitrage mispricing when they discover the opportunity. Third, hedge funds are subject to less government regulation and hence can engage more short-selling, leverage, and derivative investment in their trading strategies. Given these features, hedge funds can exploit mispricing to a greater extent than non-hedge funds.

Empirical studies concerning whether hedge funds and non-hedge funds exploit anomalies concentrate on the effect of fund flows on stock mispricing. Fund flows to mutual funds (known as "dumb money") tend to exacerbate mispricing (Frazzini and Lamont (2008), Lou (2012), Akbas et al. (2015)), while fund flows to hedge funds ("smart money") attenuate mispricing (Akbas et al. (2015)). Trades induced by fund flows cannot represent all trades by institutions. Edelen (1999) shows that mutual fund flow is responsible for 30% of all trades. Therefore, the fact that fund flows cause or reduce anomaly mispricing cannot imply the effect of hedge funds' or non-hedge funds' overall trading activity on mispricing. Caglayan, Celiker,

and Sonaer (2018) use quarterly change in institutional ownership as a proxy for institutional trading and show that both hedge funds and non-hedge funds demand more for growth stocks than value stocks before portfolio formation. However, book-to-market anomaly alone is not a precise measure for mispricing and whether hedge funds and non-hedge funds arbitrage anomaly mispricing before portfolio formation is still unknown to us. Therefore, in this paper we examine overall trading activity by hedge funds and non-hedge funds and test the effect of their trading activity on anomaly mispricing.

The main objective of this paper is to understand the role that hedge funds and non-hedge funds play in arbitraging anomaly mispricing when stocks are taking on anomaly-based characteristics. We ask three questions. How do hedge funds and non-hedge funds trade mispriced stocks when stocks are taking on anomaly-defined characteristics? Will their trading activity exacerbate or attenuate mispricing? What are their trading performances? We use both 13F quarterly institutional holding data and ANcerno daily trading data to examine these three questions.

We first follow Edelen, Ince, and Kadlec (2016) and use quarterly change in institutional ownership to proxy for institutional trading. We examine change in fraction of shares held by hedge funds ($\Delta\%HF$) and non-hedge funds ($\Delta\%NHF$) during the six-quarter horizon before portfolio formation date, which is end of June of year t. The six-quarter trading horizon includes the period when stocks are realizing their anomaly ranking variables, the period when firm's anomaly variable information becomes public, and three months following firms' full public disclosure. We find that only non-hedge funds trade in contrary to anomaly prescriptions. Non-hedge funds significantly buy more of overvalued stocks than undervalued stocks. $\Delta\%NHF$ of overvalued stocks is higher than that of undervalued stocks by 1.8% (t-stat = 2.05). Hedge funds on the contrary trade in the right direction in the sense that their demand for overvalued stocks is insignificantly different from the demand for undervalued stocks.

The effect of institutional trading on anomaly future returns also differs among hedge funds and non-hedge funds. To examine whether institutional trading activity exacerbates mispricing, we form three mispricing by three change in institutional ownership portfolios and track twelve-month holding period return for those portfolios. Among all institutional investors, only non-hedge funds' trading exacerbates mispricing and the degree of exacerbation is very pronounced. Overvalued stocks with largest increase in non-hedge fund ownership realize the abnormal return of -0.39% (t-stat = -2.35) per month and undervalued stocks with lowest

change in non-hedge funds ownership generate 0.32% (t-stat = 2.5) in the twelve-month holding period. The exacerbation of mispricing is more pronounced among overvalued stocks. Overvalued stocks non-hedge funds buy significantly underperform overvalued stocks non-hedge funds sell by 0.32% (t-stat = 2.5). These evidences strongly indicate that non-hedge funds' trading activity exacerbates anomaly mispricing. In contrast with non-hedge funds, hedge funds' trading activity does not exacerbate mispricing. Overvalued stocks hedge funds buy realize zero abnormal returns in the future. The difference in stock abnormal returns for mispriced stocks between institutional buy and sell are insignificantly different from zero, suggesting that hedge funds' trading activity neither exacerbates nor attenuates mispricing.

In addition to the analysis by using quarterly institutional holding data, we also employ ANcerno daily trading data in our analysis. Quarterly change in institutional ownership measures have several constraints. First, roundtrip trades within the quarter (intraquarter roundtrip trades) and trades that cross the quarter but initiated and closed within the six-quarter horizon are not reported by quarterly holding data. Quarterly change in institutional ownership only reflects net change in shareholdings over the trading horizon, and this only represents a subset of institutions' trading activity. Roundtrip trades within the quarter, for example trades that institutions purchase and sell (buyer-initiated roundtrip trades) or institutions sell and repurchase (seller-initiated roundtrip trades), are not captured by quarterly data. Intraquarter roundtrip trades matter as those trades are informative and can reflect institutions' ability to exploit temporary mispricing (Puckett and Yan (2011)). Intraquarter and cross-quarter roundtrip trades account for nearly 40% of all trades. Neglecting those trades leads to incomplete trading information, and implication from quarterly analysis may differ after taking account of all trades within the six-quarter horizon. Second, quarterly institutional holdings are only snapshots of number of shares held by institutions at the end of quarter, and they provide no information concerning the exact timing and execution price of those trades. Institutional investors can purchase or sell their holding stocks to lock in gains at any time within the quarter or cross the quarter. Therefore, examining one-year performance of traded anomaly stocks cannot reflect institutional investors' true trading performance. ANcerno daily trading data provides price and time information on each trade executed by institutions and hence enables us to examine investors' trading performance directly. Therefore, we complement the quarterly institutional trading analysis by using ANcerno daily trading data to examine hedge funds' and non-hedge funds' trading activity and trading performance for mispriced stocks.

Using ANcerno daily trading data, we form roundtrip trades by following Chakrabarty, Moulton, and Trzcinka (2017) and examine trading imbalances of hedge funds and non-hedge funds in trading mispriced stocks within the six-quarter trading horizon.[2] To construct imbalance of trading volume (or number of trades) among all trades for one fund manager, we first subtract the number of shares traded by seller-initiated trades (or number of seller-initiated trades) from the trading volume of shares traded by buyer-initiated trades (or number of buyer-initiated trades). The net trading volume and net number of trades is then scaled by total trading volume and total number of trades respectively. These trading imbalances are different from quarterly change in institutional ownership measures in two ways. First, daily trading imbalance encompasses hidden transactions, namely intraquarter roundtrip trades and cross-quarter roundtrip trades initiated and closed within the six-quarter horizon, whereas quarterly change in institutional ownership measure only includes the roundtrip trades thar cross the start and end of six-quarter horizon. Second, daily imbalance measure reflects the strength of buyer-initiated and seller-initiated roundtrip trades within the six-quarter trading window, while quarterly change in institutional ownership only reflects net change in institutional ownership. Using daily trading imbalance measure, we find that only non-hedge funds trade in the opposite direction with anomaly prescription. Imbalance of trading volume of non-hedge funds is 16% (t-stat = 3.17) higher for overvalued stocks than undervalued stocks. By contrast, difference in trading imbalance between overvalued stocks and undervalued stocks is insignificantly different from zero for hedge funds. This finding is consistent with the result of quarterly trading analysis. Taken together, non-hedge funds trade in contrary to anomaly prescription and hedge funds trade correctly by not overbuying overvalued stocks during the six-quarter trading horizon even after taking all hidden transactions into account.

Daily trading data enables us to examine fund managers' trading performance directly. We examine the abnormal return of roundtrip trades of undervalued and overvalued stocks for hedge funds and non-hedge funds separately, and find that hedge funds profit from trading undervalued stocks while non-hedge funds lose money from trading overvalued stocks. Hedge funds earn a profit of 0.98% (t-stat = 2.62) per roundtrip trade for undervalued stocks and suffer no loss from trading overvalued stocks. In contrast with hedge funds, non-hedge funds earn zero profit from trading undervalued stocks but significantly lose 3.17% (t-stat = 5.47) per

[2] Since quarterly change in institutional ownership includes trades that initiated before and closed after portfolio formation. We include not only roundtrip trades that initiated and closed within six-quarter trading horizon, but also roundtrip trades whose two legs straddle portfolio formation date.

roundtrip trade for overvalued stocks. Hedge funds outperform non-hedge funds by 2.86% (t-stat = 5.05) per roundtrip trade in trading overvalued stocks and 1.27% (t-stat = 2.18) for undervalued stocks. These evidences imply that non-hedge funds are not skilled in identifying and trading mispriced stocks, while hedge funds are more skillful and can profit from trading mispriced stocks.

This paper makes several contributions to the literature. First, our study extends Edelen, Ince, and Kadlec (2016)'s analysis by examining hedge funds and non-hedge funds separately and contribute to the strand of literature studying hedge funds and non-hedge funds' role in arbitraging anomalies. We demonstrate that hedge funds serve a better role in exploiting market inefficiency than non-hedge funds. Non-hedge funds trade in contrary to anomaly prescription and their trading activity exacerbates anomaly mispricing. Hedge funds prevail non-hedge funds in the sense that their trading does not exacerbate mispricing. We find no evidences that hedge funds attenuate anomaly mispricing. Caglayan, Celiker, and Sonaer (2018) use quarterly change in institutional holding data and find that both hedge funds and non-hedge funds demand more for growth stocks than value stocks during the six-quarter trading horizon. Our findings contrast theirs in hedge funds' trading activity. Both quarterly and daily institutional trading analyses provide evidences that hedge funds' trading activity is orthogonal to stocks' mispricing level. This difference may be due to two reasons. First, we use all eleven anomalies examined by Stambaugh et al. (2012) but Caglayan, Celiker, and Sonaer (2018) examines book-to-market only. Our measure of mispricing is more comprehensive and precise than theirs. Second, Caglayan, Celiker, and Sonaer (2018) use change in number of institutional investors, while we use change in fraction of shares held by institutions to measure institutional trading. We argue that change in number of institutional investors by construction is likely to be higher for overvalued stocks than undervalued stocks.[3]

We also contribute to the literature of fund managers' trading performance in trading anomalies. Although the question that whether mutual fund and hedge fund managers create value from their investment has long been under debate, few studies investigate institutions' ability to generate risk-adjusted returns from trading mispriced stocks. For mutual funds, few

[3] Number of institutional investors is more likely to increase for small stocks than large stocks. For large stocks, institutions are more likely to change existing holdings for the stock rather than clearing out all inventory stocks. Market size for the portfolio of undervalued stocks is larger than the size for overvalued stocks as small stocks are more likely to be overvalued. Therefore, quarterly change in number of institutions ($\Delta\#INST$) will be higher for overvalued stocks than undervalued stocks. We find evidences that small stocks' $\Delta\#INST$ is significantly higher than large stocks among undervalued stocks, while $\Delta\#INST$ is insignificantly different between small and large stocks among overvalued stocks.

empirical evidences show that managers profit from trading anomalies (Carhart (1997), Korajczyk and Sadka (2004), Ali et al. (2008), and Kenchington, Wan, and Yüksel (2019)). Ali et al. (2008) find that few mutual funds trade on accrual anomaly and only 10% mutual funds with highest portfolio weights in low-accrual stocks earn positive risk-adjusted alphas. Evidences concerning hedge funds' performance in trading anomalies are even fewer. we examine both hedge fund managers' and non-hedge fund managers' performance in trading anomaly mispricing when stocks are taking on anomaly-defined characteristics. We show that non-hedge funds lose money from trading overvalued stocks and make zero profit from trading undervalued stocks. This evidence is consistent with ALI et al. (2008) and suggest that non-hedge funds show little skills to profit from trading anomalies. Hedge funds on the contrary exhibit skills in trading mispriced stocks: fund managers profit from trading undervalued stocks and suffer zero lose from trading overvalued stocks.

Although examining why non-hedge funds trade in contrary to anomaly prescription is beyond the scope of this study, the result of hedge funds' and non-hedge funds' trading performance sheds light on this question. Jang and Kang (2019) argue that skilled institutional investors can profit from buying overvalued stocks, for example fund managers buy overvalued stocks to inflate the price bubble and sell the stocks before the collapse of bubble to lock in gains. If this is the case, we will expect institutions to profit from trading overpriced stocks. However, we find no evidence that hedge funds and non-hedge funds profit from trading overpriced stocks. Non-hedge funds lose money significantly from overvalued stocks, especially buy trades. These evidences suggest that profit-driven purchase of overvalued stocks cannot explain non-hedge funds trading activity.

The remainder of the paper is organized as follows: section II describes data sources and variable construction. Section III presents change in hedge funds' and non-hedge funds' ownership for mispriced stocks during six-quarter trading horzion, and in Section IV we examine anomaly future return conditional on change in institutional ownership. Section V documents hedge funds and non-hedge funds trading imbalances for mispriced stocks before portfolio formation. In Section VI, we examine hedge funds' and non-hedge funds' trading performance for mispriced stocks. Section VII concludes.

II. Data and variable definitions

A. Data description and hedge fund identification

Stock return data is obtained from Center for Research in Security Prices (CRSP). Our sample includes US common stocks (CRSP share codes of 10 or 11) traded on NYSE, Amex, and Nasdaq. Following Edelen, Ince, and Kadlec (2016), utilities, financials, and stocks priced under $5 are excluded from the sample. We follow Hou, Xue, and Zhang (2018)'s method to adjust delisting return.

Quarterly institutional holding data (13F) is obtained from CDA/Spectrum database maintained by Thomson-Reuters.[4] Institutional investors whose investment over $100 million are required to disclose their holdings in securities they traded at quarter end. We use hedge fund list from Agarwal et al. (2013) (AJTY) to identify hedge funds. The sample period for AJTY hedge fund list is from Mar 1981 to Dec 2013. For sample periods after 2013 we manually collect fund information to identify hedge funds. AJTY classify institutional managers into hedge funds by manually checking information available from institutions' websites, SEC filings, industry directories and publication, and news articles.[5] As 13F is filled at management company level rather than individual fund level, AJTY only classifies institutions whose hedge funds represent their core business into hedge funds. Compared to ADV-classification method, AJTY shows that their classification covers more hedge fund companies that ADV method omits. Non-hedge funds are the funds other than hedge funds.

The sample period of our quarterly institutional holding analysis starts from January 1994 and ends in December 2016. The reason that the sample period starts in 1994 is that number of hedge funds is quite low compared to all institutional investors before 1994. Before 1994, hedge fund investors accounts for little proportion compared to other institutional investors. Fraction of hedge fund investors is generally less than 1% and shares held by hedge funds is less than 0.7% before 1994. However, hedge fund investment increases quickly over time. The increasing trend stops right before 2008 financial crisis (GFC) and hedge fund investment starts to decrease after the financial crisis. After 2013, hedge fund investment increases to the level right before financial crisis. At the end of our sample period, hedge funds accounts for 7.94% investors among all institutions and they hold 6.67% shares.

[4] Institutional holding data starts in December 1980 and ends in June 2016.
[5] See Agarwal et al. (2013) and Agarwal, Fos, and Jiang (2013) for more detailed information about hedge fund classification.

Daily institutional trading data is obtained from Ancerno Ltd, a consulting firm that provides trading transaction costs analysis for institutional clients, for example pension funds, brokers, and money managers. Previous literature using Ancerno in their analysis includes: Chakrabarty, Moulton, and Trzcinka (2017), Puckett and Yan (2011), Goldstein et al. (2009). This dataset is free of

Our sample period starts from January 1999 and ends in September 2011. ANcerno includes separate identity codes for client (investment company such as Fidelity Investment) and managers (individual funds under fund family such as Fidelity management and research). Client and fund manager information are confidential to academics but during some time in 2010 – 2011, ANcerno disclosed a cross-reference list that disclosed identity information for clients and fund managers. We use hedge funds identified by Jame (2018) and thank Prof Russell Jame for kindly sharing hedge fund list of ANcerno fund managers online.[6]

Stocks in ANcerno data are identified by stockkey (ANcerno identify code for stocks), symbol (stock ticker), and cusip. Symbols and cusips are provided by clients and hence one stock has different symbols and different digits of cusips. To match CRSP permno with ANcerno stock ID, we use both symbol and cusip information. Finally, we include institutional client code (clientcode), manager code (clientmgrcode), stock ID (stockkey, cusip, symbol), trade date (tradedate), transaction direction (side that equals one for buy trades and negative one for sell trades), trade price (price), trade volume (volume), and close price (dpc) in our analysis. We require that clientcode to be positive as zero clientcode indicates that Ancerno cannot track fund reliably over time. Intraday trades are excluded from our analysis as intraday time stamps in Ancerno are incomplete (Anand et al. (2013)).

B. Mispriced stocks

Stock mispricing is proxied by the composite mispricing score developed by Stambaugh, Yu, and Yuan (2012). The composite mispricing score for each stock is obtained from Prof Jianfeng Yu's personal website.[7] The composite mispricing score is the average rank of eleven anomalies. The eleven anomalies include failure probability, Ohlson's O score, net stock issues, composite equity issues, total accruals, net operating assets, momentum, gross profitability, asset growth, return on assets, and investment-to-assets. Compared with

[6] Russell hedge fund list is obtained from website: http://russelljame.com/research.html

[7] Composite mispricing score (Stambaugh et al. (2012)) is obtained from website: https://sites.google.com/site/yujianfengaca/

individual anomalies, the composite score is more precise in measuring mispricing. Higher (lower) mispricing score indicates that stocks are more overpriced (underpriced). To form anomaly portfolios, we rank stocks on June 30th of year t by their composite mispricing score into tertiles and hold the stocks for twelve months from July t through June t+1. We form three anomaly-characteristic portfolios: undervalued, neutral, and overvalued stocks. Portfolio of undervalued (overvalued) stocks are those whose mispricing score is among the bottom (top) 33%. The rest of stocks are classified as neutral stocks (non-overvalued and non-undervalued). We estimate both equal-weighted and value-weighted average returns for each portfolio.

C. Trading windows:

The trading window Edelen, Ince, and Kadlec (2016) examines is the six-quarter window before end of June each year. We follow them and use the same six-quarter trading window to analyze institutional trading of mispriced stocks. Anomaly portfolios are constructed at the end of June each year by using information of the firm whose fiscal year ends in year t – 1. The six-quarter trading window in Edelen, Ince, and Kadlec (2016) therefore runs from the realization of anomaly ranking variables to portfolio formation date. The trading window involves the period when anomaly ranking variables are realized (January to December of year t – 1), the period when accounting information is disclosed to public (January to March of year t) and three months after disclosure of annual reports (April to June of year t).

D. Quarterly measure of change in institutional ownership

We use change in percentage of shares held by institutional investors to proxy for institutional trading. Change in institutional holding measure is estimated over the six-month trading window horizon prior to annual portfolio formation at the end of June. $\Delta\%INST$ is defined as the change in fraction of shares held by institutions over the trading window divided by average fraction of shares held by institutions (number of institutional investors) of size decile as of the beginning of the trading window. We winsorize $\Delta\%INST$ at the 1% level in both tails.

$$\Delta\%INST = \frac{\%INST_q - \%INST_{q-6}}{avg\left(\%INST_{size\ decile,q-6}\right)}$$

, where $\%INST$ is the percentage of shares held by institutional investors, $avg(\cdot)$ denotes the average function. For change in hedge fund and non-hedge fund holding measure, we divide

the numerator by average fraction of shares held by hedge funds and non-hedge funds of the size decile as of the beginning of trading horizon respectively. We scale the change in percentage of shares held by institutions by average change in percentage of shares held by investors of the size decile to account for the fact that institutional holding is different for large and small stocks.

Edelen, Ince, and Kadlec (2016) use change in number of institutional investors holding the stocks to measure institutional trading in their main analysis. Compared with change in number of investors holding the stocks, change in fractional shares held by institutions are advantageous in several ways. First, change in percentage of shares held by institutions can reflect trading of institutions with large trading volume while change in number of institutional investors put equal weights on institutions with large or small trading volume. Trading activities by institutions with large and small trading volume impose different impact on stock mispricing. Therefore, put equal weights on institutions with different trading volume is problematic. Second, change in fraction of shares held by institutions are better at reflecting institutional trading for large stocks than change in number of institutions. The number of institutional investors increases by one if the investor initiates the buy-side trade before the end of quarter and the number of institutional investors decreases by one if the investor sells all her share holdings in that stock. For large stocks, institutional trading that increases or decreases existing holding is more frequent than cleaning out all inventory stocks.

E. Daily trading measures: trading imbalance (number of trades, volume, abnormal return)

To construct trading performance measures for daily institutional trades, we follow Chakrabarty, Moulton, and Trzcinka (2017) and construct roundtrip trades by using both first-in, first-out (FIFO) and last-in, first-out (LIFO) method. FIFO and LIFO methods yields similar results in our analysis. We only report FIFO result in this paper and LIFO-based results are available by request. To construct roundtrip trades, all transactions for one stock by one fund manager (ANcerno ID: managercode) are sorted chronologically into a queue. FIFO (LIFO) methods match the earliest (most recent) transaction with the trade that enters the queue with opposite direction (Chakrabarty, Moulton, and Trzcinka (2017)). Trading volume is adjusted by CRSP adjustment factor such that volume can be comparable over time. Each roundtrip trade is identified as either buyer-initiated or seller-initiated. Trading volume for the roundtrip trade is the volume of initiation transaction. The trade dates of buy and sell transaction

constitute the start and end date of the roundtrip trades. For each roundtrip trade, we construct dollar volume and trading return measures. Dollar volume is the product of stock close price and trading volume as of the start date to the roundtrip trade.

Trading return of one roundtrip trade is the cumulative CRSP daily return over the same holding period of roundtrip trade. Different from Chakrabarty, Moulton, and Trzcinka (2017), our return of roundtrip trades includes return from stock distributions. To compute abnormal return of the roundtrip trade, we subtract the cumulative Daniel et al. (1997) (DGTW) return over the same holding period of roundtrip trade from the raw return. DGTW benchmark return is the value weighted return of five size by five book-to-market by five momentum portfolios (in total 125 portfolios). We thank Professor Russ Wermers for providing DGTW stock assignment data on his personal website.[8] To obtain trading return for one stock, we first compute the dollar volume weighted average return across roundtrip trades for each fund manager, and then estimate the dollar volume weighted return across managers for one stock.

In addition to trading return, we construct trading imbalances (number of trades, trading volume) to capture institutions' trading activity. Trading imbalance of number of trades is the number of buyer-initiated trades less the number of seller-initiated trades divided by total number of trades. Trading imbalance of trading volume is number of shares purchased by buyer-initiated trades less the number of shares sold by seller-initiated trades divided by total trading volume. We first compute imbalance measures for one stock and one manager and then estimate the dollar volume weighted average of imbalance measures for each stock.

Compared with quarterly change in institutional ownership measures, daily trading imbalance measures are more advantageous in measuring institutional trading in three aspects. First, daily trading imbalance measures accounts for both intraquarter and cross-quarter roundtrip trades into account while quarterly holding data only captures cross-quarter trades. Quarterly change in institutional holding only reveals net increase or decrease in stock holding over the quarter. Intraquarter roundtrip trades opens and closes within the quarter and cross-quarter trades are initiated and closed within the six-quarter trading horizon. Therefore, these two kinds of roundtrip trades are not reflected by quarterly change in institutional holding data. Intraquarter trades matter as institutions can use private information to exploit temporary mispricing. Puckett and Yan (2011) show that institutions profit from intraquarter trads and

[8] DGTW stock assignment data is obtained from website: http://terpconnect.umd.edu/~wermers/ftpsite/Dgtw/coverpage.htm.

suggest that intraquarter trades informative. Our daily trading imbalance measure is estimated across all roundtrip trades within the trading horizon and reflect not only net increase or decrease in stock holding but also hidden roundtrip trades not captured by quarterly trading measure.

Second, trading imbalance measures the strength of buyer-initiated roundtrip trades relative with seller-initiated roundtrip trades. Trading imbalance measure is positive (negative) if institutions engage in more (less) buyer-initiated roundtrip trades than seller-initiated roundtrip trades. Higher trading imbalance means that there're higher number of buyer-initiated roundtrip trades than seller-initiated roundtrip trades or more shares are traded in buyer-initiated roundtrip trades. If institutions only engage in buyer-initiated (seller-initiated) roundtrip trades within the trading horizon, trading imbalance reaches the maximum (minimum) value of one (negative one).

Last, trading imbalance measures allow us to compare institutional trading activity between hedge funds and non-hedge funds. Given that shares held by non-hedge funds is always higher than hedge funds, change in percentage of shares traded by hedge funds will always higher than the trading measure for non-hedge funds. Therefore, using quarterly change in institutional ownership to compare hedge funds and non-hedge funds' trading activity for undervalued and overvalued stocks separately is non-meaningful. By contrast, difference in market shares for hedge funds and non-hedge funds is not a concern for trading imbalance measures. Trading imbalance measure show the fraction of buyer-initiated roundtrip trades among all roundtrip trades and hence controls for different number of trades or shares traded for hedge funds and non-hedge funds. Therefore, trading imbalance measures allow us to compare hedge funds and non-hedge funds in terms of trading mispriced stocks.

F. Summary statistics

Table I and Table II report summary statistics for quarterly institutional ownership and ANcerno daily trading data respectively. In Table I, we first present the distribution of quarterly institutional holding in Panel A. Hedge funds' share holding is far less than the holding by non-hedge funds. Average fraction of shares held by hedge funds is 4%, while non-hedge funds on average hold 53% of shares. We also report stock characteristics and share holding for mispriced stocks in Panel B and Panel C respectively. Overvalued stocks significantly underperform undervalued stocks by 0.43% (t-stat = 2.86) in twelve months' holding period. Overvalued stocks are in general smaller in size and have higher book to market ratios. These

evidences suggest that mispriced stocks in our sample show characteristics that are consistent with previous literatures. Panel C shows average share holding and number of institutional investors for mispriced stocks. Hedge funds hold more overvalued stocks than undervalued stocks, while the difference in shareholding between undervalued stocks and overvalued stocks is insignificantly different from zero for non-hedge funds. In contrast with shareholding, number of hedge funds and non-hedge funds holding the stock is always higher for undervalued stocks than overvalued stocks. This contrast suggests that number of institutional investors cannot precisely proxy for shareholdings by institutions.

Table II shows the summary statistics for ANcerno daily trading data. We report distribution of variables of interest for roundtrip trades. The characteristics of roundtrip trades we examine include share volume, dollar volume, trading horizon, raw return, annualized raw return, abnormal return, and annualized abnormal return for roundtrip trades. Hedge funds engage more actively in trading than non-hedge funds, despite that number of hedge funds is much less than non-hedge funds. Average share volume per roundtrip trade is 22,522 and 13,962 for hedge funds and non-hedge funds respectively. Dollar volume of roundtrip trades is higher for hedge funds than non-hedge funds as well. Hedge funds on average earn higher profit than non-hedge funds per roundtrip trade both before and after risk adjustments. Annualized abnormal trading return per roundtrip trade for hedge funds and non-hedge funds is 11.04% and 9.25% respectively. these evidences are consistent with the notion that hedge funds are more active and skilled in trading. Panel B of Table II shows summary statistics of stocks traded by ANcerno institutional investors. Stocks traded by ANcerno institutions show similar characteristics with a larger sample of stocks covered by CRSP. Overvalued stocks underperform undervalued stocks by 0.38% (t-stat = 2.33), and overvalued stocks are smaller in size and larger in book to market ratio. This evidence suggests that there're no significant difference between stocks traded by ANcerno investors and stocks covered by CRSP.

III. Changes in institutional ownership over the trading horizon for mispriced stocks

To explore how different types of institutional investors trade mispriced stocks, we examine average change in percentage of shares held by institutional investors over the six-quarter trading horizon for overpriced and underpriced stocks. We sort stocks by Stambaugh et al. (2012) composite mispricing score into tertiles and quintiles to form mispricing portfolios. Undervalued stocks and overvalued stocks are in the lowest and highest tertile or quintile portfolio respectively, and rest of the stocks are identified as neutral. Six-quarter trading

horizon spans from December year t – 2 to June of year t. Table III reports value- and equal-weighted change in percentage of shares ($\Delta\%INST$) held by institutional investors for undervalued, neutral, and overvalued stocks. Panel A and Panel B present results for three and five mispricing portfolios respectively. We report average change in institutional holding for all institutional investors, hedge funds, and non-hedge funds. T statistics are reported in brackets and standard errors are clustered at stock and firm level. The result of difference in change in institutional ownership between hedge funds and non-hedge funds is not presented in Table III. The reason is that the comparison of quarterly change in institutional ownership measure between hedge funds and non-hedge funds cannot show whether hedge funds engages more (or less) mispriced stocks than non-hedge funds. Change in institutional ownership will always be higher for hedge funds than non-hedge funds no matter the stock is undervalued or overvalued as fraction of shares held by hedge funds in general is lower than share holdings of non-hedge funds. Average share holding by hedge funds and non-hedge funds is the denominator for quarterly institutional trading measure ($\Delta\%INST$) and the lower shareholding the higher $\Delta\%INST$ is. Therefore, quarterly change in institutional ownership is always higher for hedge funds than non-hedge funds and comparing quarterly trading measure between hedge funds and non-hedge funds is nonmeaningful.

If institutional investors trade in the direction to exploit anomalies, for example sell overpriced stocks and buy undervalued stocks, average change in institutional holdings should be higher for undervalued stocks than overvalued stocks. Therefore, the difference of change in institutional ownership between undervalued stocks and overvalued stocks should be positive. If institutions trade in the opposite direction that exacerbates mispricing, for example buy overpriced stocks and sell underpriced stocks, average change in institutional ownership will be higher for overvalued than undervalued stocks and the difference between undervalued and overvalued stocks will be negative. Therefore, average change in institutional ownership of undervalued minus overvalued portfolio measures the degree to which institutions trade in the direction of anomaly prescription. It is positive if institutions trade in the right direction and negative if institutions trade in contrary to anomaly prescription. Edelen, Ince, and Kadlec (2016) find that institutional ownership increases more for overpriced stocks than underpriced stocks, suggesting that institutional investors in general trade in contrary to anomaly prescription.

For all types of institutions, our result confirms Edelen, Ince, and Kadlec (2016)'s finding. We find that average $\Delta\%INST$ is positive for both overpriced and underpriced stocks

but higher for overpriced stocks no matter mispricing stocks are grouped into tertiles or quintiles. Average value- and equal- weighted $\Delta\%INST$ of overvalued stocks is higher than undervalued portfolio by 1.8% (t-stat = 2.05) and 3.7% (t-stat = 3.59) respectively for tertile mispricing portfolios. Average $\Delta\%INST$ in Panel B further shows that institutional demand for overvalued stocks is even higher than undervalued stocks when we require higher (lower) mispricing score cutoff for overvalued (undervalued) stocks. These evidences suggest that institutions in general demand more for overpriced stocks than underpriced stocks over the six-quarter trading horizon.

The opposite-to-anomaly-prescription trading of mispriced stocks is mainly driven by non-hedge funds rather than hedge funds. The difference in average change in fraction of shares held by institutions between undervalued and overvalued stocks is significantly negative for non-hedge funds and is insignificant for hedge funds. For non-hedge funds, value- and equal-weighted $\Delta\%INST$ to overvalued stocks is significantly higher than that of undervalued stocks by 2.7% (t-stat = 2.42) and 4.9% (t-stat = 4.42) respectively for quintile mispricing portfolios. We obtain similar result for tertile portfolios. Therefore, these evidences show that non-hedge funds trade in contrary to anomaly prescription and the degree of contrary trading is pronounced. By contrast, we find no evidence that hedge funds trade in the direction opposite to anomaly prescription. When stocks are sorted into mispricing quintile portfolios, difference in $\Delta\%INST$ between undervalued and overvalued stocks is insignificantly different from zero no matter average in institutional ownership is equal- or value- weighted. Our conclusion remains same when stocks are grouped into tertile mispricing portfolios despite that equal-weighted $\Delta\%INST$ is marginally significant. This marginal significance vanishes when overvalued (undervalued) stocks are required to higher (lower) composite mispricing score. Overall, these evidences suggest that hedge funds display no pattern in buying more overpriced stocks than undervalued stocks.

The finding that the opposite-to-anomaly-prescription trading is driven by non-hedge funds other than hedge funds is inconsistent with Caglayan, Celiker, and Sonaer (2018)'s result. Caglayan, Celiker, and Sonaer (2018) show that hedge funds significantly buy more of growth stocks (stocks with low book to market) than value stocks (stocks with high book to market). The difference in our result is due to two reasons. First, Caglayan, Celiker, and Sonaer (2018) examines book-to-market anomaly only, whereas we employ eleven anomalies examined by Stambaugh et al. (2012). Second, we use change in fraction of shares held by institutions to

proxy for institutional trading, while Caglayan, Celiker, and Sonaer (2018) use change in number of institutional investors for their main analysis.

IV. Changes in institutional ownership and anomaly return

The finding that institutional investors buy more overpriced stocks than undervalued stocks does not imply that their trading activity will exacerbate anomaly mispricing. If investors are skilled at picking stocks, overpriced stocks they buy can realize future positive returns and underpriced stocks they sell can generate future negative returns. Edelen, Ince, and Kadlec (2016) show that institutional investors in general not only trade in contrary to anomaly prescription but also exacerbates stock mispricing. In this section, we investigate whether hedge funds' and non-hedge funds' trading activity will exacerbate stock mispricing. To answer this question, we examine the future return of mispriced stocks that institutions buy and sell. We double sort stocks by mispricing score and change in institutional ownership measure and form three mispricing by three change in institutional ownership portfolios. We form three mispricing portfolios in this section to ensure that each portfolio to have sufficient number of stocks. The stocks with highest (lowest) tertile of $\Delta\%INST$ are the stocks institutional investors buy (sell). We track the future return of three mispricing by three institutional trading portfolios for twelve months, and portfolio returns are both equally weighted and value weighted.

If institutional trading attenuates stock mispricing, future return of undervalued stocks they buy (sell) will be positive (non-positive), and future return of overvalued stocks they sell (buy) will be negative (non-negative). Return difference between mispriced stocks institutions buy and sell measures to what degree that institutional trading reduces mispricing. Buy and sell return difference should be positive (negative) for undervalued and overvalued stocks if institutional trading mitigates (exacerbates) mispricing. If hedge funds' trading reduces mispricing more than non-hedge funds, buy and sell return difference should be higher for hedge funds than non-hedge funds. Therefore, the difference-in-difference measure ($HF_{buy-sell} - Non\ Hedge\ Funds_{buy-sell}$) should be positive.

Table IV presents the twelve-month holding period abnormal return of undervalued, neutral, and overvalued stocks that institutions buy and sell and the return difference between buy and sell for each mispricing portfolio. Abnormal return is the alpha of raw return regressed on Fama-French five factors (Fama and French (2015)). Our main findings are robust to the

measure of change in number of institutional investors. Panel A and Panel B report the equal- and value- weighted abnormal returns of various portfolios respectively.

For all types of institutional investors, their trading activity exacerbates both undervalued and overvalued stocks. The exacerbation of stock mispricing is more pronounced among overvalued stocks. This evidence confirms with Edelen, Ince, and Kadlec (2016)'s finding. First, institutional trading exacerbates overpricing. Buy minus sell portfolio of overvalued stocks realize significantly negative Fama-French five-factor alpha (FF5 alpha) of -0.29% (t-stat = -2.13) per month when stock return is equally weighted. This is mainly due to the negative return of overvalued stocks institutions buy. Overvalued stocks institutions buy realizes -0.38% (t-stat = -2.26) FF5 alpha per month and overvalued stocks institutions sell do not generate negative future returns. We obtain similar findings for value-weighted abnormal returns. Second, we also find evidence that institutional trading exacerbates underpricing. Undervalued stocks institutions sell significantly outperform stocks they buy. FF5 alpha of buy minus sell portfolio is -0.26% (t-stat = -2.73) per month. The negative buy minus sell abnormal return is mainly due to the positive future return of undervalued stocks institutions sell. Undervalued stocks institutions buy does not generate future positive returns. The result is less pronounced when portfolio returns are value weighted, but we still observe significant positive FF5 alpha for undervalued stocks institutions sell and zero return for undervalued stocks they buy. Overall, these evidences suggest that institutions cannot identify undervalued stocks and overvalued stocks and their trading activity exacerbates stock mispricing.

The exacerbation of anomaly mispricing is mainly driven by non-hedge funds. We find evidences that non-hedge funds' trading exacerbates both underpricing and overpricing. Buy minus sell portfolio for undervalued and overvalued stocks realizes significantly negative abnormal return: FF5 alpha of buy minus sell portfolio is -0.27% (t-stat = -2.84) and -0.32% (-2.50) respectively for undervalued stocks and overvalued stocks. The exacerbation of mispricing is very pronounced among overvalued stocks. Overvalued stocks non-hedge funds buy significantly underperform overvalued stocks they sell no matter portfolio return is equally weighted or value weighted. The underperformance is mainly driven by the significant and negative return of overvalued stocks institutions buy: -0.38% (t-stat = -2.35). Among undervalued stocks, the exacerbation of mispricing is more pronounced among small stocks as the abnormal return of buy minus sell portfolio is only significantly negative when return is equally weighted. Nevertheless, undervalued stocks non-hedge funds sell realize significantly positive future returns no matter return is value- or equal- weighted. Edelen, Ince, and Kadlec

(2016) find similar results that exacerbation of mispricing is more pronounced among overvalued stocks as stocks are more likely to be overpriced due to arbitrage constraints. Overall, these evidences suggest that non-hedge funds possess no skills in identifying undervalued and overvalued stocks and their trading activity exacerbates mispricing.

In contrast with non-hedge funds, hedge funds' trading does not exacerbate mispricing. Buy and sell return difference for undervalued and overvalued stocks are insignificantly different from zero. Among undervalued stocks, the stocks hedge funds sell does not outperform the stocks they buy: FF5 alpha of undervalued stocks hedge funds buy and sell are both significantly positive, suggesting first that hedge funds' trading activity does not exacerbate mispricing of undervalued stocks. Second, since buy and sell return difference is not positive, hedge funds' trading does not attenuate stock underpricing. We also find no evidence that hedge funds' trading activity exacerbate overpricing. Overvalued stocks hedge funds buy does not underperform overvalued stocks they sell: FF5 alpha of overvalued stocks hedge funds buy and sell are both insignificantly different from zero. Similar with the finding among undervalued stocks, this evidence suggests that hedge funds are skilled in the sense that their trading does not exacerbate overpricing but they are not skilled enough to reduce overpricing. Equal- and value- weighted abnormal return generates similar results for undervalued and overvalued stocks. Taken together, hedge fund trading activity does not exacerbate mispricing and fund managers do have skills in picking overvalued stocks to avoid loss.

Overall, hedge funds' trading prevails non-hedge funds' trading in terms of reducing mispricing. The difference in abnormal return of buy minus sell portfolio between hedge funds and non-hedge funds is significantly positive for both undervalued and overvalued stocks when portfolio return is simple averaged. Hedge funds prevails non-hedge funds in trading overvalued stocks. The difference-in-difference measure ($HF_{buy-sell} - Non\ Hedge\ Funds_{buy-sell}$) is 0.38% (t-stat = 2.52) and 0.56% (t-stat = 1.98) when portfolio return is equally weighted and value weighted. The positive difference-in-difference measure means that compared with non-hedge funds, hedge funds trading reduces mispricing to a greater extent. For undervalued stocks, hedge funds prevail non-hedge funds when abnormal return is equally weighted. The difference-in-difference measure if 0.30% (t-stat = 2.57). This again is consistent with the notion that overpricing is more pronounced than underpricing and hedge funds' better trading skills are more reflected in trading overpriced stocks. Therefore,

we conclude that hedge funds are more skilled in trading mispriced stocks and exploiting anomaly mispricing than non-hedge funds.

Previous research has shown that institutional trading activity is positively related with future anomaly return (Grinblatt, Titman, and Wermers (1995), Wermers (1999), Chen, Hong, and Stein (2002), Chen, Jegadeesh, and Wermers (2000), Bennett, Sias, and Starks (2003), Sias (2004), Sias, Starks, and Titman (2006)). Consistent with Edelen, Ince, and Kadlec (2016), our finding of negative relationship between institutional ownership and future return is due to the six-quarter trading horizon we look at. When change in institutional ownership is measured within the quarter prior to end of June, we also find the positive relationship between institutional trading and anomaly future return. This is consistent with previous findings.

V. Imbalance in number of trades and trading volume for mispriced portfolios

Quarterly change in institutional holding measure cannot capture the full picture of institutional trading activity. Intraquarter roundtrip trades and cross-quarter trades initiated and closed within the six-quarter trading horizon are not examined by quarterly measures. Actual daily trading data of institutions addresses this problem. In this section, we investigate how hedge funds and non-hedge funds trade mispriced stocks by using ANcerno daily trading data. We use trading imbalance measure to proxy for institutional demand for mispriced stocks. Trading imbalance measure is the net number of trades (or net trading volume) scaled by total number of trades (trading volume) of buyer-initiated and seller-initiated roundtrip trades. Net number of trades (or trading volume) is the number of trades (shares traded) of buyer-initiated roundtrip trades less the number of trades (trading volume) of seller-initiated roundtrip trades. We first compute trading imbalances for one stock and one manager across all roundtrip trades initiated and closed within the six-quarter horizon and roundtrip trades initiated before end of June of year t and closed before July of year t + 1.[9] Trading imbalances are then dollar-volume weighted across fund managers for one stocks. Last, we take equal- and value- weighted average of the trading imbalance measures (number of trades and trading volume) across stocks and compare institutions' trading imbalance for undervalued, neutral, and overvalued stocks. Table V presents all institutions', hedge funds', and non-hedge funds' trading imbalance for

[9] The reason to include roundtrip trades whose initial leg within the six-quarter horizon is that quarterly change in percentage of shares held by institutions include those cross-June trades. Including cross-June roundtrip trades allows us to better compare the result from daily and quarterly trading analysis.

undervalued, neutral, and overvalued stocks. Panel A and Panel B presents trading imbalances for trading volume and trading imbalances for number of trades respectively. Both equally weighted and value weighted imbalance measures are reported in each panel. T statistics are shown in the brackets and standard errors are clustered by stock and year. In general, we find similar result as quarterly trading analysis.

Institutional investors overall buy more of overvalued stocks than undervalued stocks. This result is consistent with result of quarterly measure of institutional trading. For both number of trades and trading volume, trading imbalance is significantly higher for overvalued than undervalued stocks. Higher trading imbalance indicates that buyer-initiated roundtrip trades accounts for a larger proportion among all roundtrip trades than seller-initiated roundtrip trades. Trading volume imbalance of overvalued stocks is higher than undervalued stocks by 0.08 with t statistic of 7.88, suggesting that institutions overall buy more of overvalued stocks than undervalued stocks. The overbuy of overvalued stocks is mainly driven by non-hedge funds' trading activity. Fraction of buyer-initiated roundtrip trades among all trades is significantly higher for overvalued stocks than undervalued stocks. Imbalance of trading volume for undervalued minus overvalued stocks is -0.09 with t statistics of -7.36, suggesting that non-hedge funds trade in contrary to anomaly prescriptions. We obtain similar result for imbalance of number of trades measure, and our conclusion remains same when imbalance measures are equally weighted or value weighted.

In contrary to non-hedge funds, we find no evidence that hedge funds trade in contrary to anomaly prescriptions. This result is consistent with quarterly trading analysis. Trading imbalance measures of overvalued stocks is insignificantly different from the imbalance measures of undervalued stocks. the difference in trading volume imbalance between undervalued and overvalued stocks is 0.02 with t-statistic of 0.97 when imbalance measure is equally weighted. This result is robust to imbalance of number of trades and trading volume and is robust no matter imbalance measures are equal-weighted or value-weighted. All of these evidences suggest that hedge funds do not buy more of overvalued stocks than undervalued stocks and add support to the result of quarterly trading analysis.

One advantage of trading imbalance measures is that they enable us to compare trading activity between hedge funds and non-hedge funds. By comparing imbalance measures between hedge funds and non-hedge funds, we find that hedge funds prevail non-hedge funds in terms of trading mispriced stocks. Hedge funds buy less overvalued stocks than non-hedge

funds among small stocks and buy more of undervalued stocks than non-hedge funds among large stocks. The equal-weighted trading volume and number of trades imbalance measures are significantly higher for hedge funds than non-hedge funds for overvalued stocks. The difference in trading volume imbalance between hedge funds and non-hedge funds is -0.13 (t-stat = -5.3) for overvalued stocks when trading imbalances are simple averaged, suggesting that hedge funds buy less overvalued stocks than non-hedge funds among small stocks. When imbalance measures are valued weighted, the difference in trading volume imbalance between hedge funds and non-hedge funds is 0.18 (t-stat = 2.71) for undervalued stocks, suggesting that hedge funds buy more of undervalued stocks than non-hedge funds among large stocks. Overall, these evidences suggest that hedge funds prevail non-hedge funds in trading mispriced stocks.

VI. Trading performance of hedge funds and non-hedge funds

A. Trading performance for before-June and cross-June trading horizons.

ANcerno daily trading data enables us to investigate institutional trading performance directly. Using quarterly data to examine the future return of mispriced stocks institutions buy and sell only examines trading performance for a subset of institutions' portfolio holdings. Intraquarter roundtrip trades and roundtrip trades that cross the quarter but whose start date and end date are within the six-quarter trading horizon accounts for a large fraction of fund managers' portfolio holdings. Those "hidden" trades are not examined in the quarterly institutional trading analysis. We examine trading performance for roundtrip trades opened and closed within the six-quarter trading horizon and the cross-June trades that are initiated within the six-quarter window before June of year t and closed after June of year t but before June of year t + 1. Table VI presents the abnormal return of roundtrip trades for undervalued and overvalued stocks. Panel A and Panel B report the equal-weighted and value-weighted average of abnormal returns respectively. Market capitalization as of beginning of six-quarter trading horizon is used as weights in computing value-weighted portfolio trading return.

Institutions in general lose money from trading overpriced stocks. Average abnormal return to trades of overvalued stocks is significantly negative no matter stock return is value weighted or equally weighted. Average roundtrip trade realizes a significant loss of -3.18% (t-stat = -5.89) for overvalued stocks, suggesting that institutions on average are not skilled in

trading overpriced stocks. This negative trading performance is mainly driven by non-hedge funds. Non-hedge funds lose -3.17% (t-stat: -5.47) on average of roundtrip trades for overvalued stocks. This result again is robust to equal weighted return and value weighted return. Hedge funds suffer no loss from their trading overvalued stocks. Both equal- and value-weighted abnormal return of roundtrip trades is insignificantly different from zero. The absence of loss suggests first that hedge funds and skilled in the sense that they avoid loss from trading overvalued stocks. However, they are not skilled enough in exploiting overpricing to earn profits.

Second, the result that non-hedge funds loss and hedge funds suffer no loss from trading overvalued suggests that hedge funds prevail non-hedge funds in trading overvalued stocks. The prevalence is especially pronounced among small stocks. Hedge funds outperform non-hedge funds in trading overpriced stocks by 2.86% (t-stat = 5.05) when portfolio return is equal-weighted. The outperformance is mainly driven by buyer-initiated roundtrip trades. The difference in equal- and value- weighted abnormal return of roundtrip trades between hedge funds and non-hedge funds is significantly positive: the abnormal return is 3.57% (t-stat = 5.05) when portfolio return is equal-weighted. For seller-initiated roundtrip trades, hedge funds outperform non-hedge funds for overvalued stocks mainly among small stocks. This result is consistent with the notion that overpricing is more pronounced among small stocks. Small stocks are associated with more information uncertainty (Zhang (2006)) and Puckett and Yan (2011) show that institutions profit more from informed trading among stocks with high information uncertainty. Our analysis includes informative intraquarter roundtrip trades and hence the profit for those roundtrip trades are reflected as well. The prevalence of hedge funds in trading overpriced stocks is more pronounced among small firms suggests that hedge funds display their trading skills among firms with high information uncertainty.

For undervalued stocks, hedge funds profit from their trading while non-hedge funds make zero profit. Hedge funds on average earn 0.98% (t-stat: 2.62) per roundtrip trade from trading undervalued stocks when stock return is equal-weighted, whereas the average abnormal return is insignificantly different from zero for non-hedge funds. Result is similar when stock return is value weighted: the abnormal return for hedge funds and non-hedge funds is 1.01% (t-stat = 1.83) and -0.26% (t-stat = -0.68) respectively. These evidences suggest that hedge funds is more skilled in trading undervalued stocks, whereas non-hedge funds display no skills in exploiting stock underpricing. The difference in trading performance between hedge funds and non-hedge funds is more pronounced among large stocks. The abnormal return earned by

hedge funds is higher than non-hedge funds by 2.17% (t-stat = 2.18) when stock return is value-weighted, whereas the difference in equal-weighted abnormal return between hedge funds and non-hedge funds is insignificant. Large stocks are associated with less information uncertainty and hence are less mispriced. If there's any mispricing, skilled institutions will take the opportunity and arbitrage the mispricing. Hedge funds may response quicker to public information, while non-hedge funds follow their trading decisions. This may explain why hedge funds outperform non-hedge funds in trading undervalued stocks particularly among large stocks. Overall, hedge funds prevail non-hedge funds in exploiting anomaly underpricing.

This result is consistent with the strand of literature documenting that hedge funds are more skilled than non-hedge funds, for example mutual funds, pension funds, and other investment companies in earning risk-adjusted returns.[10] We add to the literature by showing that hedge funds earn significantly positive risk-adjusted returns in trading undervalued stocks

B. Trading Performance by trading windows: before-June and cross-June sub-window analysis

In this section, we examine abnormal return of roundtrip trades during before-June and cross-June sub-windows separately. An increase in quarterly change in ownership suggests that trading volume of cross-Jube buyer-initiated roundtrip trades is high. If institutional investors who possess good timing skills buy overvalued stocks before end of June and close the position before price decrease, they can profit from such cross-June roundtrip trades. If institutions profit from cross-June trades, this may explain why institutions trade in the opposite directions as anomaly prescription. Table VII reports abnormal return of trades for mispriced stocks within before-June (Panel A) and cross-June (Panel B) sub-windows respectively. We only report equal-weighted abnormal returns and result is similar when trading return is value weighted.

For overvalued stocks, non-hedge funds lose money in both before-June and cross-June trading window, while hedge funds suffer no loss from overvalued stocks in two windows. Abnormal return of roundtrip trades for non-hedge funds is -3.11% (t-stat = -5.5) and -2.7% (t-stat = -3.04) per roundtrip trade for overvalued stocks during before-June and cross-June

[10] Papers documenting that mutual funds cannot beat market include: Carhart (1997), Daniel et al. (1997), Malkiel (1995). Other papers find mutual fund has stock picking skills include: Chen, Jegadeesh, and Wermers (2000), Kacperczyk, Sialm, and Zheng (2005), and Alexander, Cici, and Gibson (2007). Papers providing conflicting results include: Bennett, Sias, and Starks (2003), Cai and Zheng (2004), and Yan and Zhang (2009).

trading window, suggesting that non-hedge funds possess no skills in trading overvalued stocks and persistently lose money from trading overvalued stocks. The increase in $\Delta\%INST$ for non-hedge funds is not because of non-hedge funds trading skills to profit from cross-June trades. For hedge funds, abnormal trading return to overvalued stocks in before-June and cross-June sub-windows is -0.07% (t-stat = -0.21) and 0.88% (t-stat = 1.5) respectively. Hedge funds' trading performance becomes slightly positive within cross-June window but still insignificant, suggesting that hedge funds display no superior skill for cross-June trades. The difference in trading performance to overpriced stocks between hedge funds and non-hedge funds over before-June and cross-June sub-windows is 3.04% (t-stat = 5.2) and 3.58% (t-stat = 4.36) respectively. These evidences suggest that hedge funds prevail non-hedge funds in terms of trading overvalued stocks during both before-June and cross-June sub-period. Remind that non-hedge funds realize significantly negative future abnormal return, while hedge funds realize zero abnormal return for overvalued stocks they buy in quarterly trading analysis. Result in this section is consistent with quarterly data analysis. Non-hedge funds' trading exacerbates stock overpricing and they suffer significant loss from trading overvalued stocks. Hedge funds' trading neither exacerbates nor attenuates overpricing and they earn zero profit from trading overvalued stocks.

For undervalued stocks, institutions' trading profit concentrates in before-June horizon. Both hedge funds and non-hedge funds earn positive abnormal returns. Hedge funds and non-hedge funds earn 2.29% (t-stat = 4.29) and 1.03% (t-stat = 2.4) per roundtrip trade respectively. Trading profit vanishes in cross-June trading window: the abnormal return of roundtrip trades is insignificantly different from zero for both hedge funds and non-hedge funds. These evidences suggest that institutions' trades to exploit underpricing is mainly concentrated in before-June time period. We notice that non-hedge funds' trading return becomes positive in before-June rather than cross-June subperiod. Recall that non-hedge funds earn zero profit from undervalued stocks they buy in our quarterly institutional trading analysis. The positive trading performance in before-June subperiod confirms the necessity to include intraquarter roundtrip trades in evaluating fund performance. Although trading return is positive for both hedge funds and non-hedge funds over before-June sub-window, hedge funds significantly outperform non-hedge funds by 1.26% (t-stat = 1.9), confirming that hedge funds are more skilled in trading undervalued stocks than non-hedge funds.

VII. Conclusion:

This study documents hedge funds and non-hedge funds' role in exploiting anomaly mispricing when the stocks are taking on anomaly-defined characteristics by using both quarterly institutional holding and ANcerno daily trading data. We demonstrate that hedge funds serve a better role as arbitrageurs than non-hedge funds and the exacerbation of mispricing is mainly driven by non-hedge funds. Non-hedge funds trade in contrary to anomaly prescription and their trading activity exacerbates stock mispricing, whereas hedge funds trade in the right direction in the sense that they do not overbuy overvalued stocks and their trading does not exacerbate mispricing. Actual institutional trading data allows us to further explore performances in trading mispriced stocks for hedge funds and non-hedge funds. We find that non-hedge funds suffer pronounced loss from trading overvalued stocks and make zero profit from trading undervalued stocks, while hedge funds profit from trading undervalued stocks and lose no money from trading overvalued stocks. This finding confirms that hedge funds are more skilled than non-hedge funds in trading mispriced stocks.

The question that why non-hedge funds trade in contrary to anomaly prescription emerges from our findings. We show that the reason is not due to the hypothesis proposed by Jang and Kang (2019) that skillful institutions buy overpriced stocks to drive price up and close the position before price drop in order to profit from exacerbating overpricing. The reason is that non-hedge funds lose significantly rather than profit from trading overvalued stocks. One possible explanation is that the contrary trading is due to fund flow to non-hedge funds. Akbas et al. (2015) show that fund flow to mutual funds exacerbates mispricing and fund flow is responsible for 30% of all mutual fund trades (Edelen (1999)). Examining this question is beyond the scope of our study and we leave this question to future research.

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Table I: Summary Statistics

This table reports summary statistics for institutional holding by all institutional investors, hedge funds and non-hedge funds. Summary statistics are estimated at end of June each year by using variables of interest as of portfolio formation date. Value weighted average is reported. Panel A reports the distribution for institutional holding measure and quarterly change in institutional ownership within six-quarter horizon for different types of institutions. Panel B reports excess return over risk free rate, Fama and French (2015) five-factor alpha, market capitalization (in millions), and book to market for undervalued, neutral, overvalued portfolios. Panel C shows share holdings and number of investors for all institutions, hedge funds, and non-hedge funds respectively. %All, %HF, and %NHF represents percentage of shares held by all institutional investors, hedge funds, and non-hedge funds. Nall, NHF, NHF denote number of all institutional investors, hedge funds, and non-hedge funds respectively. All variables of interest except for portfolio returns are winsorized at 1% level at two tails. T-statistics is reported in brackets and standard errors are clustered at stock and year level.

Panel A Distribution of Institutional Holding

	Mean	Std	P25	Median	P75
$\%ALL$	0.56	0.29	0.34	0.60	0.80
$\%HF$	0.04	0.06	0.00	0.01	0.05
$\%NHF$	0.53	0.27	0.31	0.56	0.75

Panel B Summary Statistics for Mispriced Portfolios

Mispricing	Ret – Rf (%)	FF5 (%)	Market Cap	Book to Market
Undervalued	0.83	0.10	47.81	0.29
	[3.53]	[1.87]	[8.90]	[17.09]
Neutral	0.76	0.05	30.93	0.39
	[2.41]	[0.59]	[6.37]	[14.13]
Overvalued	0.36	-0.33	18.97	0.46
	[0.99]	[-2.54]	[8.13]	[17.13]
Undervalued - Overvalued	-0.47	-0.43	28.84	-0.16
	[-2.22]	[-2.86]	[6.11]	[-6.53]

Panel C Average Institutional Holding for Mispriced Portfolios

	%All	%HF	%NHF	NAll	NHF	NNHF
Undervalued	0.61	0.01	0.60	683.39	34.84	648.93
	[36.63]	[6.58]	[39.79]	[13.07]	[7.21]	[13.57]
Neutral	0.65	0.02	0.63	483.28	27.22	455.30
	[35.11]	[6.63]	[40.01]	[10.94]	[6.95]	[11.16]
Overvalued	0.66	0.04	0.62	364.66	22.85	341.39
	[32.89]	[6.26]	[41.37]	[13.03]	[7.82]	[13.20]
Undervalued - Overvalued	-0.04	-0.02	-0.02	318.73	11.99	307.53
	[-2.60]	[-5.21]	[-1.53]	[7.43]	[4.83]	[7.56]

Table II: Summary Statistics for ANcerno Trades

This table reports summary statistics for roundtrip trades constructed using ANcerno daily trading data. Panel A reports distribution of roundtrip trade characteristics for samples of all institutions, hedge funds, and non-hedge funds. The characteristics of roundtrip trade include share volume, dollar volume, holding horizon (in months), trading raw return, annualized trading raw return, abnormal trading return, and annualized abnormal trading return. Abnormal trading return is the difference between raw trading return and DGTW (1997) benchmark return within the roundtrip trading horizon. Mean, standard deviation (std), 25th percentile, median, and 75th percentile are reported. Panel B presents summary statistics for mispriced stocks traded by ANcerno institutions. Stocks are sorted into tertiles to form portfolios of undervalued, neutral, and overvalued stocks. Excess return over risk free rate, Fama and French (2015) alpha, market capitalization (in millions), and book to market ratio (BM) are reported for three mispricing portfolios. All variables of interest are winsorized at 1% level at two tails. T-statistics are shown in brackets. When averaging market capitalization and book to market ratio for mispriced portfolios, standard errors are clustered at stock and year level.

Panel A: Summary Statistics for ANcerno Roundtrip Trades

Characteristics	Sample	Mean	Std	P25	Median	P75
Share Volume (Roundtrip Trade)	All	14,604	40,999	392	1,700	8,100
	HF	22,522	52,401	700	3,300	15,560
	NHF	13,962	39,863	360	1,600	7,657
Dollar Volume (Roundtrip Trade)	All	370,131	1,068,556	9,282	41,125	194,511
	HF	561,893	1,360,722	16,959	75,476	359,545
	NHF	354,586	1,039,738	8,880	39,168	184,113
Roundtrip Trading Horizon (in months)	All	10.84	8.11	3.88	9.11	16.70
	HF	10.40	8.02	3.55	8.58	15.95
	NHF	10.88	8.11	3.91	9.14	16.73
Trading Return (Roundtrip Trade, %)	All	8.89	40.39	-11.64	3.40	23.31
	HF	9.36	40.21	-11.31	3.71	23.95
	NHF	8.85	40.40	-11.67	3.37	23.26
Annualized Trading Return (Roundtrip trade, %)	All	16.67	90.77	-14.76	4.16	22.95
	HF	19.01	95.45	-15.13	4.68	25.02
	NHF	16.48	90.37	-14.73	4.12	22.80

Table II continued

Panel A: Summary Statistics for ANcerno Roundtrip Trades (Continued)						
Characteristics	Sample	mean	std	P25	median	P75
Abnormal Trading Return (Roundtrip Trade, %)	All	2.17	31.24	-13.56	-0.08	14.38
	HF	2.78	31.41	-12.96	0.23	15.11
	NHF	2.12	31.23	-13.61	-0.11	14.32
Annualized Abnormal Trading Return (Roundtrip trade, %)	All	9.38	68.03	-15.42	-0.10	15.78
	HF	11.04	71.89	-15.77	0.32	17.32
	NHF	9.25	67.70	-15.40	-0.13	15.67

Panel B: Stock Characteristics				
Mispricing Portfolios	Ret – Rf (%)	FF5 (%)	Market Cap (in millions)	BM
Undervalued	0.83	0.09	50.28	0.28
	[3.44]	[1.48]	[8.63]	[16.96]
Neutral	0.77	0.05	33.47	0.38
	[2.44]	[0.54]	[6.37]	[14.01]
Overvalued	0.35	-0.30	20.58	0.46
	[0.92]	[-2.09]	[7.87]	[16.06]
Undervalued - Overvalued	-0.48	-0.38	29.70	-0.18
	[-2.14]	[-2.33]	[5.53]	[-7.00]

Table III: Average change in institutional ownership for mispricing portfolios

This table presents average change in fraction of shares ($\Delta\%INST$) held by all institutional investors, non-hedge funds (NHF), and hedge funds (HF) for undervalued, neutral, and overvalued stocks respectively from 1994 to 2016. The change in fraction of shares held by institutions are measured within the six-quarter trading horizon prior to portfolio formation date, which is end of June. Panel A and Panel B report the result for quintile and tertile mispricing portfolios respectively. Stocks with highest (lowest) 25% or 33% composite mispricing score are identified as overvalued (undervalued) stocks. We report both value- and equal- weighted average of $\Delta\%INST$ for Panel A and Panel B. T-statistics are reported in brackets and standard errors clustered at stock and year level.

Panel A: Quintile Mispricing Portfolios				
Mispricing	statistics	All	NHF	HF
Value Weighted				
Undervalued	Est	3.6%	3.3%	19.4%
	t-stat	[3.49]	[3.23]	[5.21]
Neutral	Est	3.6%	3.2%	23.0%
	t-stat	[2.99]	[2.77]	[4.26]
Overvalued	Est	6.7%	6.0%	26.4%
	t-stat	[3.94]	[3.73]	[4.17]
Undervalued - Overvalued	Est	-3.1%	-2.7%	-7.0%
	t-stat	[-2.55]	[-2.42]	[-1.40]
Equal Weighted				
Undervalued	Est	8.4%	7.6%	31.3%
	t-stat	[5.29]	[5.12]	[5.45]
Neutral	Est	10.5%	9.7%	33.1%
	t-stat	[6.30]	[6.28]	[5.18]
Overvalued	Est	13.9%	12.6%	38.0%
	t-stat	[6.63]	[6.72]	[6.12]
Undervalued - Overvalued	Est	-5.5%	-4.9%	-6.7%
	t-stat	[-4.41]	[-4.42]	[-1.48]

Panel B: Three Mispricing Portfolios				
Mispricing	statistics	All	NHF	HF
Value Weighted				
Undervalued	Est	3.4%	3.1%	20.1%
	t-stat	[3.37]	[3.11]	[5.29]
Neutral	Est	4.0%	3.6%	24.2%
	t-stat	[3.18]	[2.93]	[4.48]
Overvalued	Est	5.2%	4.7%	24.7%
	t-stat	[3.59]	[3.42]	[3.10]
Undervalued - Overvalued	Est	-1.8%	-1.6%	-4.6%
	t-stat	[-2.05]	[-1.90]	[-0.79]
Equal Weighted				
Undervalued	Est	9.0%	8.2%	31.4%
	t-stat	[5.65]	[5.57]	[5.20]
Neutral	Est	10.7%	9.9%	32.2%
	t-stat	[6.31]	[6.21]	[5.20]
Overvalued	Est	12.7%	11.4%	37.6%
	t-stat	[6.48]	[6.56]	[5.95]
Undervalued - Overvalued	Est	-3.7%	-3.2%	-6.2%
	t-stat	[-3.59]	[-3.39]	[-1.77]

Table IV: Abnormal returns of mispricing portfolios conditional on institutional demand

This table reports monthly Fama and French (2015) five-factor alphas for three mispricing by three quarterly change in fraction of shares held by institutions portfolios. We measure change in institutional holding during six-quarter trading horizon for all institutions, non-hedge funds, and hedge funds respectively. Portfolios are formed annually at the end of June and holding period return from July of year t to June of year t + 1 is estimated. Panel A and Panel B present the equally weighted and value weighted abnormal returns respectively. In each panel, we report abnormal return of buy minus sell, buy, and sell portfolios of mispriced stocks. Buy (sell) refers to the top (bottom) tertile of $\Delta NINST$ portfolios. The last column shows the difference in abnormal return between hedge funds and non-hedge funds. T-statistics are reported in brackets.

Panel A: Equal Weighted FF5 alpha				
Mispricing	All	NHF	HF	HF - NHF
	Buy - Sell			
Undervalued	-0.26	-0.27	0.03	0.30
	[-2.73]	[-2.84]	[0.43]	[2.57]
Neutral	-0.15	-0.19	0.12	0.31
	[-1.54]	[-1.88]	[1.45]	[2.46]
Overvalued	-0.29	-0.32	0.06	0.38
	[-2.13]	[-2.50]	[0.63]	[2.52]
	Buy			
Undervalued	0.12	0.10	0.22	0.12
	[1.11]	[1.00]	[2.46]	[1.82]
Neutral	0.06	0.01	0.13	0.13
	[0.52]	[0.05]	[1.31]	[1.84]
Overvalued	-0.38	-0.38	-0.16	0.23
	[-2.26]	[-2.35]	[-0.94]	[2.78]
	Sell			
Undervalued	0.38	0.37	0.19	-0.18
	[4.72]	[4.69]	[2.27]	[-2.66]
Neutral	0.21	0.19	0.01	-0.18
	[1.89]	[1.76]	[0.14]	[-2.43]
Overvalued	-0.10	-0.06	-0.22	-0.16
	[-0.56]	[-0.39]	[-1.36]	[-1.72]

Panel B: Value Weighted FF5 alpha				
Mispricing	All	NHF	HF	HF - NHF
	Buy - Sell			
Undervalued	-0.13	-0.11	-0.03	0.08
	[-0.71]	[-0.65]	[-0.18]	[0.40]
Neutral	-0.19	-0.16	0.22	0.38
	[-1.02]	[-0.90]	[1.21]	[1.61]
Overvalued	-0.61	-0.54	0.02	0.56
	[-2.76]	[-2.49]	[0.11]	[1.98]
	Buy			
Undervalued	0.24	0.29	0.18	-0.11
	[1.61]	[1.96]	[1.54]	[-0.75]
Neutral	-0.02	-0.07	0.16	0.24
	[-0.18]	[-0.56]	[1.33]	[1.55]
Overvalued	-0.59	-0.54	-0.18	0.35
	[-3.47]	[-3.23]	[-1.25]	[2.21]
	Sell			
Undervalued	0.37	0.40	0.21	-0.19
	[3.44]	[3.88]	[2.24]	[-1.66]
Neutral	0.17	0.09	-0.06	-0.14
	[1.04]	[0.53]	[-0.36]	[-1.01]
Overvalued	0.02	0.01	-0.20	-0.21
	[0.12]	[0.04]	[-1.15]	[-1.34]

Table V: Trading imbalances for mispricing portfolios

This table shows hedge funds' and non-hedge funds' trading imbalance measures for mispriced stocks. Panel A reports imbalance of trading volume and Panel B presents imbalance of number of trades. Imbalance of trading volume (number of trades) is defined as net trading volume (net number of trades) scaled by total trading volume (total number of trades). Net trading volume (net number of trades) equals trading volume (number of trades) of buyer-initiated roundtrip trades minus trading volume (number of trades) of seller-initiated roundtrip trades. Both equal- and value- weighted trading imbalances are reported. Last column (HF – NHF) denotes the difference in trading imbalance measures between hedge funds and non-hedge funds. Imbalance measures are winsorized at 1% level in both tails. Standard errors are clustered at stock and year level.

Panel A: Imbalance of Trading Volume				
Equal Weighted				
Mispricing	All	NHF	HF	HF - NHF
Undervalued	0.36	0.35	0.33	-0.02
	[16.68]	[14.74]	[16.16]	[-0.70]
Neutral	0.40	0.39	0.32	-0.07
	[19.98]	[18.73]	[18.96]	[-3.16]
Overvalued	0.44	0.44	0.31	-0.13
	[21.91]	[19.05]	[26.88]	[-5.30]
Undervalued - Overvalued	-0.08	-0.09	0.02	0.11
	[-7.69]	[-7.07]	[0.80]	[3.56]
Value Weighted				
Undervalued	0.14	0.11	0.29	0.18
	[3.90]	[2.99]	[5.33]	[2.71]
Neutral	0.21	0.20	0.25	0.05
	[5.06]	[4.60]	[5.37]	[0.85]
Overvalued	0.28	0.27	0.29	0.02
	[7.35]	[6.54]	[5.81]	[0.30]
Undervalued - Overvalued	-0.14	-0.16	0.00	0.15
	[-2.94]	[-3.00]	[-0.04]	[1.58]

Panel B: Imbalance of Number of Trades				
Equal Weighted				
Mispricing	All	NHF	HF	HF - NHF
Undervalued	0.37	0.36	0.35	-0.01
	[17.57]	[15.28]	[16.67]	[-0.38]
Neutral	0.41	0.41	0.34	-0.06
	[20.73]	[19.29]	[19.65]	[-2.64]
Overvalued	0.45	0.45	0.33	-0.13
	[23.35]	[20.26]	[27.10]	[-5.27]
Undervalued - Overvalued	-0.08	-0.09	0.02	0.11
	[-7.88]	[-7.36]	[0.97]	[3.74]
Value Weighted				
Undervalued	0.14	0.11	0.30	0.19
	[3.93]	[2.92]	[5.73]	[2.92]
Neutral	0.21	0.20	0.25	0.05
	[4.94]	[4.51]	[5.98]	[0.97]
Overvalued	0.28	0.27	0.30	0.02
	[7.59]	[6.67]	[6.68]	[0.33]
Undervalued - Overvalued	-0.14	-0.16	0.01	0.17
	[-3.13]	[-3.17]	[0.10]	[1.71]

Table VI: average trading performance for mispricing portfolios during six-quarter trading horizon

This table presents the abnormal return of roundtrip trades for hedge funds and non-hedge funds in trading mispriced stocks. The roundtrip trades include the trades initiated and closed within the six-quarter trading horizon and cross-June trades whose initial and closing trades straddle June of year t. Trading return is winsorized at 1% level in both tails and abnormal return is calculated as subtracting DGTW (1997) benchmark return from roundtrip raw return. Panel A and Panel B report equal-weighted and value-weighted abnormal trading returns. The column of HF – NHF represent the return difference between hedge funds and non-hedge funds. Last two columns decompose return difference between hedge funds and non-hedge funds into returns to buyer-initiated and seller-initiated roundtrip trades. T-statistics are reported in brackets and standard errors are clustered at stock and year level.

Panel A: Equal Weighting						
	All	NHF	HF	HF - NHF	HF - NHF (buy)	HF – NHF (sell)
Undervalued	0.95	0.82	0.98	0.16	-0.03	0.91
	[1.90]	[1.42]	[2.62]	[0.20]	[-0.05]	[1.58]
Neutral	0.11	0.07	0.33	0.26	1.52	0.68
	[0.25]	[0.15]	[0.89]	[0.38]	[2.17]	[1.24]
Overvalued	-3.18	-3.17	-0.31	2.86	3.57	1.56
	[-5.89]	[-5.47]	[-0.88]	[5.05]	[5.05]	[2.50]
Undervalued - Overvalued	4.13	4.00	1.29	-2.70	-3.61	-0.65
	[7.35]	[6.05]	[2.26]	[-3.73]	[-4.90]	[-0.79]
Panel B: Value Weighting						
	All	NHF	HF	HF - NHF	HF - NHF (buy)	HF - NHF (sell)
Undervalued	-0.09	-0.26	1.01	1.27	1.15	0.62
	[-0.24]	[-0.68]	[1.83]	[2.18]	[2.59]	[3.53]
Neutral	-0.49	-0.54	0.29	0.84	1.22	1.11
	[-1.85]	[-2.27]	[0.52]	[1.53]	[5.03]	[1.94]
Overvalued	-1.60	-1.58	-0.83	0.75	1.53	1.32
	[-2.76]	[-2.56]	[-1.26]	[0.86]	[3.14]	[1.59]
Undervalued - Overvalued	1.51	1.32	1.85	0.53	-0.38	-0.69
	[2.02]	[1.70]	[1.99]	[0.52]	[-0.76]	[-0.91]

Table VII: average trading performance of mispricing portfolios during sub-windows

This table reports equal-weighted abnormal return of roundtrip trades for hedge funds and non-hedge funds over before-June and cross-June subperiod. Roundtrip trip during before-June subperiod are trades that initiated and closed within the six-quarter trading horizon. Cross-June roundtrip trades are those trades whose two legs straddle June of year t. Panel A and Panel B present abnormal return for before-June and cross-June roundtrip trades respectively. Trading return is winsorized at 1% level in two tails. Standard errors are clustered at stock and year level. HF – NHF denotes the return difference between hedge funds and non-hedge funds. The last two columns show hedge funds and non-hedge funds return difference for buyer-initiated and seller-initiated roundtrip trades respectively.

Panel A: Before June						
	All	NHF	HF	HF - NHF	HF – NHF (buy)	HF - NHF (sell)
Undervalued	1.36	1.03	2.29	1.26	-0.29	2.96
	[3.55]	[2.40]	[4.29]	[1.90]	[-0.30]	[5.31]
Neutral	0.13	-0.14	1.32	1.47	0.91	2.39
	[0.38]	[-0.38]	[2.03]	[2.06]	[0.96]	[3.50]
Overvalued	-2.73	-3.11	-0.07	3.04	2.83	2.24
	[-5.40]	[-5.50]	[-0.21]	[5.20]	[3.19]	[3.02]
Undervalued - Overvalued	4.08	4.15	2.37	-1.78	-3.12	0.72
	[7.11]	[6.71]	[3.89]	[-3.58]	[-5.10]	[0.94]
Panel B: Cross June						
	All	NHF	HF	HF - NHF	HF – NHF (buy)	HF - NHF (sell)
Undervalued	1.09	1.02	0.60	-0.42	1.26	-0.18
	[1.79]	[1.44]	[1.10]	[-0.43]	[2.00]	[-0.27]
Neutral	0.50	0.55	0.19	-0.36	2.19	-0.12
	[0.96]	[1.01]	[0.37]	[-0.39]	[3.09]	[-0.18]
Overvalued	-2.80	-2.70	0.88	3.58	3.54	0.71
	[-3.78]	[-3.04]	[1.50]	[3.46]	[6.09]	[1.61]
Undervalued - Overvalued	3.89	3.71	-0.28	-4.00	-2.28	-0.88
	[5.10]	[3.82]	[-0.31]	[-3.41]	[-3.00]	[-1.43]