On the Other Side of Hedge Fund Equity Trades

Xinyu Cui, Olga Kolokolova, Jiaguo (George) Wang*

This version: March 23, 2021

Abstract

Hedge funds earn positive ex-post abnormal returns and avoid negative abnormal returns on their equity portfolios when trading in the opposite direction of highly-diversified low-turnover institutional investors (quasi-indexers). This pattern is pronounced for short- and long-term holding periods, as well as if trading is conditional on return predictability associated with well-known market anomalies. It seems to be driven by the preferences of quasi-indexers for liquid, high-market-beta stocks, which tend to exhibit low future abnormal returns. Trading against other institutional investors or non-institutions does not result in abnormal performance for hedge funds.

Keywords: Institutional Trading, Alpha, Market Beta, Market Anomalies, Quasi-Indexers, Hedge Funds.

JEL Classification: G12, G14, G23.

---

*X. Cui (xinyu.cui@manchester.ac.uk) and O. Kolokolova (olga.kolokolova@manchester.ac.uk) are at the University of Manchester, and G. Wang is at the Lancaster University (george.wang@lancaster.ac.uk). We thank Vikas Agarwal, Michael Brennan, Stefano Giglio (Discussant), Marc Goergen, Wei Jiang, Alex Kostakis, Guillaume Monarcha (Discussant), Dalia Marciukaityte (Discussant), Ingmar Nolte, Stefan Petry, Winfried Pohlmeier, Adam Reed and the participants at the AFA 2021 Annual Meeting, the 2019 FMA Annual Meeting, the 11th Annual Hedge Fund and Private Equity Research Conference, the 4th KoLa Workshop, the 5th Young Finance Scholars Conference, and the participants of the seminars at NEOMA Business School, the University of Manchester, the University of Reading, and Aston Business School for helpful comments and constructive suggestions. All errors remain our own.

1. Introduction

> *If you are making money more often than not, what is motivating others to trade the other way, and will they continue to do so in the future? Remember that for every buyer, there is a seller, so someone is always taking the other side of your trades, and if you do not understand the economics of the trade, they may.*
>
> Lasse Pedersen, "Efficiently Inefficient", 2015

As professional arbitrageurs and sophisticated investors, hedge funds (HFs) play an essential role in stock price formation and improving market efficiency (see Stulz, 2007; Agarwal et al., 2015). Using equity holdings of HFs disclosed in 13F filings to Security and Exchange Commission (SEC), recent studies find comprehensive evidence on the link between HF trading, future stock returns, and mispricing.[1] For example, Cao et al. (2018b) show that HFs tend to hold undervalued stocks and their trading predicts future stock returns and delivers a positive alpha. Cao et al. (2018a) find that HF equity holdings improve efficiency of stock prices. Calluzzo et al. (2019) further show that HFs trade on the well-documented market anomalies and these arbitrage activities generate positive risk-adjusted returns. We join this strand of literature, but instead of looking at the identity of arbitrageurs and quantifying their gains, we focus on the flip side of HF equity trades. We set out to find who the counterparties of these professional arbitrageurs are and what the economic reasons behind their trading decisions might be.

Institutional investors hold around 80% ($18 trillion) of the S&P 500 stocks[2] and account for about 70% of daily trading volume[3], hence, in this paper we mainly focus on potential institutional

[1] Brunnermeier and Nagel (2004) are among the first ones to examine fund holdings. The authors conclude that HFs possess stock-picking and market timing abilities. HF demand shocks predict stock returns over the next few quarters (Sias et al., 2016). Informed stock demand of HFs predicts not only stock returns, but firms' fundamentals such as returns on assets (Jiao et al., 2016). HF trading often reduces stock mispricing, whereas mutual funds and other types of institutional investors either do not have any significant effect on mispricing or even exacerbate it (Jiao and Ye, 2014; Akbas et al., 2015; Kokkonen and Suominen, 2015; Ha and Hu, 2018). While HF stock holdings predict future stock returns, their option holdings predict both stock returns and volatility (Aragon and Martin, 2012).

[2] According to Pensions and Investments as of 2017, https://www.pionline.com/article/20170425/INTERACTIVE/170429926/80-of-equity-market-cap-held-by-institutions.

[3] According to Institutional Investor as of 2015, https://www.finra.org/investors/insights/institutional-investors-get-smart-about-smart-money.

counterparties of HFs.[4] To understand the economics of the other side of HF equity trades, we need to recognize the heterogeneous objective functions and trading behaviour of HFs and non-HF investors. One possibility would be that other investors make random errors in their judgements of stock profitability, and HFs exploit these errors. If this is the case, there should not be any specific type of institutions which as a group consistently exhibit "negative skill" when trading in the opposite direction of HFs. Alternatively, there may be groups of investors that do not have an alpha-maximizing objective functions (see, e.g., Baker et al., 2011; Christoffersen and Simutin, 2017). For such investors, forgoing an alpha may be a natural consequence of their optimal trades. Such investors may constitute systematic counterparties of HFs, facilitating their abnormal gains. In this paper, we set out to establish if any type of institutional investors consistently provides HFs with profitable trading opportunities, and if yes, what the economic reasons behind such behaviour might be.

The group of institutional investors is heterogeneous. Passive and active mutual funds, index funds and exchange-traded funds, pension funds and insurance companies all have different objective functions, investment horizons, compensation schemes, and trading strategies. Their trading has been extensively studied in the literature,[5] and all of them can be potential direct or indirect counterparties of HF equity trades. However, even within the same nominal type, the investment behaviour of institutions can be substantially different (Bushee, 2001). In his influential work Bushee (2001) suggests classifying institutions according to their actual trading behaviour (the level of their portfolio diversification and turnover), and not according to nominal labelling. This classification has been also used in, for example, Ke and Ramalingegowda (2005); Cella et al. (2013); Fang et al. (2014); Boone and White (2015); Appel et al. (2016). Such a "revealed" classification scheme provides more insights into preferences and investment goals of the institutions.

[4]We recognize that individual investors could also be counterparties of HF equity trades (Ben-David et al., 2012). In our empirical analysis, we evaluate trades made by HFs against other investors too. However, given the dominating market presence of the institutional investors, and the limited available data on individuals, we leave the detailed analysis of the economics of individual decision making for future research.

[5]From the trading skill perspective, active mutual funds are often found to underperform index-tracking funds (Blake et al., 1993; Malkiel, 1995; Elton et al., 1996; French, 2008; Guercio and Reuter, 2014; Crane and Crotty, 2018). In terms of market impact, institutional trading may play a positive role in price discovery and mitigate market anomalies (Gompers and Metrick, 2001; Nagel, 2005; Israel and Moskowitz, 2013), but it can also destabilize stock prices (Frazzini and Lamont, 2008; Dasgupta et al., 2011).

Following Bushee (2001), we identify two large groups of institutional investors: quasi-indexers (QIXs) and transient institutions (TRAs). A quasi-indexer is defined as an institutional investor exhibiting high portfolio diversification and low turnover, and also pursuing index-based buy-and-hold strategies. A transient institution also holds a highly-diversified portfolio but has a high turnover, and follows predominantly short-term trading strategies. For example, Vanguard group is classified as QIX, Fidelity International is TRA.[6] We also confirm that in our sample, compared to other groups of institutions considered, QIXs have the lowest turnover and the smallest active share, computed following Cremers and Petajisto (2009).

We find empirical evidence that QIXs significantly underperform when trading in the opposite direction of HFs. On average, stocks sold by HFs and simultaneously purchased by QIXs exhibit a significantly negative alpha of -0.33% per month relative to the CAPM, whereas stocks purchased by HFs and sold by QIXs earn a significantly positive alpha of $+0.49\%$ per month over the following quarter. This pattern is also pronounced when the abnormal returns are calculated using the characteristic-based approach of Daniel et al. (1997). Other investors do not exhibit such patterns, when trading in the opposite direction of HFs. Stocks purchased by HFs while being sold by QIXs correspond to around 8% of the total dollar value of HF stock holdings. However, they contribute almost 30% of the overall HF stock portfolio alpha.

QIXs usually have limited potential to lock in alpha due to leverage and short-selling restrictions. They are often constrained by the need to keep the tracking error within certain bounds, and their performance is benchmarked with respect to that of market indices. In order to achieve higher expected returns and beat the index, they optimally choose stocks with higher market betas, and thus depart from alpha-maximizing portfolios. Such reasoning is supported by Christoffersen and Simutin (2017), who show that mutual fund managers tend to increase their exposure to high-beta stocks to boost expected returns while maintaining tracking errors around the benchmark. We find that the average market beta of stocks sold by HFs and purchased by QIXs is 1.33, whereas

[6] Bushee (2001) also uses a third group of institutional investors – dedicated holders – institutions that invest in concentrated portfolios and has low turnover, focusing on long-term trading strategies with low sensitivity to current firm earnings. In our sample, on average, only 69 such institutions report per quarter, with their aggregate holdings being less than 2%. We do not use them as a separate sub-group but integrate in the group of other investors.

the average beta of stocks purchased by HFs and sold by QIXs is 1.13, with the difference being highly statistically significant and persistent over time as well as for longer holding periods.

The beta-over-alpha preferences explain the negative abnormal returns on stock bought by QIXs and simultaneously sold by HFs. When we control for the betting against beta factor of Frazzini and Pedersen (2014), the negative alpha of this portfolio loses significance, as its underperformance in now absorbed by the negative factor loading. The positive abnormal return of stocks bought by HFs and sold by QIXs remains significant even after controlling for the beta preferences of QIXs and stock illiquidity, suggesting some extra stock-picking skills of HFs.

Our approach allows us also to contribute to the extensive literature on the relation between institutional ownership and market anomalies.[7] McLean and Pontiff (2016) show that market anomalies tend to decline after their publication dates. They suggest two competing explanations: (1) the very existence of the anomalies is questionable and may be a result of inappropriate statistical analysis (see, e.g., Harvey et al., 2016), hence, the anomalies should not persist; and (2) the anomalies exist because of stock mispricing, and sophisticated arbitrageurs correct them over time. Directly looking at institutional trading on market anomalies, Edelen et al. (2016) report, however, a negative relation between the change in aggregate institutional holding and the stocks' ex-post abnormal returns. At the same time, Chen et al. (2018) find that HFs earn positive abnormal returns by trading on anomaly stocks, and Ha and Hu (2018) show that the HF daily order flow is positively correlated with previous daily market anomalies. Our paper complements these studies and shows that the overall poor performance of institutional anomaly trading is mainly driven by QIXs, taking the "wrong" side of an anomaly trade due to the general beta-over-alpha preferences. HFs buy low-beta stock while QIXs sell them and vice versa, which results in a positive alpha for HFs, even when trading can be linked to return predictability based on well-documented market anomalies.

The total asset size of QIXs is far larger than that of other types of institutional investors and HFs together, that is, the vast amount of capital is invested in strategies that are not risk-adjusted

[7]See Gompers and Metrick (2001); Nagel (2005); Frazzini and Lamont (2008); Green et al. (2011); Israel and Moskowitz (2013); McLean and Pontiff (2016); Calluzzo et al. (2019), among others.

return maximizing. Proactive arbitrageurs, such as HFs, have plentiful opportunities of delivering alpha to their investors, exploiting trading preferences of other institutions. This pattern is not likely to be reversed soon, since large investment firms keep launching low-cost index-tracking vehicles.[8]

2. Research Design

To identify possible counterparties of HF equity trades, we need to classify different types of investors first. Previous studies usually employ one of the two systems: institutional investors are classified either according to their business registration type (e.g., mutual funds, banks, insurance companies, etc.) or according to their actual trading behaviour (Bushee, 2001). While considering both systems in our study, we believe the trading-behaviour based classification is more relevant to our research target.[9] Following Bushee (2001), we first identify two distinct large groups of institutional investors, namely, QIXs and TRAs.[10] We also consider other investors, institutional or not, (OTHs) as a potential counterparts for HF equity trades.

Key "suspects" in our investigation of the other side of HF equity trades are QIXs. These institutions may constitute a systematic counterparty of HFs, as they are less likely to have alpha-maximizing objective functions. Instead, they may be more concerned with minimizing the tracking error with respect to their benchmark index, while still trying to beat it.[11] An important feature of the trading of institutions that face benchmarking is that they tilt their portfolios to high-beta stocks, in order to beat the benchmark. Buffa et al. (2019) develop an equilibrium framework in which choosing higher-beta investments is optimal for a benchmarking manager. Christoffersen and Simutin (2017) empirically show that those mutual funds that have a large share of investment from

[8]Fidelity, for example, launched the first index-tracking stock fund without any fees for investors on 3 August 2018. See "Asset managers shares dive after no-fee fund launch", *Financial Times*, August 2, 2018.

[9]Another potential way to classify institutional investors would be through direct textual processing of their prospectus as, for example, in Abis (2020).

[10]http://acct.wharton.upenn.edu/faculty/bushee/IIclass.html

[11]There are other factors that provide incentives/disincentives for funds to generate alpha. Among those are, for example, distribution channels of funds (Guercio and Reuter, 2014).

pension funds and, thus, are more likely to be benchmarked, invest disproportionally into high-beta stocks, and stocks with high market betas tend to have low alphas (Frazzini and Pedersen, 2014). Another important feature of QIXs is that they tend to prefer more liquid stocks (Gompers and Metrick, 2001), whereas HFs are known for earning high returns by trading less liquid assets and providing market liquidity (Teo, 2011; Jylhä et al., 2014). These leads to our "swap" hypotheses as follows:

α swap:	*HFs earn positive abnormal returns when trading in the opposite direction of QIXs.*
	The abnormal returns are driven by:
β swap:	*HFs selling high-beta and buying low-beta stocks,*
Liquidity swap:	*HFs selling more liquid and buying less liquid stocks.*

To test our hypothesis, we first select those institutional investors with a unique identifier of permanent classification provided by Bushee (2001), and split them into HFs and non-HF investors. Then, we identify QIXs and TRAs among non-HFs. We obtain institutional holdings from the 13F filings, and compute the holdings of other investors (OTHs) in the spirit of Ben-David et al. (2012) as the difference between 100% and the total percentage holdings of HFs, QIXs, and TRAs.[12] We exclude from the sample those quarter-stock data points for which the total percentage holding of HFs, QIXs, and TRAs exceeds 100%, similar to Campbell et al. (2009) and Yan and Zhang (2009), among others.

Second, for each type of trader and quarter, we compute quarterly changes in the fractional holdings of each stock.[13] For example, the change in holding of stock i by HFs during quarter q

[12]Holdings of OTHs include holdings of institutional investors without a permanent classification or with several permanent classifications in the database of Bushee (2001), investors classified as dedicated, small US-based institutional investors and foreign institutions which do not need to comply with 13F filing requirements, as well as small holdings of large US-based institutional investors, which are below the reporting threshold or for which confidential treatment was requested by reporting institutions, and individual investors (French, 2008; Ince and Kadlec, 2020).

[13]This measure is widely used by many studies (Gompers and Metrick, 2001; Sias et al., 2006; Campbell et al., 2009; Edelen et al., 2016).

($\Delta\text{StockHold}^{\text{HF}}_{\text{i,q}}$) is given by:

$$\Delta\text{StockHold}^{\text{HF}}_{\text{i,q}} = \frac{\text{StockHold}^{\text{HF}}_{\text{i,q}}}{\text{TSO}_{\text{i,q}}} - \frac{\text{StockHold}^{\text{HF}}_{\text{i,q-1}}}{\text{TSO}_{\text{i,q-1}}}, \tag{1}$$

where $\text{StockHold}^{\text{HF}}_{\text{i,q}}$ is the holding of stock i by all HFs at the end of quarter q, i.e.

$$\text{StockHold}^{\text{HF}}_{\text{i,q}} = \sum_{\text{j}} \text{StockHold}^{\text{HF}_{\text{j}}}_{\text{i,q}}, \tag{2}$$

and $\text{TSO}_{\text{i,q}}$ is the total number of outstanding shares of firm i at the end of quarter q. $\Delta\text{StockHold}^{\text{HF}}_{\text{i,q}}$ is considered to be a missing value if any of $\text{TSO}_{\text{i,q}}$ or $\text{TSO}_{\text{i,q-1}}$ is missing. All holding and numbers of shares outstanding are adjusted for stock splits.

Third, we construct a set of swap portfolios, which include stocks heavily traded by HFs and simultaneously traded in the opposite direction by QIXs, TRAs, or OTHs.We rank stocks based on the change in holding during each quarter in year t within stocks of two size groups – above or below the NYSE size median at the end of year $\text{t} - 1$ – following Fama and French (1993). We consider stocks with the change in holding below the 20^{th} percentile as those that investors significantly sell, and those above the 80^{th} percentile as those that investors significantly buy. The swapped stocks are those which belong to the intensively traded stocks for two types of investors, but in different directions. We form a set of swap portfolios as an equal-weighted average across different size groups of the value-weighted average returns of the chosen swapped stocks.[14] The portfolios are then held for one quarter until the end of the following quarter and then rebalanced. To capture the longer-term performance of swapped stocks, we also consider annual holding periods. We form swap portfolios every quarter and hold them for the following year. Every month we compute the average return of the previously formed portfolios which are still being held at that month to obtain the time series of long-term holding portfolio returns.

Last but not least, we evaluate the performance of these portfolios. We compute monthly average excess returns over the risk-free rate (measured as the 3-month T-bill rate) as well as

[14] As a robustness check, we also used 10% and 30% cutoffs. The results remain qualitatively the same and are reported in the Online Appendix.

the abnormal returns (α-s) and market factor loadings (β-s) relative to CAPM model.[15] We then compute the average Amihud (2002) illiquidity measure to check if HFs swap liquid to illiquid stocks with QIXs. Our swap hypotheses imply that the alpha of stocks bought by HFs and simultaneously sold by QIXs should be larger than that of stocks sold by HFs and bought by QIXs, while the relation of their market betas is the opposite. Stocks bought by HFs and sold by QIXs are also expected to be less liquid than stocks sold by HFs and bought by QIXs.

To take into account other stock characteristics that may impact performance in potentially nonlinear manner, we follow the procedure of Daniel et al. (1997) (hereafter DGTW) and construct the DGTW-adjusted monthly excess returns. At the end of each June, we assign stocks into one of 125 portfolios constructed based on market capitalization using NYSE breakpoints, the industry-adjusted book-to-market ratio using the Fama-French 48 industries, and the prior 12-month return. Portfolios are held for one year and then rebalanced. For each of the 125 portfolios, we calculate the value-weighted monthly returns as the benchmark. The DGTW-adjusted monthly excess return is the difference between the stock's monthly return and the return of the benchmark portfolio to which it belongs. We compare the monthly average DGTW-adjusted excess returns of stocks swapped by HFs and other types of investors. Similar to the CAPM abnormal returns, we expect the DGTW-adjusted excess returns to be higher of stocks bought by HFs and sold by QIXs, compared to excess returns of the opposite swap.

If the superior HF performance on swapped stocks is indeed driven by the β- and liquidity-swap, one should observe that the abnormal returns of HFs on swap portfolios to disappear after the differences in stock betas and liquidity are accounted for. In doing so, we use the betting against beta factor (hereafter BAB) of Frazzini and Pedersen (2014),[16] who find that high-beta assets earn low alphas due to funding constraints, and the traded liquidity factor (hereafter LIQ) of Pástor and Stambaugh (2003), who show that liquidity risk is an important determinant of HF returns.[17]

[15] As a robustness check we also use the Fama-French 3-factor model and Carhart 4-factor model (Carhart, 1997). Results reported in a supplementary Online Appendix show the same patten in the estimated alphas also after controlling for size, value, and momentum factors.

[16] The time series values of the factor are obtained from the authors' web-page https://www.aqr.com/Insights/Datasets/Betting-Against-Beta-Equity-Factors-Monthly.

[17] The time series values of the factor are obtained from the authors' web-page http://finance.wharton.upenn.e

We evaluate the alphas from the regressions of the DGTW-adjusted excess returns of the swapped portfolios on these two factors.

To assess the stability of the results during different market conditions, we repeat the analysis before, during, and after the financial crisis of 2007–2008, and also run a rolling window regression using a three-year window and quarterly steps. We also assess the long-term performance of the swapped stocks and use an annual holding period instead of a quarterly one, as described above.

3. Data Sources and Sample Construction

Stock returns are from the Center for Research in Security Prices (CRSP) Monthly Stock File. We consider the monthly returns of common stocks (those with CRSP share codes of 10 or 11) traded on the NYSE, AMEX or NASDAQ (those with CRSP exchange codes of 1, 2 or 3) from April 1994 to December 2018. Stock returns are adjusted for split and delisting. We only consider the stocks with monthly prices above \$5 at the beginning of each quarter, in order to purge the estimation noise from the minimum tick effect (Harris, 1994; Amihud, 2002) and to make sure that all institutional investors can trade them. We exclude the stocks of utility firms (those with standard industrial classification (SIC) codes from 4900 to 4999) and financial firms (those with SIC codes from 6000 to 6999). Panel A of Table 1 reports the descriptive statistics of all of the stocks in our sample. We also collect the data for the standard market factors from Ken French's data library.[18]

Our data on institutional holding are from the Thomson Reuters Institutional (13f) Holding database (CDA/Spectrum s34). The 13f mandatory reports of institutional holding are filed with the Securities and Exchange Commission (SEC) and are compiled by Thomson Reuters. According to the 1978 amendment to the Securities and Exchange Act of 1934, institutions with aggregate fair market values over \$100 million must file their forms within 45 days after the end of a calendar quarter. The managers are allowed to omit their "small" holding (if they hold fewer than 10,000

du/~stambaug/.

[18] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

shares and less than $200,000 in terms of their market values). Thus, most of the disclosed holding data come from relatively large positions of large firms.

We identify HFs using a union of three major HF databases – EurekaHedge, TASS Lipper, and Morningstar – for the period from 1994 to 2017.[19] We merge the databases following the procedure described in Joenväärä et al. (2016). We then create a list of HFs' 13f identifiers, i.e. manager numbers (hereafter MGRNOs), by matching the HF company name and the names of the institution reporting to the 13f database. We manually check that the identified companies do not have any other business (e.g., a mutual fund, insurance, banking etc.), ensuring that we obtain a list of pure HF companies. Altogether, we identify 734 HFs. Further, we identify 2,906 QIXs and 1,448 TRAs from the remaining institutions in the Bushee (2001) database. Overall, identified HFs, QIXs, and TRAs institutions in our final sample cover 63.84% of all institutions from the 13f database existing between 1994 and 2017.[20] As of the end of 2017, the overall portfolio size based on the holdings of our sample stocks of QIXs was $9.69 trillion, whereas it was $2.82 trillion for TRAs, and $1.58 trillion for HFs.

[Place Table 1 about here]

Panel B of Table 1 reports the descriptive statistics of the institutional portfolios. The largest group of institutions are QIXs, with on average 1,352 institutions reporting holding per quarter compared to 319 HFs. QIXs are also the most diversified institutions, holding on average 170 different stocks in a quarter, followed by TRAs with 166 stocks per quarter, compared to 118 of HFs. QIXs have the smallest turnover, on average 6.59% per quarter, while that of HFs is over 22.26% per quarter and it is 23.95% for TRAs. Turnover for quarter q is calculated as the minimum of purchases and sales during quarter q, divided by the average market value of the portfolio at the end of quarter q and the previous quarter.

Another economically appealing and widely adopted method to classify institutional investors is

[19]Starting from 1994, most databases keep the information on defunct HFs: a potential survivorship bias in the data is thereby ameliorated.

[20]The rest of the reporting institutions are included in OTHs.

the Active Share measure of Cremers and Petajisto (2009).[21] Active Share is designed to measure to what extent an investor deviates from a passive benchmark index. In the spirit of Cremers and Petajisto (2009), we compute this measure for HFs, QIXs, and TRAs using CRSP all share value-weighted index. In Panel B of Table 1, we see clear correspondence between the active share classification and Bushee's classification, with QIXs exhibiting on average the lowest active share of 72.75%, and HFs having the highest value of 88.70%. The average active share for QIXs is consistent with that for pure-ETF of 70.47% (Cremers et al., 2016). Therefore, we proceed with the following analysis based on Bushee's classification system.

Table 2 reports the descriptive statistics of the holding and the change in holding of all types of investors in our sample across three periods: the pre-crisis period 1994q2 to 2007q2, the crisis period 2007q3-2009q1, and the post-crisis period 2009q2-2017q4. The descriptive statistics of the holdings are broadly similar to those reported in Jiao et al. (2016). QIXs hold a substantial share of the market. Their average holdings of shares in listed non-financial and non-utility companies have increased from 31% in the pre-crisis period to around 40% in the later periods. The average holdings of HFs and TRAs in these firms also have increased from 7% and almost 11% pre-crises to around 11% and 13% in the later sample, respectively. Before the crisis, QIXs have the largest average positive change in holdings of 0.60% per quarter, compared to 0.17% for HFs, and 0.07% for TRAs. OTHs, on the contrary, are net sellers. During the crisis period, QIXs keep purchasing stocks on average, although at a slower pace (the average change of 0.27%), and OTHs, on average, buy stocks (the average change of 0.25%), while HFs and TRAs have been selling stocks on average (the corresponding change are -0.08% and -0.44% respectively). Post-crisis, TRAs, HFs, and QIXs are net buyers in the stock market, with the average changes of 0.20%, 0.07%, and 0.07%, while OTHs revert to being net sellers (the average change in holding is -0.34%).

[Place Table 2 about here]

[21] See Cremers et al. (2016) and Crane and Crotty (2018), among others.

4. Empirical Results

4.1. Institutional trading: α-, β- and liquidity-swap

Panel A of Table 3 reports the excess returns over the risk-free rate, the CAPM alphas and betas[22], and Amihud illiquidity measures for stocks swapped between HFs and other types of investors.

Consistent with our expectations, the stocks sold by HFs and simultaneously bought by QIXs exhibit negative future alphas of -0.33% per month, have high beta of 1.33, and are more liquid (Amihud illiquidity of 0.83×10^{-6}), compared to stocks bought by HFs and sold by QIXs. The latter exhibit a positive alpha of 0.49% per month, have smaller beta of 1.13, and higher illiquidity (1.11×10^{-6}), with all the differences being highly statistically significant. In contrast, stocks swapped between HFs and TRAs or OTHs do not exhibit any statistically significant alphas in either direction. The differences between beta measures are not significant, either, while the difference between illiquidity measures is only marginally significant for HF/TRA swap, but not for HF/OTH swap.[23]

Even after controlling for other factors via DGTW-adjusted returns (Panel B of Table 3), the excess return of stocks sold by HFs and purchased by QIXs remains negative of -0.16% per month but not significant, whereas the DGTW-adjusted excess return of stocks bought by HFs and sold by QIXs is 0.45% per month, significant at the 1% level. The swaps between HFs and TRAs or OTHs do not generate any significant adjusted returns.[24]

Controlling for LIQ and BAB factors reveals that stocks swaps between HFs and QIXs in opposite directions do not exhibit significant differences in their exposure to the liquidity factor,

[22]The results based on the Fama-French 3-factor model and Carhart 4-factor model are qualitatively the same and are reported in the Online Appendix.

[23]Remarkably, the CAPM betas of the swapped portfolios between all the institutions in all directions are higher than one, suggesting that high-beta stocks are generally more likely to change owners from quarter to quarter.

[24]We run a robustness check by subdividing OTHs into other institutions reporting to 13f (OTH_INSTs) and unreported holdings (OTH_OTHERs). The results reported in the Online Appendix similarly indicate no significant differences in CAPM alphas and betas, liquidity, or DGTW adjusted returns for these swaps. The only exception is the CAPM alpha for the stocks that are sold by HFs and bought by OTH_OTHER, which is negative and statistically significant. The differences in DGTW-adjusted returns is still not significant for this swap.

thus, differential liquidity risk does not contribute to underperformance of stocks bought by QIXs relative to stocks sold. At the same time, the difference in exposures to BAB factors is highly statistically signifiant, providing further support to our β-swap hypotheses. The negative abnormal return of stocks sold by HFs and simultaneously bought by QIXs further decreases in absolute value after controlling for BAB. Remarkably, abnormal return on stocks purchased by HFs and simultaneously sold by QIXs remains large positive (0.43% per month) and statistically significant at the 1% level, even after LIQ and BAB factors are controlled for, suggesting a different source of superior HF performance in this case.

Combined together, the results suggest that QIXs trade in the alpha for the market beta when making purchasing decisions. Trying to beat the benchmark while remaining within admissible tracking error bounds, QIXs tilt their portfolios to high-beta stocks, which tend to be associated with low alphas. HFs exploit this opportunity and provide liquidity for such trades.[25]

[Place Table 3 around here]

To evaluate the contribution of such swap trades to the overall HF long-equity portfolio performance, we conduct a decomposition analysis of HF equity portfolios.[26] First, we use dollar-holding-weighted portfolios for each HF based on their 13f reports of the sample stocks and evaluate total average performance of these portfolios. Each quarter we calculate the dollar-holding-weighted average monthly DGTW-adjusted excess returns of portfolios of each HF, and then calculate the equal-weighted average across all HFs reporting during this quarter. Next, we decompose the total performance for HF equity portfolio. At the end of each quarter q, we split equity holdings of each HF into three categories based on trading in quarter q: (1) "HF/QIX Sell" contains stocks that have been in the HF/QIX swap portfolio in q with HF selling them, (2) "Other Trades" contains

[25] As a robustness check, we evaluate the performance of swapped stocks across all other pairs of investors and report the results in the Online Appendix. We find that swaps between TRAs and QIXs have similar properties to swaps between HFs and QIXs based on CAPM alpha. The superior performance of TRAs is much smaller in magnitude than that of HFs, and there no statistically significant alphas can be found for any swap portfolios after DGTW, BAB, and LIQ adjustment.

[26] This decomposition captures only reported in 13f large long positions of HFs in the US equity. It does not account for the returns generated by short-selling positions of HFs, their option trading, fixed income investments, or investments in other assets not subject to reporting requirements in 13f, such as for example, foreign equity or real estate.

stocks that have not been in the swap portfolio in q in either direction, and (3) "HF/QIX Buy" contains stocks from the HF/QIX swap portfolio which HF have bought in q. We calculate the partial performance for each category using the same weights as for the total portfolio performance.

The decomposition results are reported in Table 4. HF equity portfolio, on average, earns an ex-post abnormal return of 0.11% per month. The dollar holding of stocks in "HF/QIXs Buy" swap during quarter q increase from 5.95% at the end of q-1 to almost 8% at the end of q, consistent with HFs buying these stocks. These stocks then contribute the abnormal return of 0.03 percentage points per month, which amounts to about 27% of the total abnormal performance of HF equity portfolio. The dollar holding of stocks in "HF/QIXs Sell" swap decrease from 6.25% at the end of quarter q-1 to 5.40% at the end of quarter q, again consistent with HFs selling these stocks. The remaining unsold stocks (5.40% of the total value of HF equity portfolio) contribute negatively to the total portfolio abnormal return, reducing it by -0.01 percentage points, around 13.1% of the total portfolio abnormal performance. Hence, by engaging in swap trades with QIXs, HFs considerably improve performance of their equity portfolio, especially through purchased stocks, while reducing negative effects of poorly performing stocks by decreasing their holdings.

[Place Table 4 around here]

Despite similarities in the levels of portfolio diversification and rebalancing frequencies, the group of QIXs is heterogeneous. Passive mutual funds that track an index are more likely to be benchmarked relative to it, as compared, for example, to insurance companies. This may lead to differences in their preferences for stocks with high market beta. We refine the analysis by splitting the sample of QIXs into several sub-categories of investors. The first one is independent investment advisors (IIAs), the largest group capturing 73.64% of QIXs in our sample, which contains, for example, mutual funds. The second is banks (BNKs) capturing 11.98% of the sample. The remaining 14.38% are other QIXs (OTQIXs), including pensions plans, insurance companies, and university endowments. These sub-categories are based on the detailed classification of Bushee (2001). We further refine this classification and identify a group of QIXs, which explicitly report managing index funds (INDEX). We follow Crane and Crotty (2018) and use the CRSP index fund

flag (denoted as "D") and manually match the names of companies that manage at least one index fund with the names of QIXs in our sample. In total, we identify 108 QIXs that have managed at least one CRSP index fund.[27]

The beta-over-alpha preferences discussed above can be seen for all three types of QIXs (Table 5). The worst performance in terms of the abnormal returns seems to be generated by BNKs. The CAPM alpha spread between the portfolio of stocks bought by HFs and sold by BNKs, and sold by HFs while purchased by BNKs is 0.92% per month. The corresponding difference in the DGTW-adjusted excess returns is 0.71% per month, significant at the 1% level. It is 0.35% (the 10% significance level) for IIAs, 0.54% for OTQIXs (the 1% significance level), and 0.55% for INDEX (the 1% significance level). The difference in CAPM betas is the strongest for IIAs of -0.29, significant at the 1% level. It is larger in absolute value than -0.20 reported in Table 3 for all QIXs.

[Place Table 5 around here]

An alternative explanation for the significant ex-post alphas associated with HF/QIX swaps may be position reversals by QIXs and/or herding by investors after HF trades. If various investors sell a substantial amount of the stocks that have been bought by QIXs but sold by HFs during the previous quarter, the selling pressure would reduce the abnormal returns. The abnormal returns would increase if investors follow previous HF purchases. To check if such a mechanism is supported by the data, we compute the average change in holdings of HF/QIX swapped stocks during each quarter and the average quarterly change in holdings of HFs and non-HF investors of these stocks during the subsequent quarter (Table 6). During trading quarters, the change in holding of HFs is smaller in absolute value than the corresponding change in holdings of QIXs. HFs do not seem to fully exploit potential arbitrage opportunities, which may be due to the relatively small total size of the HF industry as compared to the overall market value. TRAs and OTHs, on average, take the same side of HF/QIX swap trades as HFs, and accommodate the remaining portion of QIXs's demand. We find no evidence of substantial trade reversals or herding, however. QIXs, moreover,

[27]The complete list of these funds, including 13f identifiers is available in Online Appendix.

tend to keep buying during quarter q+1 stocks they purchased during the previous quarter and that were sold by HFs. On the HF buying side, during subsequent quarter q+1 HFs and TRAs increase their holdings in stocks swapped between HFs and QIXs, while OTHs sell these stocks. All these changes are small in absolute values (0.22%, 0.27%, and -0.44% respectively) as compared to the initial HF purchase size of 3.40%. Thus, we cannot find empirical support for trade reversals of QIXs or institutional herding into swapped stocks, which can lead to the observed abnormal return patterns.

[Place Table 6 about here]

4.2. Institutional trading swap: time-series variation and long-term performance

To assess the stability of our results across different market conditions, we repeat the analysis for three sample periods separately: pre-crisis (1994q1–2007q2), crisis (2007q3–2009q2), and post-crisis (2009q3–2017q4) periods (Ben-David et al., 2012).

The difference in CAPM alpha between stocks sold by HFs/bought by QIXs, and those bought by HFs/sold by QIXs is persistent across all three periods (Table 7). In the pre-crisis and crisis periods, HFs were gaining significantly by buying future winners. The effect is especially strong during the crisis period, where the ex-post alpha of stocks bought by HFs and sold by QIXs relative to the CAPM reaches 1.75% per month. During the post-crisis period, the performance differences are generated predominantly by HFs selling future losers. As for market betas, QIXs have been buying especially high-beta stocks during the pre-crisis periods, but not during the crisis, when the difference in betas between stock sold by HFs/bought by QIXs, and those bought by HFs/sold by QIXs is not statistically significant. This result is consistent with the intuition that QIXs tilt their portfolios towards high-beta stocks when trying to beat the benchmark. This strategy works, however, only as long as the benchmark has a positive expected return. During the crisis period the market returns were negative, and retreating from high-beta stocks was optimal for benchmarked institutions.

Similar pattern is observed when DGTW-adjusted returns are used (Table 8). The largest spread between two swapped portfolios (in terms of the DGTW-adjusted returns and their alphas relative to LIQ and BAB factors) is generated during the crisis period. In the post-crisis period, although stocks bought by HFs and simultaneously sold by QIXs still significantly outperform those sold by HFs/bought by QIXs, the magnitude of the difference is only about one third of that during the crisis period.

[Place Tables 7 and 8 around here]

Figure 1 further plots the time series of alphas and market betas relative to the CAPM for stocks swapped between HFs and other investors estimated using three-year rolling windows. The alphas of stocks bought by HFs/sold by QIXs are almost always positive and above those sold by HFs/bought by QIXs, which are in most cases negative. The betas of the stocks purchased by HFs, on the other hand, are almost always smaller than those of sold stocks, apart from the crisis period, consistent with the previous discussion. As for the swaps between HFs and other investors, no persistent difference can be seen for either alphas or market betas over time.

[Place Figure 1 about here]

Long-term performance of the swapped stocks (Table 9) reveals that the alpha losses of QIXs that buy stocks which are sold by HFs are predominantly associated with the short-term performance over the first quarter, and the losses are not statistically significant over the annual horizon. It turns almost zero when LIQ and BAB are taken into account with DGTW-adjusted returns. At the same time, the gains which HFs make by purchasing stocks sold by QIXs remain positive and statistically significant even on the annual horizon, although their magnitude decreases. This findings is consistent with HFs being shorter-term investors with high turnover, capitalising predominantly on their skills to predict short-term returns (see Agarwal and Naik, 2000; Edwards and Caglayan, 2001; Jagannathan et al., 2010, among others). The difference in market betas and in loadings on the BAB factor remains statistically significant, with HFs selling/QIXs buying high-beta stocks, and this swap portfolio having a significantly negative exposure to the BAB factor. No statistical difference can be found for other counterparties of HFs.

[Place Table 9 around here]

4.3. Implications for market anomalies

Over the past decades, an increasing number of firm characteristics that predict future stock returns have been discovered (so-called market anomalies). The trading behaviour of institutional investors associated with these anomalies has attracted a great deal of scholarly attention (see Fama and French, 2008; Campbell et al., 2009; Israel and Moskowitz, 2013; Hou et al., 2015; Edelen et al., 2016, among others).

Calluzzo et al. (2019) show that HFs and other high turnover institutions do trade on market anomalies and exploit return predictability, especially over short-term. Edelen et al. (2016), however, show that on aggregate institutional investors trade against market anomalies. They incur abnormal losses when wrongly purchasing "anomaly" stocks that theoretically should belong to the short side of the anomaly trade. Thus, similar to our main findings, these equilibrium results suggest that HFs may be profiting by trading in the opposite direction other investors even if the trades are related to known features of return predictability. Our previous empirical results indicate that QIXs seem to have a different objective function from other institutional investors, and swap portfolio alphas for portfolio betas – the strategy being exploited by HFs. We now extend this analysis to portfolios of "anomaly" stocks.

We consider nine well-known market anomalies discussed in Fama and French (2008) and Stambaugh et al. (2012), including the operating profit (OP), gross profitability (GP), O-Score, investment-to-assets (IVA), investment growth (IK), net operating assets (NOA), net stock issues (NSI), accrual (ACR), and asset growth (AG) anomalies.[28]

To guarantee that all of the firm specific information related to the market anomalies is available to all institutional investors, we consider the institutional trading during the second quarter of year t. This ensures that the annual reports for the fiscal year ending in calendar year $t-1$ are readily available.The portfolio holding period is the following four quarters starting from the third quarter

[28]The anomalies are described in detail in the supplementary Online Appendix.

of year t. The anomaly portfolios constructed during the institutional trading window of year t are held until the end of the next trading window of year $t + 1$.

Similar to our main analysis and following Fama and French (1993, 2008), we construct portfolios from the intersection of two size groups (above or below the NYSE size median at the end of calendar year $t - 1$) and each of the anomaly groups (using NYSE breakpoints for the quintiles). To reduce the dominance of micro-cap stock returns (Edelen et al., 2016), we compute the monthly value-weighted returns for each portfolio and calculate the equal-weighted returns of portfolios in different size groups but the same anomaly group. The resulting portfolios characterize the average performance of the anomaly-related stocks in our sample. We call portfolios "underpriced" if they contain the top 20% of stocks according to the gross profit and gross profitability, or the bottom 20% of stocks according to other anomalies. The underpriced portfolios are expected to have positive abnormal returns, and they belong to the long leg of a trade. We call portfolios "overpriced" if they contain the bottom 20% of stocks according to the gross profit and gross profitability, or the top 20% stocks according to other anomalies. The overpriced portfolios are expected to have negative abnormal returns and they belong to the short leg of a trade.

We then construct a set of institutional swaps on market anomalies portfolios. During the institutional trading window (the second quarter of year t), we conduct independent triple sorts of all stocks based on (1) stock sizes at the end of calendar year $t - 1$ using the NYSE median, (2) each of the nine market anomalies evaluated for the fiscal year ending in calendar year $t - 1$ using the 20% and 80% NYSE breakpoints, and (3) the change in holding during the second quarter of calendar year t using the 20^{th} and 80^{th} percentiles. For each portfolio, we compute the monthly value-weighted returns and calculate the equal-weighted returns of portfolios in different size groups but the same anomaly group, ranking variables and the change in holding. Then, we calculate the equal-weighted returns of nine anomaly portfolios for each pair of investors. Altogether, we end up with four swap portfolios for each pair of investors. For example, if HFs exploit market anomalies and QIXs make "wrong-side" trades, we would expect to find significantly negative abnormal returns for stocks in the short leg of the anomaly that are sold by HFs and bought by QIXs.

We collect the accounting information from the CRSP/Compustat Merged Database Fundamentals Annually from 1993 to 2016.[29] We only use firms with the minimum of two years of data available, starting from their second reporting year.

Panel A of Table 10 reports the descriptive statistics of the firm performance measures, related to the nine market anomalies in our sample. All of the anomaly measures are winsorized at the 1% and 99% levels. Panel B of Table 10 reports the CAPM alphas for portfolios sorted on each of the nine anomalies under study and the equal-weighted portfolio of nine anomaly portfolios (EW-Avg); Panel C reports the corresponding DGTW-adjusted excess returns. The results substantiate the existence of these anomalies in our sample, with the GP and NOA anomalies being the most pronounced. By investing in the corresponding long-short portfolios investors can obtain up to 0.67% per month in terms of abnormal returns relative to the CAPM, and 0.56% per month in terms of DGTW-adjusted returns, both signifiant at the 1% level (the NOA anomaly).

[Place Table 10 about here]

Table 11 reports CAPM alphas, betas, and liquidity for swapped stocks related to the equal-weighted combination of the market anomalies under consideration during the entire holding period, and Table 12 reports the DGTW-adjusted excess returns (Daniel et al., 1997), corresponding ex-post 2-factor alphas, and factor loadings. Swaps in which HFs sell/QIXs buy overpriced stocks deliver a significantly negative alpha of -0.53% per month, while swaps in which HFs buy/QIXs sell underpriced stocks exhibit a positive alpha of 0.32% per month. However, the differences in alphas of stocks bought by HFs/sold by QIXs and sold by HFs/bought by QIXs is positive and highly statistically significant only for short leg of market anomalies. In terms of market betas in each sub-group of stocks (overpriced/underpriced relative to market anomalies), QIXs buy stocks with significantly higher market betas than those of stocks they sell. Swaps between HFs and other types of investors do not exhibit such patterns in either alpha or beta.

The abnormal returns of HF/QIX swapped stocks in both short and long legs of anomaly

[29]The accounting information we used is this study is related to year $t-1$. Thus, our last calendar year for the accounting data is 2016; based on this information our last holding period is from July 2017 to June 2018, that is, until the end of our return sample.

trades lose their significance when DGTW-adjusted returns are used and LIQ and BAB factors are controlled for, suggesting that superior performance of HF is driven by a combination of factors, such as choosing lower beta, lower liquidity stocks, in addition to trading based on market-anomalies related signals.

[Place Tables 11 and 12 about here]

Overall, the results suggest that HFs are able to exploit return predictability associated with different market anomalies because they are able to find a willing counterparty – QIXs – investors that tilt their portfolios towards high-beta stocks and do not seem to be directly motivated to exploit return predictability.

The QIXs are the dominant group of institutional investors in our sample according to their asset size. Thus, as QIXs do not exploit the profitable opportunities arising from the market anomalies due to the peculiar objective function of these traders, and the total portfolio size of other institutions is not sufficient to offset the impact of the trading of QIXs, the market anomalies are still strongly pronounced nowadays, despite the availability of theoretical research explaining their nature and accounting information underlying the corresponding portfolio choice.

5. Conclusion

Hedge funds earn positive abnormal returns and avoid negative abnormal returns when they trade in the opposite direction of quasi-indexers – highly-diversified and low turnover institutions. Stocks bought by hedge funds and simultaneously sold by quasi-indexers exhibit significantly positive future alphas relative to various benchmark models, while stocks sold by hedge funds and bought by quasi-indexers exhibit negative future alphas. The seemingly negative stock-picking skills of quasi-indexers are likely to be related to their trading strategy, which is not explicitly alpha-maximizing. Being motivated by benchmarking relative to the market index, these institutions tend to purchase stocks with higher market betas, and sell stocks with low market betas, and hence, trading in alpha. Hedge funds provide liquidity for such trades, earning abnormal returns

for their own investors. Other types of investors do not exhibit such patterns: hedge funds do not earn significant abnormal returns when trading with them.

The beta-over-alpha preferences seem to keep quasi-indexers from trading against well-established market anomalies, too. Even conditional on the anomaly-related accounting information being publicly available, quasi-indexers still invest into high-beta and low-alpha stocks. They do not exploit return predictability, and allow hedge funds that trade against them to earn abnormal returns. This finding echoes Giannetti and Kahraman (2017), who show that open-end investment structures may hamper the trading against mispricing. It also extends the work of Edelen et al. (2016) by showing that the negative relation between change in institutional holding and ex-post abnormal returns for anomaly stocks is mainly driven by quasi-indexers, trading in the alpha for the market beta.

Our paper suggests that, as long as the largest amount of investible capital is allocated to traders that are not explicitly motivated to deliver high risk-adjusted expected returns, various profit-making opportunities (including but not limited to market anomalies) will persist in the market. More active and properly-motivated investors, such as hedge funds, will exploit these opportunities at the expense of individuals who delegate their money management to quasi-indexers.

References

Abis, S. 2020. Man vs. machine: Quantitative and discretionary equity management. *Machine: Quantitative and Discretionary Equity Management (October 23, 2020)* .

Agarwal, V., K. A. Mullally, and N. Y. Naik. 2015. The economics and finance of hedge funds: A review of the academic literature. *Foundations and Trends in Finance* 10:1–111.

Agarwal, V., and N. Y. Naik. 2000. Multi-period performance persistence analysis of hedge funds. *Journal of Financial and Quantitative Analysis* pp. 327–342.

Akbas, F., W. J. Armstrong, S. Sorescu, and A. Subrahmanyam. 2015. Smart money, dumb money, and capital market anomalies. *Journal of Financial Economics* 118:355–382.

Amihud, Y. 2002. Illiquidity and stock returns: Cross-section and time-series effects. *Journal of Financial Markets* 5:31–56.

Appel, I. R., T. A. Gormley, and D. B. Keim. 2016. Passive investors, not passive owners. *Journal of Financial Economics* 121:111–141.

Aragon, G. O., and S. J. Martin. 2012. A unique view of hedge fund derivatives usage: Safeguard or speculation? *Journal of Financial Economics* 105:436–456.

Baker, M., B. Bradley, and J. Wurgler. 2011. Benchmarks as limits to arbitrage: Understanding the low-volatility anomaly. *Financial Analysts Journal* 67:40–54.

Ben-David, I., F. Franzoni, and R. Moussawi. 2012. Hedge fund stock trading in the financial crisis of 2007–2009. *The Review of Financial Studies* 25:1–54.

Blake, C. R., E. J. Elton, and M. J. Gruber. 1993. The performance of bond mutual funds. *Journal of Business* pp. 371–403.

Boone, A. L., and J. T. White. 2015. The effect of institutional ownership on firm transparency and information production. *Journal of Financial Economics* 117:508–533.

Brunnermeier, M. K., and S. Nagel. 2004. Hedge funds and the technology bubble. *The Journal of Finance* 59:2013–2040.

Buffa, A. M., D. Vayanos, and W. Paul. 2019. Asset management contracts and equilibrium prices. *Working paper* .

Bushee, B. J. 2001. Do institutional investors prefer near-term earnings over long-run value? *Contemporary Accounting Research* 18:207–246.

Calluzzo, P., F. Moneta, and S. Topaloglu. 2019. When anomalies are publicized broadly, do institutions trade accordingly? *Management Science, forthcoming* .

Campbell, J. Y., T. Ramadorai, and A. Schwartz. 2009. Caught on tape: Institutional trading, stock returns, and earnings announcements. *Journal of Financial Economics* 92:66–91.

Cao, C., B. Liang, A. W. Lo, and L. Petrasek. 2018a. Hedge fund holdings and stock market efficiency. *The Review of Asset Pricing Studies* 8:77–116.

Cao, Q., Y. Chen, W. Goetzmann, and B. Liang. 2018b. Hedge funds and stock price formation. *Financial Analysts Journal* 74:54–68.

Carhart, M. M. 1997. On persistence in mutual fund performance. *The Journal of Finance* 52:57–82.

Cella, C., A. Ellul, and M. Giannetti. 2013. Investors' horizons and the amplification of market shocks. *The Review of Financial Studies* 26:1607–1648.

Chen, Y., Z. Da, and D. Huang. 2018. Arbitrage trading: The long and the short of it. *Working Paper* .

Christoffersen, S., and M. Simutin. 2017. On the demand for high-beta stocks: Evidence from mutual funds. *Review of Financial Studies* 30:2596–2620.

Crane, A. D., and K. Crotty. 2018. Passive versus active fund performance: do index funds have skill? *Journal of Financial and Quantitative Analysis* 53:33–64.

Cremers, K. M., and A. Petajisto. 2009. How active is your fund manager? A new measure that predicts performance. *The review of financial studies* 22:3329–3365.

Cremers, M., M. A. Ferreira, P. Matos, and L. Starks. 2016. Indexing and active fund management: International evidence. *Journal of Financial Economics* 120:539–560.

Daniel, K., M. Grinblatt, S. Titman, and R. Wermers. 1997. Measuring mutual fund performance with characteristic-based benchmarks. *The Journal of finance* 52:1035–1058.

Dasgupta, A., A. Prat, and M. Verardo. 2011. Institutional trade persistence and long-term equity returns. *The Journal of Finance* 66:635–653.

Edelen, R. M., O. S. Ince, and G. B. Kadlec. 2016. Institutional investors and stock return anomalies. *Journal of Financial Economics* 119:472–488.

Edwards, F. R., and M. O. Caglayan. 2001. Hedge fund performance and manager skill. *Journal of Futures Markets: Futures, Options, and Other Derivative Products* 21:1003–1028.

Elton, E. J., M. J. Gruber, and C. R. Blake. 1996. The persistence of risk-adjusted mutual fund performance. *Journal of Business* 69:133–157.

Fama, E. F., and K. R. French. 1993. Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics* 33:3–56.

Fama, E. F., and K. R. French. 2008. Dissecting anomalies. *The Journal of Finance* 63:1653–1678.

Fang, V. W., X. Tian, and S. Tice. 2014. Does stock liquidity enhance or impede firm innovation? *The Journal of Finance* 69:2085–2125.

Frazzini, A., and O. A. Lamont. 2008. Dumb money: Mutual fund flows and the cross-section of stock returns. *Journal of Financial Economics* 88:299–322.

Frazzini, A., and L. H. Pedersen. 2014. Betting against beta. *Journal of Financial Economics* 111:1–25.

French, K. R. 2008. Presidential address: The cost of active investing. *The Journal of Finance* 63:1537–1573.

Giannetti, M., and B. Kahraman. 2017. Open-end organizational structures and limits to arbitrage. *The Review of Financial Studies* 31:773–810.

Gompers, P. A., and A. Metrick. 2001. Institutional investors and equity prices. *The Quarterly Journal of Economics* 116:229–259.

Green, J., J. R. Hand, and M. T. Soliman. 2011. Going, going, gone? The apparent demise of the accruals anomaly. *Management Science* 57:797–816.

Guercio, D. D., and J. Reuter. 2014. Mutual fund performance and the incentive to generate alpha. *The Journal of Finance* 69:1673–1704.

Ha, J., and J. Hu. 2018. How Smart Is Institutional Trading? *Working Paper* .

Harris, L. E. 1994. Minimum price variations, discrete bid–ask spreads, and quotation sizes. *The Review of Financial Studies* 7:149–178.

Harvey, C. R., Y. Liu, and H. Zhu. 2016. ... and the cross-section of expected returns. *The Review of Financial Studies* 29:5–68.

Hou, K., C. Xue, and L. Zhang. 2015. Digesting anomalies: An investment approach. *Review of Financial Studies* 28:650–705.

Ince, O., and G. B. Kadlec. 2020. The decline in performance of institutional investors: Insights from their trade counterparties. *Working Paper* .

Israel, R., and T. J. Moskowitz. 2013. The role of shorting, firm size, and time on market anomalies. *Journal of Financial Economics* 108:275–301.

Jagannathan, R., A. Malakhov, and D. Novikov. 2010. Do hot hands exist among hedge fund managers? An empirical evaluation. *The Journal of Finance* 65:217–255.

Jiao, Y., M. Massa, and H. Zhang. 2016. Short selling meets hedge fund 13F: An anatomy of informed demand. *Journal of Financial Economics* 122:544–567.

Jiao, Y., and P. Ye. 2014. Mutual fund herding in response to hedge fund herding and the impacts on stock prices. *Journal of Banking and Finance* 49:131–148.

Joenväärä, J., R. Kosowski, and P. Tolonen. 2016. Hedge fund performance: What do we know? *Working Paper* .

Jylhä, P., K. Rinne, and M. Suominen. 2014. Do hedge funds supply or demand liquidity? *Review of Finance* 18:1259–1298.

Ke, B., and S. Ramalingegowda. 2005. Do institutional investors exploit the post-earnings announcement drift? *Journal of Accounting and Economics* 39:25–53.

Kokkonen, J., and M. Suominen. 2015. Hedge funds and stock market efficiency. *Management Science* 61:2890–2904.

Malkiel, B. G. 1995. Returns from investing in equity mutual funds 1971 to 1991. *The Journal of Finance* 50:549–572.

McLean, R. D., and J. Pontiff. 2016. Does academic research destroy stock return predictability? *The Journal of Finance* 71:5–32.

Nagel, S. 2005. Short sales, institutional investors and the cross-section of stock returns. *Journal of Financial Economics* 78:277–309.

Pástor, L., and R. F. Stambaugh. 2003. Liquidity risk and expected stock returns. *Journal of Political Economy* 111:642–685.

Sias, R., H. Turtle, and B. Zykaj. 2016. Hedge fund crowds and mispricing. *Management Science* 62:764–784.

Sias, R. W., L. T. Starks, and S. Titman. 2006. Changes in institutional ownership and stock returns: Assessment and methodology. *The Journal of Business* 79:2869–2910.

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

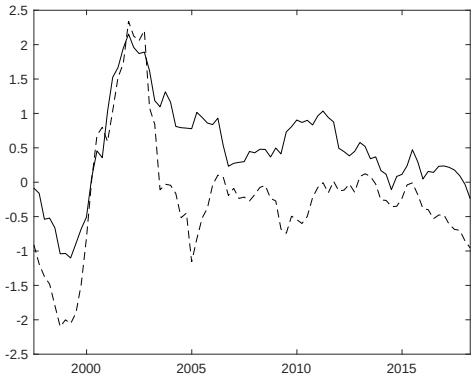
Stulz, R. M. 2007. Hedge funds: past, present, and future. *Journal of Economic Perspectives* 21:175–194.

Teo, M. 2011. The liquidity risk of liquid hedge funds. *Journal of Financial Economics* 100:24–44.

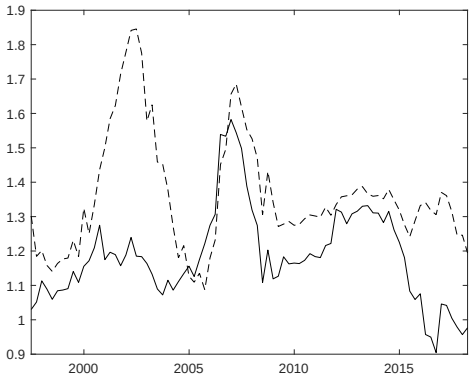
Yan, X., and Z. Zhang. 2009. Institutional investors and equity returns: Are short-term institutions better informed? *Review of Financial Studies* 22:893–924.

Figure 1: Time series of alphas and market betas for trading swaps

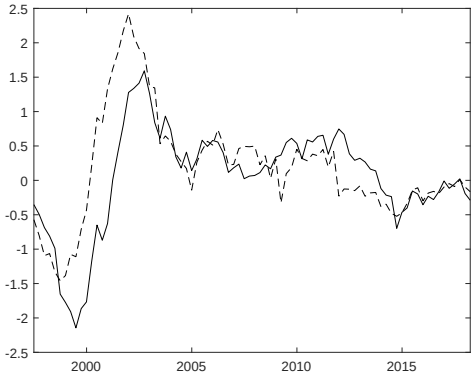
The figure plots the time series of alphas and market betas from the CAPM model of stocks bought (solid line) by HFs from different groups of non-HF investors and sold (dashed line) by HFs to different groups of non-HF investors from 1994q2 to 2017q4. Non-HF investors include (1) quasi-indexers (QIXs), (2) transient institutions (TRAs), and (3) other investors (OTHs). QIXs and TRAs are classified using the permanent classification provided in Brian Bushee's database (Bushee, 2001). Holding of OTHs is calculated in the spirit of Ben-David et al. (2012) as the difference between 100% and the total percentage holding of HFs, QIXs, and TRAs. The estimation is performed over three-year rolling windows.



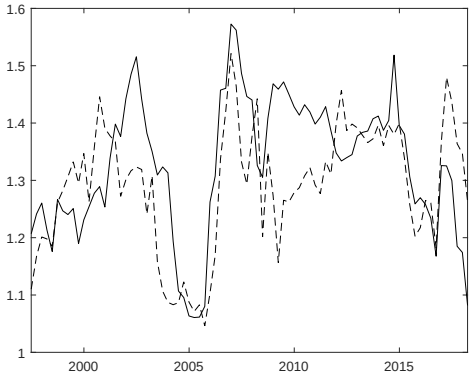
(i) HF/QIX Swap: α



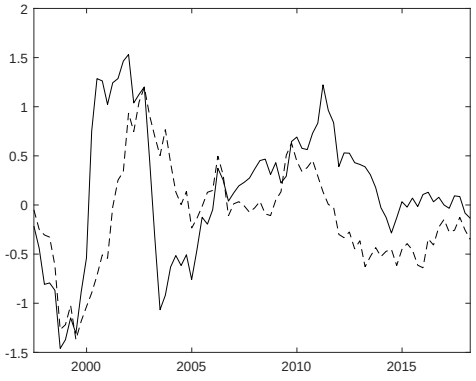
(ii) HF/QIX Swap: β



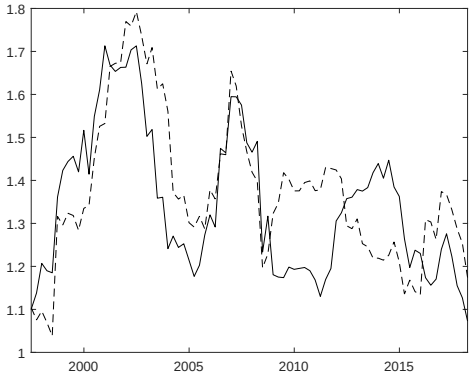
(iii) HF/TRA Swap: α



(iv) HF/TRA Swap: β



(v) HF/OTH Swap: α



(vi) HF/OTH Swap: β

Table 1: Descriptive statistics: stocks traded and portfolios

This table reports the summary statistics of characteristics of stocks traded and different groups of investors from 1994q2 to 2018q4. Panel A reports the monthly returns, prices, and Amihud illiquidity (Amihud, 2002). We only consider common stocks (those with CRSP share codes of 10 or 11) traded on the NYSE, AMEX or NASDAQ (those with CRSP exchange codes of 1, 2 or 3) with monthly prices above \$5 at the end of previous quarter. We exclude stocks of utility firms (those with standard industrial classification (SIC) codes from 4900 to 4999) and financial firms (those with SIC codes from 6000 to 6999). Panel B reports the portfolio characteristics of HFs, quasi-indexers (QIXs), and transient institutions (TRAs), including portfolio assets (PortAssets, in \$million), numbers of stock held per quarter (No.StockHold), turnover (Turnover, in % per quarter), and the active share (Cremers and Petajisto, 2009). QIXs and TRAs are classified using the permanent classification provided in Brian Bushee's database (Bushee, 2001).

Panel A: Characteristics of Stocks Traded

	Mean	Std.Dev	P5	P25	Median	P75	P95
Adjusted Return (% per month)	0.95	15.27	-21.48	-6.30	0.58	7.57	23.88
Price or Bid/Ask Average (\$)	29.52	57.80	5.25	11.13	20.01	35.50	74.90
Amihud Illiquidity ($\times 10^{-6}$)	2.69	15.16	0.00	0.03	0.13	0.61	9.57

Panel B: Portfolio Characteristics

	Mean	Std.Dev	P5	P25	Median	P75	P95	No. Investors (per quarter)
$\text{PortAssets}^{\text{HF}}$	2345	11080	12	91	310	1229	8286	319
$\text{PortAssets}^{\text{QIX}}$	3388	23847	20	90	217	799	10537	1352
$\text{PortAssets}^{\text{TRA}}$	2543	23723	7	72	236	944	7671	489
$\text{No.StockHold}^{\text{HF}}$	118	227	3	15	36	105	516	319
$\text{No.StockHold}^{\text{QIX}}$	170	326	8	37	67	137	735	1352
$\text{No.StockHold}^{\text{TRA}}$	166	295	3	24	62	160	706	489
$\text{Turnover}^{\text{HF}}$	22.26	18.04	0.21	8.47	17.51	32.63	57.96	306
$\text{Turnover}^{\text{QIX}}$	6.59	7.01	0.11	2.07	4.68	8.88	18.84	1293
$\text{Turnover}^{\text{TRA}}$	23.95	17.82	0.46	10.84	19.98	33.83	59.16	462
$\text{Active Share}^{\text{HF}}$	88.70	14.80	54.92	84.69	94.65	98.70	99.94	316
$\text{Active Share}^{\text{QIX}}$	72.75	19.08	34.97	61.91	73.86	87.70	99.39	1342
$\text{Active Share}^{\text{TRA}}$	83.23	17.60	46.42	74.14	89.57	97.29	99.85	485

Table 2: Descriptive statistics: ownership and trading of different groups of investors

This table reports the summary statistics of the quarterly stock holding (StockHold, in %) and change in holding (ΔStockHold, in % per quarter) of HFs, quasi-indexers (QIXs), transient institutions (TRAs), and other investors (OTHs) from 1994q2 to 2017q4. QIXs and TRAs are classified using the permanent classification provided in Brian Bushee's database (Bushee, 2001). Holding of OTHs is calculated in the spirit of Ben-David et al. (2012) as the difference between 100% and the total percentage holding of HFs, QIXs, and TRAs.

Panel A: Pre-Crisis (1994q2-2007q2)

	Mean	Std.Dev	P5	P25	Median	P75	P95
$\text{StockHold}^{\text{HF}}$	6.98	6.48	0.12	2.03	5.25	10.22	19.31
$\text{StockHold}^{\text{QIX}}$	31.42	17.08	4.91	17.46	31.44	44.30	59.54
$\text{StockHold}^{\text{TRA}}$	10.76	8.88	0.42	3.96	8.73	15.45	28.01
$\text{StockHold}^{\text{OTH}}$	50.84	23.58	13.48	32.18	49.93	69.52	89.80
$\Delta\text{StockHold}^{\text{HF}}$	0.17	2.55	-3.38	-0.61	0.03	0.93	3.97
$\Delta\text{StockHold}^{\text{QIX}}$	0.60	4.66	-6.23	-1.41	0.40	2.60	7.81
$\Delta\text{StockHold}^{\text{TRA}}$	0.07	3.97	-5.79	-1.25	0.01	1.40	6.07
$\Delta\text{StockHold}^{\text{OTH}}$	-0.84	6.65	-10.87	-3.32	-0.55	1.78	8.49

Panel B: Crisis (2007q3-2009q1)

	Mean	Std.Dev	P5	P25	Median	P75	P95
$\text{StockHold}^{\text{HF}}$	11.06	7.79	1.10	5.44	9.57	15.22	25.69
$\text{StockHold}^{\text{QIX}}$	40.92	19.42	6.25	26.18	43.43	55.89	69.78
$\text{StockHold}^{\text{TRA}}$	12.64	8.42	0.99	6.35	11.45	17.59	28.06
$\text{StockHold}^{\text{OTH}}$	35.39	24.94	4.40	15.03	29.28	52.10	84.57
$\Delta\text{StockHold}^{\text{HF}}$	-0.08	2.79	-4.27	-1.14	-0.02	0.97	4.12
$\Delta\text{StockHold}^{\text{QIX}}$	0.27	4.92	-6.69	-1.69	0.19	2.29	7.48
$\Delta\text{StockHold}^{\text{TRA}}$	-0.44	3.75	-6.43	-1.91	-0.21	1.11	5.11
$\Delta\text{StockHold}^{\text{OTH}}$	0.25	6.37	-8.25	-2.15	0.16	2.71	8.74

Panel C: Post-Crisis (2009q2-2017q4)

	Mean	Std.Dev	P5	P25	Median	P75	P95
$\text{StockHold}^{\text{HF}}$	10.46	7.54	0.51	5.11	9.20	14.40	24.42
$\text{StockHold}^{\text{QIX}}$	39.85	19.53	2.10	25.86	43.89	54.82	66.72
$\text{StockHold}^{\text{TRA}}$	13.72	8.17	0.23	7.82	13.72	19.18	27.27
$\text{StockHold}^{\text{OTH}}$	35.97	27.47	4.74	13.96	27.59	53.33	95.15
$\Delta\text{StockHold}^{\text{HF}}$	0.07	2.45	-3.22	-0.78	0.00	0.82	3.63
$\Delta\text{StockHold}^{\text{QIX}}$	0.07	4.59	-5.22	-1.24	0.07	1.54	5.42
$\Delta\text{StockHold}^{\text{TRA}}$	0.20	3.09	-4.24	-0.89	0.02	1.23	5.16
$\Delta\text{StockHold}^{\text{OTH}}$	-0.34	6.54	-7.21	-1.86	-0.13	1.30	5.50

Table 3: Trading swaps and possible counterparties of hedge fund trades

This table reports monthly ex-post excess returns over the risk-free rate (measured as the 3-month T-bill rate), ex-post CAPM alphas and market betas, Amihud illiquidity (Amihud, 2002), DGTW-adjusted excess returns (Daniel et al., 1997), corresponding ex-post 2-factor alphas and factor loadings for the short-term portfolios of quarterly trading swaps between HFs and non-HF investors from 1994q2 to 2017q4. Non-HF investors include (1) quasi-indexers (QIXs), (2) transient institutions (TRAs), and (3) other investors (OTHs). QIXs and TRAs are classified using the permanent classification provided in Brian Bushee's database (Bushee, 2001). Holding of OTHs is calculated in the spirit of Ben-David et al. (2012) as the difference between 100% and the total percentage holding of HFs, QIXs, and TRAs. Portfolios are constructed at the end of each quarter and held for the following quarter. Stocks with the change in holding below (above) the bottom (top) 20^{th} percentile are considered as those that investors significantly sell (buy); they are denoted by S (B) respectively. Factors considered in the 2-factor model are betting-against-beta (Frazzini and Pedersen, 2014) and liquidity (Pástor and Stambaugh, 2003). *, **, *** indicate significance at the 10%, 5%, and 1% level respectively. The standard errors are adjusted for heteroscedasticity and serial correlation using the Newey-West estimator with 6 lags. t-statistics are reported in brackets.

Panel A: Risk-Free Excess Returns, CAPM Alphas, CAPM Betas, and Amihud Illiquidity

	Risk-Free Excess Returns (%)			CAPM Alphas (%)			CAPM Betas			Amihud Illiquidity ($\times 10^{-6}$)		
	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH
S/B	0.60	0.93**	0.70*	-0.33*	0.06	-0.24	1.33***	1.25***	1.35***	0.83***	0.69***	1.42***
	(1.49)	(2.57)	(1.91)	(-1.97)	(0.36)	(-1.58)	(28.88)	(34.16)	(26.84)	(6.37)	(7.36)	(10.48)
B/S	1.28***	0.95**	0.98**	0.49***	0.04	0.06	1.13***	1.30***	1.32***	1.11***	0.85***	1.24***
	(4.11)	(2.56)	(2.50)	(2.67)	(0.23)	(0.30)	(31.11)	(32.04)	(22.26)	(6.95)	(7.40)	(9.14)
B/S − S/B	0.68***	0.02	0.28	0.82***	-0.02	0.30	-0.20***	0.06	-0.03	0.28**	0.16*	-0.18
	(3.70)	(0.11)	(1.43)	(5.04)	(-0.13)	(1.59)	(-3.55)	(1.34)	(-0.80)	(2.37)	(1.81)	(-1.57)

Panel B: DGTW-Adjusted Excess Returns, 2-Factor Alphas, and Factor Loadings on LIQ and BAB

	DGTW-Adjusted Excess Returns (%)			2-Factor Alphas (%)			Factor Loadings on LIQ			Factor Loadings on BAB		
	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH
S/B	-0.16	0.12	0.00	-0.08	0.18	0.12	0.09	0.09*	0.13***	-0.15**	-0.12	-0.22***
	(-1.23)	(0.96)	(0.02)	(-0.47)	(1.16)	(1.21)	(1.55)	(1.77)	(4.23)	(-2.31)	(-1.40)	(-5.59)
B/S	0.45***	0.18	0.19	0.43***	0.18	0.29	0.08**	0.08	0.07	-0.03	-0.04	-0.16
	(4.00)	(1.60)	(1.29)	(3.74)	(1.51)	(1.48)	(2.26)	(1.42)	(1.41)	(-0.52)	(-1.19)	(-1.45)
B/S − S/B	0.60***	0.06	0.19	0.50***	0.00	0.17	0.00	-0.01	-0.06	0.13**	0.08	0.07
	(4.00)	(0.33)	(1.14)	(2.95)	(-0.00)	(0.75)	(-0.03)	(-0.16)	(-1.15)	(2.30)	(0.98)	(0.62)

Table 4: DGTW-Adjusted Excess Returns: Hedge Fund Portfolio Decomposition

This table reports the decomposition of the total performance for HF equity portfolio. Portfolios are constructed at the end of each quarter q and held for the following quarter. Total portfolio performance is measured as the average monthly dollar-holding-weighted DGTW-adjusted excess return in q+1. To decomposed the total performance for HF equity portfolio, at the end of each quarter q, the equity holdings of each HF are divided into three categories based on the trading swap in q, (1) HF/QIX Sell, (2) Other Trades, and (3) HF/QIX Buy. Partial performance is calculated using the same weights as for total portfolio performance.

HF Equity Portfolio	Decomposed DGTW-Adjusetd Excess Returns (%, per month)	Contribution to Total Portfolio Performance (%)	Average Portfolio Dollar Holding at the end of q-1 (%)	Average Portfolio Dollar Holding at the end of q (%)
HF/QIX Sell	-0.01**	-13.09	6.25	5.40
	(-2.22)			
Other Trades	0.09***	86.09	87.80	86.61
	(2.85)			
HF/QIX Buy	0.03***	27.00	5.95	7.99
	(3.35)			
		Sum	Sum	Sum
Total	0.11***	100.00	100.00	100.00
	(2.81)			

Table 5: Trading swaps: QIXs sub-groups

This table reports monthly ex-post excess returns over the risk-free rate (measured as the 3-month T-bill rate), ex-post CAPM alphas and market betas, Amihud illiquidity (Amihud, 2002), DGTW-adjusted excess returns (Daniel et al., 1997), corresponding ex-post 2-factor alphas and factor loadings for the short-term portfolios of quarterly trading swaps between HFs and different groups of QIXs from 1994q2 to 2017q4. QIXs include independent investment advisors (IIA), banks (BNK), and other QIXs like insurance companies, pension funds and endowments (OTQIX) following Bushee (2001). INDEX stands for those QIX companies that manage at least one CRSP index fund. Portfolios are constructed at the end of each quarter and held for the following quarter. Stocks with the change in holding below (above) the bottom (top) 20^{th} percentile are considered as those that investors significantly sell (buy); they are denoted by S (B) respectively. Factors considered in the 2-factor model are betting-against-beta (Frazzini and Pedersen, 2014) and liquidity (Pástor and Stambaugh, 2003). *, **, *** indicate significance at the 10%, 5%, and 1% level respectively. The standard errors are adjusted for heteroscedasticity and serial correlation using the Newey-West estimator with 6 lags. t-statistics are reported in brackets.

Panel A: Risk-Free Excess Returns, CAPM Alphas, CAPM Betas, and Amihud Illiquidity

	Risk-Free Excess Returns (%)				CAPM Alphas (%)				CAPM Betas				Amihud Illiquidity ($\times 10^{-6}$)			
	HF/IIA	HF/BNK	HF/OTQIX	HF/INDEX	HF/IIA	HF/BNK	HF/OTQIX	HF/INDEX	HF/IIA	HF/BNK	HF/OTQIX	HF/INDEX	HF/IIA	HF/BNK	HF/OTQIX	HF/INDEX
S/B	0.78*	0.52	0.66	0.69	-0.17	-0.43**	-0.31	-0.28	1.36***	1.36***	1.38***	1.39***	0.90***	0.58***	0.60***	0.54***
	(1.91)	(1.21)	(1.51)	(1.62)	(-0.85)	(-2.11)	(-1.53)	(-1.34)	(27.78)	(25.53)	(20.04)	(22.55)	(6.24)	(4.14)	(5.58)	(5.81)
B/S	1.31***	1.30***	1.31***	1.31***	0.57***	0.49**	0.47**	0.48***	1.07***	1.15***	1.21***	1.19***	1.11***	0.77***	0.78***	0.79***
	(4.49)	(4.03)	(3.83)	(4.07)	(2.67)	(2.26)	(2.39)	(2.73)	(27.99)	(25.22)	(30.13)	(31.73)	(6.03)	(5.40)	(5.86)	(5.32)
B/S − S/B	0.53**	0.78***	0.65***	0.62***	0.73***	0.92***	0.77***	0.76***	-0.29***	-0.20**	-0.17**	-0.20***	0.22	0.19*	0.18	0.24***
	(2.49)	(3.13)	(2.85)	(2.92)	(4.01)	(4.11)	(3.66)	(4.06)	(-5.28)	(-2.45)	(-2.38)	(-3.53)	(1.60)	(1.77)	(1.50)	(2.70)

Panel B: DGTW-Adjusted Excess Returns, 2-Factor Alphas, and Factor Loadings on LIQ and BAB

	DGTW-Adjusted Excess Returns (%)				2-Factor Alphas (%)				Factor Loadings on LIQ				Factor Loadings on BAB			
	HF/IIA	HF/BNK	HF/OTQIX	HF/INDEX	HF/IIA	HF/BNK	HF/OTQIX	HF/INDEX	HF/IIA	HF/BNK	HF/OTQIX	HF/INDEX	HF/IIA	HF/BNK	HF/OTQIX	HF/INDEX
S/B	0.04	-0.23	-0.09	-0.08	0.13	-0.12	0.00	0.02	0.08	0.09	0.12*	0.12**	-0.16**	-0.19**	-0.19**	-0.20**
	(0.23)	(-1.20)	(-0.60)	(-0.53)	(0.62)	(-0.53)	(-0.00)	(0.09)	(1.39)	(1.36)	(1.91)	(1.98)	(-2.32)	(-2.03)	(-2.30)	(-2.29)
B/S	0.39***	0.49***	0.45***	0.47***	0.41***	0.50***	0.45***	0.49***	0.06	0.07	0.12**	0.13***	-0.05	-0.06	-0.07	-0.09
	(2.81)	(4.05)	(3.10)	(4.23)	(2.86)	(4.02)	(2.70)	(3.60)	(1.65)	(1.51)	(2.08)	(2.68)	(-0.82)	(-1.46)	(-1.16)	(-1.62)
B/S − S/B	0.35*	0.71***	0.54***	0.55***	0.28	0.62**	0.45**	0.47***	-0.02	-0.02	0.00	0.00	0.11*	0.13	0.12**	0.10*
	(1.77)	(3.43)	(2.97)	(3.28)	(1.32)	(2.51)	(2.28)	(2.60)	(-0.29)	(-0.31)	(-0.10)	(0.10)	(1.90)	(1.33)	(1.97)	(1.83)

Table 6: Average change in holdings of trading-swap stocks

This table reports the average quarterly change in holding (ΔStockHold, in % per quarter) of trading-swap stocks between HFs and quasi-indexers (QIXs) in trading quarters (q) and corresponding average quarterly change in holding of HFs and non-HF investors of the same stocks in quarters following trading (q+1) from 1994q2 to 2017q4. In trading quarter, stocks with the change in holding below (above) the bottom (top) 20^{th} percentile are considered as those that investors significantly sell (buy). Non-HF investors include (1) quasi-indexers (QIXs), (2) transient institutions (TRAs), and (3) other investors (OTHs). QIXs and TRAs are classified using the permanent classification provided in Brian Bushee's database (Bushee, 2001). Holding of OTHs is calculated in the spirit of Ben-David et al. (2012) as the difference between 100% and the total percentage holding of HFs, QIXs, and TRAs.

	ΔStockHold (%) in q				ΔStockHold (%) in q+1			
	HF/QIX		TRA	OTH	HF	QIX	TRA	OTH
S/B	-3.02***	5.60***	-0.59***	-2.00***	-0.06	0.36***	-0.25***	-0.05
	(-53.12)	(34.11)	(-6.39)	(-12.87)	(-1.04)	(3.07)	(-2.89)	(-0.29)
B/S	3.40***	-5.07***	0.59***	1.08***	0.22***	-0.05	0.27***	-0.44***
	(53.33)	(-41.80)	(5.87)	(6.88)	(4.63)	(-0.39)	(3.17)	(-2.80)

Table 7: Impact of financial crisis on trading swaps: risk-free excess return, alpha, market beta, and Amihud illiquidity

This table reports monthly ex-post excess returns over the risk-free rate (measured as the 3-month T-bill rate), ex-post CAPM alphas and market betas, Amihud illiquidity (Amihud, 2002) for the short-term portfolios of quarterly trading swaps between HFs and non-HF investors in pre-crisis (1994q2-2007q2), crisis (2007q3-2009q1), and post-crisis (2009q2-2017q4) periods (Ben-David et al., 2012). Non-HF investors include (1) quasi-indexers (QIXs), (2) transient institutions (TRAs), and (3) other investors (OTHs). QIXs and TRAs are classified using the permanent classification provided in Brian Bushee's database (Bushee, 2001). Holding of OTHs is calculated in the spirit of Ben-David et al. (2012) as the difference between 100% and the total percentage holding of HFs, QIXs, and TRAs. Portfolios are constructed at the end of each quarter and held for the following quarter. Stocks with the change in holding below (above) the bottom (top) 20^{th} percentile are considered as those that investors significantly sell (buy); they are denoted by S (B) respectively. *, **, *** indicate significance at the 10%, 5%, and 1% level respectively. The standard errors are adjusted for heteroscedasticity and serial correlation using the Newey-West estimator with 6 lags. t-statistics are reported in brackets.

Panel A: Pre-Crisis (1994q2-2007q2)

	Risk-Free Excess Returns (%)			CAPM Alphas (%)			CAPM Betas			Amihud Illiquidity ($\times 10^{-6}$)		
	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH
S/B	0.67	1.05**	0.65	-0.29	0.20	-0.35*	1.39***	1.24***	1.45***	1.01***	0.78***	1.58***
	(1.36)	(2.43)	(1.42)	(-1.07)	(0.73)	(-1.76)	(17.74)	(20.43)	(19.68)	(5.23)	(5.89)	(8.18)
B/S	1.40***	0.86*	0.90	0.62**	-0.04	-0.08	1.13***	1.30***	1.43***	1.42***	0.97***	1.34***
	(3.61)	(1.97)	(1.65)	(2.19)	(-0.13)	(-0.28)	(18.53)	(19.81)	(17.38)	(5.98)	(5.64)	(6.64)
B/S − S/B	0.74***	-0.19	0.25	0.92***	-0.23	0.27	-0.26***	0.07	-0.03	0.41***	0.19**	-0.24**
	(2.71)	(-0.71)	(0.82)	(3.72)	(-0.97)	(0.92)	(-2.72)	(1.08)	(-0.49)	(3.65)	(2.54)	(-2.43)

Panel B: Crisis (2007q3-2009q1)

	Risk-Free Excess Returns (%)			CAPM Alphas (%)			CAPM Betas			Amihud Illiquidity ($\times 10^{-6}$)		
	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH
S/B	-2.88	-2.17	-1.1	-0.35	0.32	1.60**	1.28***	1.26***	1.37***	0.40***	0.38***	1.22***
	(-1.23)	(-1.00)	(-0.45)	(-0.92)	(0.85)	(2.44)	(24.02)	(23.74)	(23.76)	(6.30)	(4.24)	(4.96)
B/S	-0.62	-1.46	-1.58	1.75***	1.38***	0.76**	1.20***	1.43***	1.18***	0.50***	0.77***	1.00***
	(-0.32)	(-0.58)	(-0.85)	(4.05)	(4.20)	(2.73)	(43.89)	(21.16)	(29.09)	(5.07)	(3.77)	(3.24)
B/S − S/B	2.26***	0.71	-0.48	2.10***	1.05***	-0.84	-0.08	0.17	-0.18**	0.10	0.39	-0.22
	(3.71)	(1.64)	(-0.57)	(4.04)	(3.21)	(-1.13)	(-1.52)	(1.72)	(-2.21)	(0.73)	(1.60)	(-0.52)

Panel C: Post-Crisis (2009q2-2017q4)

	Risk-Free Excess Returns (%)			CAPM Alphas (%)			CAPM Betas			Amihud Illiquidity ($\times 10^{-6}$)		
	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH
S/B	1.20**	1.38***	1.14***	-0.37*	-0.22	-0.37***	1.25***	1.28***	1.21***	0.65***	0.61***	1.23***
	(2.61)	(3.22)	(2.84)	(-1.69)	(-1.20)	(-2.79)	(22.36)	(22.49)	(27.33)	(3.58)	(4.17)	(6.05)
B/S	1.48***	1.58***	1.62***	0.04	-0.01	0.08	1.15***	1.27***	1.23***	0.77***	0.69***	1.13***
	(3.80)	(3.65)	(3.88)	(0.22)	(-0.06)	(0.37)	(22.83)	(20.56)	(15.60)	(3.94)	(4.29)	(5.94)
B/S − S/B	0.29*	0.19	0.47**	0.41**	0.21	0.45**	-0.10**	-0.02	0.02	0.12	0.09	-0.09
	(1.88)	(0.99)	(2.62)	(2.43)	(0.98)	(2.05)	(-2.37)	(-0.25)	(0.22)	(0.46)	(0.40)	(-0.35)

Table 8: Impact of financial crisis on trading swaps: DGTW-adjusted excess return, 2-factor alpha, and factor loading

This table reports DGTW-adjusted excess returns (Daniel et al., 1997), corresponding ex-post 2-factor alphas and factor loadings for the short-term portfolios of quarterly trading swaps between HFs and non-HF investors in pre-crisis (1994q2-2007q2), crisis (2007q3-2009q1), and post-crisis (2009q2-2017q4) periods (Ben-David et al., 2012). Non-HF investors include (1) quasi-indexers (QIXs), (2) transient institutions (TRAs), and (3) other investors (OTHs). QIXs and TRAs are classified using the permanent classification provided in Brian Bushee's database (Bushee, 2001). Holding of OTHs is calculated in the spirit of Ben-David et al. (2012) as the difference between 100% and the total percentage holding of HFs, QIXs, and TRAs. Portfolios are constructed at the end of each quarter and held for the following quarter. Stocks with the change in holding below (above) the bottom (top) 20^{th} percentile are considered as those that investors significantly sell (buy); they are denoted by S (B) respectively. Factors considered in the 2-factor model are betting-against-beta (Frazzini and Pedersen, 2014) and liquidity (Pástor and Stambaugh, 2003). *, **, *** indicate significance at the 10%, 5%, and 1% level respectively. The standard errors are adjusted for heteroscedasticity and serial correlation using the Newey-West estimator with 6 lags. t-statistics are reported in brackets.

Panel A: Pre-Crisis (1994q2-2007q2)

	DGTW-Adjusted Excess Returns (%)			2-Factor Alphas (%)			Factor Loadings on LIQ			Factor Loadings on BAB		
	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH
S/B	-0.06	0.21	0.00	0.21	0.40*	0.16	-0.02	-0.01	0.14***	-0.24***	-0.17	-0.28***
	(-0.30)	(1.05)	(-0.03)	(0.95)	(1.66)	(0.94)	(-0.27)	(-0.10)	(4.05)	(-3.21)	(-1.46)	(-7.12)
B/S	0.63***	0.21	0.17	0.67***	0.30*	0.44	0.02	0.00	-0.01	-0.05	-0.08**	-0.24*
	(4.08)	(1.29)	(0.69)	(3.66)	(1.72)	(1.47)	(0.28)	(0.03)	(-0.16)	(-0.74)	(-2.25)	(-1.74)
B/S − S/B	0.69***	0.00	0.18	0.46*	-0.10	0.28	0.03	0.01	-0.15***	0.19***	0.09	0.04
	(2.98)	(-0.00)	(0.67)	(1.88)	(-0.33)	(0.78)	(0.70)	(0.09)	(-2.91)	(3.23)	(0.84)	(0.27)

Panel B: Crisis (2007q3-2009q1)

	DGTW-Adjusted Excess Returns (%)			2-Factor Alphas (%)			Factor Loadings on LIQ			Factor Loadings on BAB		
	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH
S/B	-0.88*	-0.21	0.51	-0.78*	-0.29	0.59*	0.20***	0.22***	0.09*	0.07	-0.06	0.05
	(-1.92)	(-0.50)	(1.45)	(-2.01)	(-0.68)	(1.87)	(4.54)	(4.83)	(1.79)	(1.01)	(-0.83)	(0.92)
B/S	0.62	0.06	0.14	0.69	0.31	0.25	0.16***	0.13	0.16*	0.05	0.17***	0.08
	(1.01)	(0.12)	(0.24)	(0.91)	(0.75)	(0.41)	(3.17)	(1.26)	(1.81)	(0.54)	(3.06)	(1.26)
B/S − S/B	1.50***	0.27	-0.38	1.47**	0.59	-0.34	-0.03	-0.09	0.06	-0.02	0.22***	0.03
	(3.36)	(0.50)	(-0.46)	(2.68)	(1.30)	(-0.41)	(-0.57)	(-0.88)	(0.53)	(-0.21)	(3.63)	(0.44)

Panel C: Post-Crisis (2009q2-2017q4)

	DGTW-Adjusted Excess Returns (%)			2-Factor Alphas (%)			Factor Loadings on LIQ			Factor Loadings on BAB		
	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH
S/B	-0.16	0.05	-0.09	-0.17	0.10	0.02	0.09	0.10**	0.01	0.02	-0.05	-0.15**
	(-1.30)	(0.41)	(-1.06)	(-1.24)	(0.75)	(0.31)	(1.45)	(2.16)	(0.22)	(0.54)	(-0.65)	(-2.62)
B/S	0.13	0.15	0.24**	0.16	0.25	0.17	0.08*	0.07	0.07*	-0.02	-0.11	0.09
	(1.30)	(1.09)	(2.05)	(1.44)	(1.62)	(1.48)	(1.95)	(1.31)	(1.82)	(-0.28)	(-1.38)	(1.62)
B/S − S/B	0.29**	0.10	0.33**	0.33**	0.15	0.15	-0.01	-0.03	0.06	-0.04	-0.07	0.24***
	(2.21)	(0.62)	(2.21)	(2.01)	(0.72)	(1.01)	(-0.07)	(-0.37)	(0.88)	(-0.45)	(-0.55)	(2.76)

Table 9: Trading swaps: long-term

This table reports monthly ex-post excess returns over the risk-free rate (measured as the 3-month T-bill rate), ex-post CAPM alphas and market betas, Amihud illiquidity (Amihud, 2002), DGTW-adjusted excess returns (Daniel et al., 1997), corresponding ex-post 2-factor alphas and factor loadings for the long-term portfolios of quarterly trading swaps between HFs and non-HF investors from 1994q2 to 2017q4. Non-HF investors include (1) quasi-indexers (QIXs), (2) transient institutions (TRAs), and (3) other investors (OTHs). QIXs and TRAs are classified using the permanent classification provided in Brian Bushee's database (Bushee, 2001). Holding of OTHs is calculated in the spirit of Ben-David et al. (2012) as the difference between 100% and the total percentage holding of HFs, QIXs, and TRAs. Portfolios are constructed at the end of each quarter and held for the following four quarters. Stocks with the change in holding below (above) the bottom (top) 20^{th} percentile are considered as those that investors significantly sell (buy); they are denoted by S (B) respectively. Factors considered in the 2-factor model are betting-against-beta (Frazzini and Pedersen, 2014) and liquidity (Pástor and Stambaugh, 2003). *, **, *** indicate significance at the 10%, 5%, and 1% level respectively. The standard errors are adjusted for heteroscedasticity and serial correlation using the Newey-West estimator with 6 lags. t-statistics are reported in brackets.

Panel A: Risk-Free Excess Returns, CAPM Alphas, CAPM Betas, and Amihud illiquidity

	Risk-Free Excess Returns (%)			CAPM Alphas (%)			CAPM Betas			Amihud Illiquidity ($\times 10^{-6}$)		
	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH
S/B	0.70*	0.75**	0.62*	-0.18	-0.08	-0.23*	1.33***	1.26***	1.29***	0.90***	0.72***	1.44***
	(1.89)	(2.03)	(1.73)	(-1.35)	(-0.58)	(-1.80)	(36.06)	(38.70)	(33.33)	(5.84)	(7.24)	(11.01)
B/S	1.05***	0.87**	0.77**	0.28**	0.05	-0.09	1.17***	1.26***	1.31***	1.16***	0.89***	1.28***
	(3.29)	(2.53)	(1.99)	(1.99)	(0.32)	(-0.59)	(36.73)	(41.77)	(28.14)	(7.19)	(7.45)	(8.66)
B/S − S/B	0.35***	0.12	0.14	0.45***	0.13	0.13	-0.16***	-0.01	0.02	0.26***	0.18**	-0.17*
	(3.87)	(1.19)	(1.36)	(5.09)	(1.24)	(1.34)	(-3.93)	(-0.30)	(0.48)	(2.68)	(2.28)	(-1.91)

Panel B: DGTW-Adjusted Excess Returns, 2-Factor Alphas, and Factor Loadings on LIQ and BAB

	DGTW-Adjusted Excess Returns (%)			2-Factor Alphas (%)			Factor Loadings on LIQ			Factor Loadings on BAB		
	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH
S/B	-0.02	-0.01	-0.08	0.03	0.02	-0.04	0.10***	0.09**	0.10***	-0.13**	-0.09	-0.11***
	(-0.25)	(-0.06)	(-1.15)	-0.32	(0.17)	(-0.62)	(2.61)	(2.35)	(4.25)	(-2.14)	(-1.42)	(-3.36)
B/S	0.23***	0.12*	0.04	0.19**	0.10	0.10	0.09***	0.09**	0.09**	0.00	-0.03	-0.13
	(3.08)	(1.75)	(0.35)	(1.98)	(1.25)	(0.76)	(2.93)	(2.54)	(2.13)	(0.05)	(-0.62)	(-1.59)
B/S − S/B	0.25***	0.12	0.12	0.15*	0.08	0.14	0.00	0.00	-0.01	0.13***	0.06**	-0.02
	(3.21)	(1.43)	(1.49)	(1.74)	(0.93)	(1.38)	(-0.16)	(-0.11)	(-0.44)	(4.73)	(2.40)	(-0.29)

Table 10: Market anomalies: descriptive statistics and portfolio performance

This table reports the descriptive statistics, portfolio CAPM alphas and DGTW-adjusted excess returns (Daniel et al., 1997) from 1994q3 to 2018q2 for nine market anomalies, including the OP (operating profit), GP (gross profitability), O-Score, IVA (investment-to-assets), IK (investment growth), NOA (net operating assets), NSI (net stock issues), ACR (accrual), and AG (asset growth) anomalies. Portfolios are constructed in the second quarter of year t using anomaly information for the fiscal year ending in calendar year t-1 and are held for the following one year. Short (Long) leg is defined as portfolios that expect to have negative (positive) ex-post alphas, which comprise stocks at the bottom (top) 20% of OP and GP anomaly and those at the top (bottom) 20% of O-Score, IVA, IK, NOA, NSI, ACR, or AG anomaly. EW-Avg refers to the equal-weighted portfolio of portfolios for nine anomalies. *, **, *** indicate significance at the 10%, 5%, and 1% level respectively. The standard errors are adjusted for heteroscedasticity and serial correlation using the Newey-West estimator with 12 lags. t-statistics are reported in brackets.

Panel A: Descriptive Statistics of Market Anomalies

	Mean	Std.Dev	P5	P25	Median	P75	P95
OP	0.22	0.34	-0.30	0.12	0.22	0.34	0.66
GP	0.36	0.26	0.01	0.20	0.33	0.50	0.84
O-Score	-3.35	2.35	-6.67	-4.76	-3.53	-2.24	0.49
IVA	0.10	0.19	-0.06	0.01	0.05	0.12	0.43
IK	0.51	1.51	-0.59	-0.18	0.12	0.60	2.84
NOA	0.67	0.43	0.07	0.45	0.64	0.81	1.32
NSI	0.11	0.39	-0.06	0.00	0.01	0.05	0.56
ACR	0.01	0.23	-0.25	-0.04	0.01	0.07	0.28
AG	0.34	0.90	-0.15	0.00	0.09	0.27	1.63

Panel B: CAPM Alphas of Anomaly Portfolios

	OP	GP	O-Score	IVA	IK	NOA	NSI	ACR	AG	EW-Avg
Short Leg	-0.27	-0.29*	-0.21	-0.34*	-0.11	-0.42***	-0.24	-0.19	-0.11	-0.24*
	(-1.25)	(-1.83)	(-1.14)	(-1.92)	(-0.68)	(-3.14)	(-1.44)	(-1.22)	(-0.62)	(-1.79)
Long Leg	0.20	0.37***	0.13	0.13	0.21	0.25	0.28	0.14	0.17	0.21*
	(1.35)	(3.19)	(0.98)	(0.82)	(1.13)	(1.62)	(1.34)	(1.17)	(0.92)	(1.80)
Long − Short	0.47	0.66***	0.34**	0.46**	0.32**	0.67***	0.52*	0.34**	0.27	0.45***
	(1.50)	(3.84)	(2.09)	(2.44)	(2.32)	(3.51)	(1.74)	(2.05)	(1.00)	(3.71)

Panel C: DGTW-Adjusted Excess Returns of Anomaly Portfolios

	OP	GP	O-Score	IVA	IK	NOA	NSI	ACR	AG	EW-Avg
Short Leg	-0.12	-0.17	-0.06	-0.23**	-0.03	-0.35***	-0.08	-0.17**	-0.01	-0.14
	(-0.64)	(-1.38)	(-0.36)	(-2.01)	(-0.30)	(-3.41)	(-0.68)	(-2.35)	(-0.11)	(-1.34)
Long Leg	0.09	0.24***	0.06	0.08	0.21	0.21*	0.01	0.12	0.08	0.12**
	(1.04)	(2.75)	(0.73)	(1.13)	(1.56)	(1.76)	(0.14)	(1.22)	(1.23)	(2.06)
Long − Short	0.20	0.41***	0.13	0.31**	0.24**	0.56***	0.09	0.29**	0.10	0.26***
	(0.91)	(2.75)	(0.77)	(2.32)	(1.99)	(3.64)	(0.52)	(2.41)	(0.69)	(2.93)

Table 11: Trading swaps for market anomalies: risk-free excess return, alpha, market beta, and Amihud illiquidity

This table reports the monthly ex-post excess returns over the risk-free rate (measured as the 3-month T-bill rate), ex-post CAPM alphas and market betas, Amihud illiquidity (Amihud, 2002) for the equal-weighted portfolio of trading-swap portfolios from 1994q3 to 2018q2 for nine anomalies, including the operating profit, gross profitability, O-Score, investment-to-assets, investment growth, net operating assets, net stock issues, accrual, and asset growth anomalies. Trading swaps are between HFs and Non-HF investors, which include (1) quasi-indexers (QIXs), (2) transient institutions (TRAs), and (3) other investors (OTHs). QIXs and TRAs are classified using the permanent classification provided in Brian Bushee's database (Bushee, 2001). Holding of OTHs is calculated in the spirit of Ben-David et al. (2012) as the difference between 100% and the total percentage holding of HFs, QIXs, and TRAs. Portfolios are constructed in the second quarter of year t using the change in holding information in the same quarter and the anomaly information for the fiscal year ending in calendar year t-1, and are held for the following one year. Stocks with the change in holding below (above) the bottom (top) 20^{th} percentile are considered as those that investors significantly sell (buy); they are denoted by S (B) respectively. Short (Long) leg is defined as portfolios that expect to have negative (positive) ex-post alphas, which comprise stocks at the bottom (top) 20% of OP and GP anomaly and those at the top (bottom) 20% of O-Score, IVA, IK, NOA, NSI, ACR, or AG anomaly. *, **, *** indicate significance at the 10%, 5%, and 1% level respectively. The standard errors are adjusted for heteroscedasticity and serial correlation using the Newey-West estimator with 12 lags. t-statistics are reported in brackets.

Panel A: HF/QIX Swap

	Risk-Free Excess Returns (%)			CAPM Alphas (%)			CAPM Betas			Amihud Illiquidity ($\times 10^{-6}$)		
	S/B	B/S	B/S − S/B	S/B	B/S	B/S − S/B	S/B	B/S	B/S − S/B	S/B	B/S	B/S − S/B
Short Leg	0.62	1.34***	0.72**	-0.53**	0.34	0.87***	1.45***	1.26***	-0.19***	1.10**	1.11***	0.01
	(1.31)	(3.30)	(2.24)	(-2.29)	(1.17)	(2.89)	(21.97)	(27.76)	(-2.74)	(2.53)	(4.27)	(0.02)
Long Leg	1.12***	1.19***	0.07	0.15	0.32*	0.16	1.22***	1.11***	-0.12**	0.93**	0.94***	0.01
	(3.20)	(4.37)	(0.43)	(0.64)	(1.93)	(0.94)	(26.33)	(40.97)	(-2.54)	(2.52)	(4.30)	(0.06)

Panel B: HF/TRA Swap

	Risk-Free Excess Returns (%)			CAPM Alphas (%)			CAPM Betas			Amihud Illiquidity ($\times 10^{-6}$)		
	S/B	B/S	B/S − S/B	S/B	B/S	B/S − S/B	S/B	B/S	B/S − S/B	S/B	B/S	B/S − S/B
Short Leg	1.15**	0.97**	-0.19	0.02	-0.21	-0.23	1.44***	1.49***	0.05	0.72***	0.90***	0.17
	(2.28)	(2.11)	(-0.86)	(0.06)	(-0.73)	(-0.88)	(22.18)	(17.95)	(0.48)	(3.60)	(4.12)	(1.05)
Long Leg	1.21***	1.27***	0.05	0.26	0.26	0.01	1.21***	1.27***	0.06	0.55***	1.26***	0.72***
	(3.39)	(3.94)	(0.22)	(0.96)	(1.25)	(0.03)	(20.65)	(16.90)	(0.53)	(3.30)	(4.25)	(2.87)

Panel C: HF/OTH Swap

	Risk-Free Excess Returns (%)			CAPM Alphas (%)			CAPM Betas			Amihud Illiquidity ($\times 10^{-6}$)		
	S/B	B/S	B/S − S/B	S/B	B/S	B/S − S/B	S/B	B/S	B/S − S/B	S/B	B/S	B/S − S/B
Short Leg	0.59	1.25***	0.65**	-0.56	0.11	0.67*	1.46***	1.44***	-0.02	1.70***	1.22***	-0.48*
	(1.10)	(3.07)	(2.12)	(-1.62)	(0.37)	(1.91)	(12.41)	(16.91)	(-0.24)	(5.99)	(3.91)	(-1.87)
Long Leg	0.91***	1.20***	0.29	-0.05	0.19	0.24	1.21***	1.27***	0.06	1.96***	1.00***	-0.97***
	(2.69)	(3.40)	(1.64)	(-0.24)	(0.81)	(1.22)	(26.17)	(24.66)	(0.88)	(5.20)	(3.41)	(-3.38)

Table 12: Trading swaps for market anomalies: DGTW-adjusted excess return, 2-factor alpha, and factor loading

This table reports the DGTW-adjusted excess returns (Daniel et al., 1997), corresponding ex-post 2-factor alphas and factor loadings for the equal-weighted portfolio of trading-swap portfolios from 1994q3 to 2018q2 for nine anomalies, including the operating profit, gross profitability, O-Score, investment-to-assets, investment growth, net operating assets, net stock issues, accrual, and asset growth anomalies. Trading swaps are between HFs and Non-HF investors, which include (1) quasi-indexers (QIXs), (2) transient institutions (TRAs), and (3) other investors (OTHs). QIXs and TRAs are classified using the permanent classification provided in Brian Bushee's database (Bushee, 2001). Holding of OTHs is calculated in the spirit of Ben-David et al. (2012) as the difference between 100% and the total percentage holding of HFs, QIXs, and TRAs. Portfolios are constructed in the second quarter of year t using the change in holding information in the same quarter and the anomaly information for the fiscal year ending in calendar year t-1, and are held for the following one year. Stocks with the change in holding below (above) the bottom (top) 20^{th} percentile are considered as those that investors significantly sell (buy); they are denoted by S (B) respectively. Short (Long) leg is defined as portfolios that expect to have negative (positive) ex-post alphas, which comprise stocks at the bottom (top) 20% of OP and GP anomaly and those at the top (bottom) 20% of O-Score, IVA, IK, NOA, NSI, ACR, or AG anomaly. Factors considered in the 2-factor model are betting-against-beta (Frazzini and Pedersen, 2014) and liquidity (Pástor and Stambaugh, 2003). *, **, *** indicate significance at the 10%, 5%, and 1% level respectively. The standard errors are adjusted for heteroscedasticity and serial correlation using the Newey-West estimator with 12 lags. t-statistics are reported in brackets.

Panel A: HF/QIX Swap

	DGTW-Adjusted Excess Returns (%)			2-Factor Alphas (%)			Factor Loadings on LIQ			Factor Loadings on BAB		
	S/B	B/S	B/S − S/B	S/B	B/S	B/S − S/B	S/B	B/S	B/S − S/B	S/B	B/S	B/S − S/B
Short Leg	-0.21	0.33	0.55**	-0.21	0.28	0.49*	0.08	0.26**	0.18**	-0.05	-0.07	-0.02
	(-1.34)	(1.46)	(1.99)	(-1.14)	(1.04)	(1.75)	(0.89)	(2.55)	(2.07)	(-0.60)	(-0.48)	(-0.22)
Long Leg	0.21	0.19**	-0.02	0.23	0.14	-0.09	0.05	-0.02	-0.06	-0.06	0.08	0.13***
	(1.46)	(2.06)	(-0.13)	(1.45)	(1.49)	(-0.55)	(0.78)	(-0.32)	(-1.17)	(-0.77)	(1.31)	(2.95)

Panel B: HF/TRA Swap

	DGTW-Adjusted Excess Returns (%)			2-Factor Alphas (%)			Factor Loadings on LIQ			Factor Loadings on BAB		
	S/B	B/S	B/S − S/B	S/B	B/S	B/S − S/B	S/B	B/S	B/S − S/B	S/B	B/S	B/S − S/B
Short Leg	0.19	0.03	-0.16	0.17	0.21	0.04	0.11	0.16	0.05	-0.04	-0.36**	-0.32**
	(0.77)	(0.12)	(-0.91)	(0.59)	(0.80)	(0.18)	(1.25)	(1.61)	(0.56)	(-0.31)	(-1.99)	(-2.50)
Long Leg	0.21	0.38**	0.17	0.24	0.52***	0.29	0.06	0.05	-0.01	-0.07	-0.23***	-0.16
	(1.07)	(2.46)	(0.77)	(1.17)	(2.97)	(1.17)	(0.94)	(0.95)	(-0.22)	(-0.69)	(-2.74)	(-1.34)

Panel C: HF/OTH Swap

	DGTW-Adjusted Excess Returns (%)			2-Factor Alphas (%)			Factor Loadings on LIQ			Factor Loadings on BAB		
	S/B	B/S	B/S − S/B	S/B	B/S	B/S − S/B	S/B	B/S	B/S − S/B	S/B	B/S	B/S − S/B
Short Leg	-0.34	0.25	0.59**	-0.22	0.39*	0.61**	0.06	0.16*	0.10	-0.21***	-0.29**	-0.08
	(-1.30)	(1.02)	(2.16)	(-0.98)	(1.69)	(2.11)	(1.12)	(1.87)	(1.20)	(-2.60)	(-2.12)	(-0.62)
Long Leg	-0.1	0.23	0.33*	-0.07	0.26	0.32	0.00	0.13*	0.12	-0.05	-0.11	-0.06
	(-0.93)	(1.52)	(1.74)	(-0.63)	(1.40)	(1.50)	(0.08)	(1.71)	(1.52)	(-0.97)	(-0.87)	(-0.63)

On the Other Side of Hedge Fund Equity Trades

SUPPLEMENTARY RESULTS

March 23, 2021

Table A1: Trading swaps and possible counterparties of hedge fund trades: different models

This table reports monthly ex-post alphas and market betas based on Fama-French 3-factor model (Fama and French 1993) and Carhart 4-factor model (Carhart 1997) for the short-term portfolios of quarterly trading swaps between HFs and non-HF investors from 1994q2 to 2017q4. Non-HF investors include (1) quasi-indexers (QIXs), (2) transient institutions (TRAs), and (3) other investors (OTHs). QIXs and TRAs are classified using the permanent classification provided in Brian Bushee's database (Bushee 2001). Holding of OTHs is calculated in the spirit of Ben-David et al. (2012) as the difference between 100% and the total percentage holding of HFs, QIXs, and TRAs. Portfolios are constructed at the end of each quarter and held for the following quarter. Stocks with the change in holding below (above) the bottom (top) 20^{th} percentile are considered as those that investors significantly sell (buy); they are denoted by S (B) respectively. *, **, *** indicate significance at the 10%, 5%, and 1% level respectively. The standard errors are adjusted for heteroscedasticity and serial correlation using the Newey-West estimator with 6 lags. t-statistics are reported in brackets.

Panel A: Fama-French 3-Factor Alphas and Market Betas

	3-Factor Alphas			3-Factor Market Betas		
	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH
S/B	-0.31**	0.07	-0.22*	1.19***	1.13***	1.25***
	(-2.37)	(0.57)	(-1.73)	(38.73)	(43.69)	(34.74)
B/S	0.46***	0.03	0.11	1.06***	1.22***	1.16***
	(3.42)	(0.18)	(0.96)	(33.48)	(33.60)	(33.61)
B/S − S/B	0.76***	-0.05	0.33*	-0.14***	0.09*	-0.09**
	(4.51)	(-0.27)	(1.79)	(-2.87)	(1.96)	(-2.10)

Panel B: Carhart 4-Factor Alphas and Market Betas

	4-Factor Alphas			4-Factor Market Betas		
	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH
S/B	-0.26*	0.04	-0.06	1.17***	1.15***	1.17***
	(-1.82)	(0.36)	(-0.48)	(41.28)	(51.88)	(31.97)
B/S	0.56***	0.17	0.04	1.01***	1.15***	1.20***
	(4.36)	(1.31)	(0.34)	(32.28)	(31.22)	(30.08)
B/S − S/B	0.81***	0.13	0.10	-0.16***	0.00	0.03
	(4.61)	(0.79)	(0.53)	(-3.58)	(-0.03)	(0.51)

Table A2: Trading swaps and possible counterparties of hedge fund trades: 10% cutoff

This table reports monthly ex-post excess returns over the risk-free rate (measured as the 3-month T-bill rate), ex-post CAPM alphas and market betas, Amihud illiquidity (Amihud 2002), DGTW-adjusted excess returns (Daniel et al. 1997), corresponding ex-post 2-factor alphas and factor loadings for the short-term portfolios of quarterly trading swaps between HFs and non-HF investors from 1994q2 to 2017q4. Non-HF investors include (1) quasi-indexers (QIXs), (2) transient institutions (TRAs), and (3) other investors (OTHs). QIXs and TRAs are classified using the permanent classification provided in Brian Bushee's database (Bushee 2001). Holding of OTHs is calculated in the spirit of Ben-David et al. (2012) as the difference between 100% and the total percentage holding of HFs, QIXs, and TRAs. Portfolios are constructed at the end of each quarter and held for the following quarter. Stocks with the change in holding below (above) the bottom (top) 10^{th} percentile are considered as those that investors significantly sell (buy); they are denoted by S (B) respectively. Factors considered in the 2-factor model are betting-against-beta (Frazzini and Pedersen 2014) and liquidity (Pástor and Stambaugh 2003). *, **, *** indicate significance at the 10%, 5%, and 1% level respectively. The standard errors are adjusted for heteroscedasticity and serial correlation using the Newey-West estimator with 6 lags. t-statistics are reported in brackets.

Panel A: Risk-Free Excess Returns, CAPM Alphas, CAPM Betas, and Amihud Illiquidity

	Risk-Free Excess Returns (%)			CAPM Alphas (%)			CAPM Betas			Amihud Illiquidity ($\times 10^{-6}$)		
	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH
S/B	0.51	0.55	0.62	-0.46*	-0.29	-0.40*	1.38***	1.21***	1.45***	1.02***	0.81***	1.57***
	(1.12)	(1.30)	(1.38)	(-1.90)	(-1.15)	(-1.87)	(21.69)	(19.77)	(23.88)	(5.47)	(4.70)	(9.84)
B/S	1.12***	1.07**	1.06**	0.30	0.08	0.06	1.17***	1.42***	1.43***	0.95***	0.68***	1.41***
	(3.19)	(2.56)	(2.21)	(1.53)	(0.34)	(0.20)	(25.26)	(24.03)	(17.81)	(4.91)	(5.48)	(7.73)
B/S − S/B	0.62***	0.52**	0.44	0.76***	0.37	0.46	-0.21***	0.21***	-0.03	-0.07	-0.13	-0.16
	(2.96)	(2.27)	(1.30)	(3.99)	(1.60)	(1.42)	(-3.14)	(3.49)	(-0.36)	(-0.39)	(-0.65)	(-0.78)

Panel B: DGTW-Adjusted Excess Returns, 2-Factor Alphas, and Factor Loadings on LIQ and BAB

	DGTW-Adjusted Excess Returns (%)			2-Factor Alphas (%)			Factor Loadings on LIQ			Factor Loadings on BAB		
	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH
S/B	-0.29	-0.33*	-0.06	-0.12	-0.23	0.12	0.07	0.05	0.17***	-0.27***	-0.15	-0.33***
	(-1.56)	(-1.67)	(-0.36)	(-0.51)	(-1.10)	(0.66)	(1.03)	(0.75)	(3.21)	(-3.36)	(-1.43)	(-6.59)
B/S	0.18	0.30*	0.31	0.27	0.33*	0.41	0.03	0.08	0.20**	-0.13	-0.08	-0.24
	(1.25)	(1.77)	(1.25)	(1.44)	(1.74)	(1.31)	(0.56)	(1.20)	(2.17)	(-1.51)	(-1.28)	(-1.39)
B/S − S/B	0.48***	0.63**	0.37	0.39**	0.56**	0.29	-0.05	0.03	0.03	0.14**	0.07	0.09
	(2.71)	(2.54)	(1.22)	(2.12)	(2.04)	(0.74)	(-0.75)	(0.45)	(0.28)	(2.47)	(0.71)	(0.47)

Table A3: Trading swaps and possible counterparties of hedge fund trades: 30% cutoff

This table reports monthly ex-post excess returns over the risk-free rate (measured as the 3-month T-bill rate), ex-post CAPM alphas and market betas, Amihud illiquidity (Amihud 2002), DGTW-adjusted excess returns (Daniel et al. 1997), corresponding ex-post 2-factor alphas and factor loadings for the short-term portfolios of quarterly trading swaps between HFs and non-HF investors from 1994q2 to 2017q4. Non-HF investors include (1) quasi-indexers (QIXs), (2) transient institutions (TRAs), and (3) other investors (OTHs). QIXs and TRAs are classified using the permanent classification provided in Brian Bushee's database (Bushee 2001). Holding of OTHs is calculated in the spirit of Ben-David et al. (2012) as the difference between 100% and the total percentage holding of HFs, QIXs, and TRAs. Portfolios are constructed at the end of each quarter and held for the following quarter. Stocks with the change in holding below (above) the bottom (top) 30^{th} percentile are considered as those that investors significantly sell (buy); they are denoted by S (B) respectively. Factors considered in the 2-factor model are betting-against-beta (Frazzini and Pedersen 2014) and liquidity (Pástor and Stambaugh 2003). *, **, *** indicate significance at the 10%, 5%, and 1% level respectively. The standard errors are adjusted for heteroscedasticity and serial correlation using the Newey-West estimator with 6 lags. t-statistics are reported in brackets.

Panel A: Risk-Free Excess Returns, CAPM Alphas, CAPM Betas, and Amihud Illiquidity

	Risk-Free Excess Returns (%)			CAPM Alphas (%)			CAPM Betas			Amihud Illiquidity ($\times 10^{-6}$)		
	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH
S/B	0.67*	0.85**	0.62*	-0.22*	0.03	-0.27**	1.27***	1.18***	1.27***	0.94***	0.77***	1.49***
	(1.89)	(2.50)	(1.77)	(-1.71)	(0.20)	(-2.34)	(35.18)	(31.31)	(35.30)	(7.67)	(7.30)	(11.21)
B/S	1.07***	0.97***	0.92**	0.30*	0.09	0.03	1.11***	1.25***	1.27***	1.15***	0.92***	1.40***
	(3.55)	(2.81)	(2.42)	(1.95)	(0.66)	(0.20)	(33.88)	(36.82)	(33.94)	(7.89)	(8.80)	(9.58)
B/S − S/B	0.40***	0.12	0.30**	0.52***	0.07	0.30**	-0.17***	0.07*	0.00	0.22**	0.14**	-0.09
	(3.12)	(0.97)	(2.11)	(4.46)	(0.56)	(2.15)	(-4.07)	(1.79)	(0.05)	(2.53)	(2.14)	(-0.79)

Panel B: DGTW-Adjusted Excess Returns, 2-Factor Alphas, and Factor Loadings on LIQ and BAB

	DGTW-Adjusted Excess Returns (%)			2-Factor Alphas (%)			Factor Loadings on LIQ			Factor Loadings on BAB		
	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH	HF/QIX	HF/TRA	HF/OTH
S/B	-0.12	0.03	-0.07	-0.07	0.04	-0.01	0.07*	0.08**	0.10***	-0.10*	-0.06	-0.13***
	(-1.27)	(0.33)	(-1.10)	(-0.61)	(0.32)	(-0.18)	(1.78)	(2.17)	(4.75)	(-1.68)	(-0.75)	(-5.14)
B/S	0.27***	0.21***	0.13	0.23**	0.20**	0.17	0.07**	0.09**	0.09**	0.01	-0.04	-0.09
	(3.20)	(2.80)	(1.20)	(2.36)	(2.33)	(1.08)	(2.16)	(2.22)	(2.29)	(0.20)	(-1.29)	(-1.01)
B/S − S/B	0.38***	0.17	0.20*	0.30**	0.16	0.18	-0.01	0.00	-0.01	0.11***	0.02	0.04
	(3.55)	(1.50)	(1.83)	(2.38)	(1.15)	(1.16)	(-0.16)	(0.08)	(-0.33)	(2.74)	(0.33)	(0.45)

Table A4: Trading swaps among Non-HF investors

This table reports monthly ex-post excess returns over the risk-free rate (measured as the 3-month T-bill rate), ex-post CAPM alphas and market betas, Amihud illiquidity (Amihud 2002), DGTW-adjusted excess returns (Daniel et al. 1997), corresponding ex-post 2-factor alphas and factor loadings for the short-term portfolios of quarterly trading swaps among non-HF investors from 1994q2 to 2017q4. Non-HF investors include (1) quasi-indexers (QIXs), (2) transient institutions (TRAs), and (3) other investors (OTHs). QIXs and TRAs are classified using the permanent classification provided in Brian Bushee's database (Bushee 2001). Holding of OTHs is calculated in the spirit of Ben-David et al. (2012) as the difference between 100% and the total percentage holding of HFs, QIXs, and TRAs. Portfolios are constructed at the end of each quarter and held for the following quarter. Stocks with the change in holding below (above) the bottom (top) 20^{th} percentile are considered as those that investors significantly sell (buy); they are denoted by S (B) respectively. Factors considered in the 2-factor model are betting-against-beta (Frazzini and Pedersen 2014) and liquidity (Pástor and Stambaugh 2003). *, **, *** indicate significance at the 10%, 5%, and 1% level respectively. The standard errors are adjusted for heteroscedasticity and serial correlation using the Newey-West estimator with 6 lags. t-statistics are reported in brackets.

Panel A: Risk-Free Excess Returns, CAPM Alphas, CAPM Betas, and Amihud Illiquidity

	Risk-Free Excess Returns (%)			CAPM Alphas (%)			CAPM Betas			Amihud Illiquidity ($\times 10^{-6}$))		
	TRA/QIX	OTH/QIX	TRA/OTH	TRA/QIX	OTH/QIX	TRA/OTH	TRA/QIX	OTH/QIX	TRA/OTH	TRA/QIX	OTH/QIX	TRA/OTH
S/B	0.64*	0.73*	0.78*	-0.31*	-0.17	-0.22	1.36***	1.28***	1.42***	0.72***	1.23***	0.96***
	(1.73)	(1.89)	(1.95)	(-1.75)	(-1.10)	(-1.61)	(28.83)	(27.78)	(28.83)	(4.85)	(8.32)	(9.18)
B/S	1.03***	0.76**	1.00**	0.25	-0.06	0.09	1.11***	1.17***	1.30***	0.65***	1.48***	0.84***
	(3.10)	(2.30)	(2.54)	(1.31)	(-0.42)	(0.47)	(27.67)	(33.40)	(22.00)	(7.32)	(8.99)	(9.30)
B/S − S/B	0.39**	0.03	0.23	0.56***	0.11	0.31*	-0.25***	-0.11***	-0.12**	-0.06	0.25**	-0.13
	(2.13)	(0.20)	(1.13)	(3.33)	(0.72)	(1.65)	(-4.17)	(-3.05)	(-2.29)	(-0.45)	(2.58)	(-1.29)

Panel B: DGTW-Adjusted Excess Returns, 2-Factor Alphas, and Factor Loadings on LIQ and BAB

	DGTW-Adjusted Excess Returns (%)			2-Factor Alphas (%)			Factor Loadings on LIQ			Factor Loadings on BAB		
	TRA/QIX	OTH/QIX	TRA/OTH	TRA/QIX	OTH/QIX	TRA/OTH	TRA/QIX	OTH/QIX	TRA/OTH	TRA/QIX	OTH/QIX	TRA/OTH
S/B	-0.10	-0.07	0.06	-0.07	-0.04	0.15	0.07	0.08**	0.12***	-0.08**	-0.08	-0.19***
	(-0.98)	(-0.64)	(0.57)	(-0.58)	(-0.29)	(1.36)	(1.44)	(1.99)	(3.74)	(-2.23)	(-0.97)	(-4.47)
B/S	0.22	0.05	0.10	0.20	0.06	0.18	0.11**	0.07***	0.06	-0.04	-0.06*	-0.15
	(1.40)	(0.57)	(0.62)	(1.06)	(0.85)	(0.85)	(2.22)	(2.90)	(1.22)	(-0.42)	(-1.91)	(-1.11)
B/S − S/B	0.31*	0.12	0.04	0.27	0.10	0.03	0.04	0.00	-0.05	0.03	0.02	0.05
	(1.78)	(0.83)	(0.21)	(1.22)	(0.61)	(0.11)	(0.69)	(-0.07)	(-0.94)	(0.36)	(0.24)	(0.31)

Table A5: Trading swaps between hedge funds and other investors

This table reports monthly ex-post excess returns over the risk-free rate (measured as the 3-month T-bill rate), ex-post CAPM alphas and market betas, Amihud illiquidity (Amihud 2002), DGTW-adjusted excess returns (Daniel et al. 1997), corresponding ex-post 2-factor alphas and factor loadings for the short-term portfolios of quarterly trading swaps between HFs and two subgroups of other investors (OTHs) from 1994q2 to 2017q4, including other report-to-13f institutions (OTH_INSTs) and other unreported investors (OTH_OTHERs). Holding of OTH_OTHERs is calculated in the spirit of Ben-David et al. (2012) as the difference between 100% and the total percentage holding of all institutions that report to 13f, and OTH_INSTs is the difference between the percentage holding of OTHs and OTH_OTHERs. Portfolios are constructed at the end of each quarter and held for the following quarter. Stocks with the change in holding below (above) the bottom (top) 20^{th} percentile are considered as those that investors significantly sell (buy); they are denoted by S (B) respectively. Factors considered in the 2-factor model are betting-against-beta (Frazzini and Pedersen 2014) and liquidity (Pástor and Stambaugh 2003). *, **, *** indicate significance at the 10%, 5%, and 1% level respectively. The standard errors are adjusted for heteroscedasticity and serial correlation using the Newey-West estimator with 6 lags. t-statistics are reported in brackets.

Panel A: Risk-Free Excess Returns, CAPM Alphas, CAPM Betas, and Amihud Illiquidity

	Risk-Free Excess Returns (%)		CAPM Alphas (%)		CAPM Betas		Amihud Illiquidity ($\times 10^{-6}$)	
	HF/OTH_INST	HF/OTH_OTHER	HF/OTH_INST	HF/OTH_OTHER	HF/OTH_INST	HF/OTH_OTHER	HF/OTH_INST	HF/OTH_OTHER
S/B	0.82**	0.67*	-0.09	-0.29**	1.31***	1.37***	0.78***	1.43***
	(2.17)	(1.79)	(-0.63)	(-1.97)	(33.59)	(25.39)	(6.95)	(10.42)
B/S	0.98***	1.03***	0.13	0.11	1.22***	1.31***	0.74***	1.29***
	(2.67)	(2.66)	(0.64)	(0.62)	(20.49)	(23.47)	(5.62)	(8.74)
B/S − S/B	0.16	0.36**	0.22	0.40**	-0.09	-0.06	-0.04	-0.15
	(0.90)	(2.12)	(1.15)	(2.49)	(-1.38)	(-1.48)	(-0.46)	(-1.14)

Panel B: DGTW-Adjusted Excess Returns, 2-Factor Alphas, and Factor Loadings on LIQ and BAB

	DGTW-Adjusted Excess Returns (%)		2-Factor Alphas (%)		Factor Loadings on LIQ		Factor Loadings on BAB	
	HF/OTH_INST	HF/OTH_OTHER	HF/OTH_INST	HF/OTH_OTHER	HF/OTH_INST	HF/OTH_OTHER	HF/OTH_INST	HF/OTH_OTHER
S/B	0.07	-0.03	0.14	0.12	0.09**	0.12***	-0.14***	-0.25***
	(0.64)	(-0.28)	(1.12)	(1.16)	(1.99)	(3.82)	(-3.19)	(-6.11)
B/S	0.25*	0.21	0.32**	0.30	0.08**	0.06	-0.14**	-0.15
	(1.90)	(1.44)	(2.46)	(1.56)	(2.08)	(1.09)	(-2.16)	(-1.33)
B/S − S/B	0.18	0.24	0.18	0.18	0.00	-0.06	0.00	0.10
	(1.26)	(1.54)	(1.06)	(0.87)	(-0.06)	(-1.16)	(0.06)	(1.04)

Table A6: Market anomalies: description

This table describes the market anomalies used in this study. "Positive" predictability means that stocks with high value of the anomaly-related characteristic are expected to have positive future abnormal returns, whereas "negative" predictability means that the expected abnormal returns are negative. The variable names (items) are as used in COMPUSTAT.

Market anomaly	Variable	Predictability	Construction	Reference
Gross profitability	GP	Positive	Total revenue (item REVT) minus the cost of goods sold (item COGS), divided by total assets (item AT).	Novy-Marx (2013)
Operating profit	OP	Positive	Total revenue minus the cost of goods sold, minus selling, general, and administrative expenses (item XSGA) if available, minus interest expense (item XINT) if available, divided by book equity. Book equity is stockholders' book equity (item SEQ), plus balance sheet deferred taxes (Compustat item ITCB) and investment tax credit (TXDB) if available, minus the book value of preferred stock (zero if missing). Book value of preferred stock is redemption value (PSTKRV), liquidating value (PSTKL), or par value (PSTK).	Fama and French (2015)
O-Score	O-Score	Negative	O-Score $= -0.407\text{SIZE} + 6.03\text{TLTA} - 1.43\text{WCTA} + 0.076\text{CLCA} - 1.72\text{OENEG} - 2.37\text{NITA} - 1.83\text{FUTL} + 0.285\text{INTWO} - 0.521\text{CHIN} - 1.32$, where SIZE is the log of total assets, TLTA is the book value of debt (item DLC plus item DLTT) divided by total assets, WCTA is working capital (item ACT minus item LCT) divided by total assets, CLCA is current liabilities (item LCT) divided by current assets (item ACT), ONEEG is 1 if total liabilities (item LT) exceed total assets and is zero otherwise, NITA is net income (item NI) divided by total assets, FUTL is funds provided by operations (item PI) divided by total liabilities, INTWO is equal to 1 if net income (item NI) is negative for the last 2 years and zero otherwise, CHIN is $(\text{NI}_j - \text{NI}_{j-1})/(\lvert\text{NI}_j\rvert + \lvert\text{NI}_{j-1}\rvert)$, in which NI_j is the income (item NI) for year j.	Ohlson (1980)
Investment-to-assets	IVA	Negative	The change in gross property, plant, and equipment (item PPEGT) plus the change in inventory (item INVT), divided by lagged total assets.	Titman et al. (2004)
Investment growth	IK	Negative	The change in capital expenditure (item CAPX) divided by lagged capital expenditure.	Xing (2008)
Net operating assets	NOA	Negative	Debt included in current liabilities (item DLC, zero if missing), plus long-term debt (item DLTT, zero if missing), plus common equity (item CEQ), plus minority interests (item MIB), plus book value of preferred stocks, minus cash and short-term investment (item CHE), divided by lagged total assets.	Hirshleifer et al. (2004)
Net stock issues	NSI	Negative	The annual log change in split-adjusted shares outstanding. Split-adjusted shares outstanding equals shares outstanding (item CSHO) times the adjustment factor (item AJEX).	Fama and French (2008)
Accrual	ACR	Negative	The change in operating working capital per split-adjusted share, divided by book equity per split-adjusted share. Operating working capital is computed as current assets, minus cash and short-term investments, minus the difference of current liability and debt included in current liabilities if available.	Fama and French (2008)
Asset growth	AG	Negative	The change in total assets divided by lagged total assets.	Cooper et al. (2008)

Table A7: Index fund managing QIXs

The table lists the names of the institutions that have permanent classification as "quasi-indexers" (QIX) in the database of Bushee (2001), which manage at least one CRSP index fund (with the flag "D" in CRSP). The table reports corresponding identification information from CRSP, 13f, and the assigned classification in the database of Bushee (2001).

Managing Company Name (CRSP Index Funds)	TFN-MGRNO	Company Name (TR 13f)	Example Index Fund Held (CRSP-FUNDNO)	Permanent Spectrum Type (Bushee's Database)	Permanent QTD Type (Bushee's Database)
Thrivent Financial for Lutherans	650	THRIVENT FINL FOR LUTHERANS	039610	CPS	QIX
Allianz Investment Management LLC	1275	ALLIANZ INVESTMENT CORP	049345	IIA	QIX
Allstate Institutional Investors LLC	1365	ALLSTATE INS CO	046568	INS	QIX
PROFUND ADVISORS LLC	7633	PROFUND ADVR LLC	040034	MSC	QIX
Mason Street Advisors LLC	7634	MASON STR ADVISORS, LLC	041338	MSC	QIX
Wells Asset Management Inc	7832	WELLS ASSET MANAGEMENT, INC.	032239	MSC	QIX
UBS Global Asset Management	7836	UBS GLOBAL ASSET MGMT US INC	046501	MSC	QIX
Barclays Capital Inc	7900	BARCLAYS BANK LTD	095981	BNK	QIX
DOMINI SOCIAL INVESTMENTS LLC	8728	DOMINI SOCIAL INVESTMENTS, LLC	009203	IIA	QIX
Cambria Investment Management LP	8851	CAMBRIA INVESTMENT MGMT, L.P.	088043	CPS	QIX
Rational Advisors Inc	9031	RATIONAL ADVISORS, INC.	096032	IIA	QIX
Vident Advisory, LLC	9213	VIDENT INVT ADVISORY, LLC	093351	MSC	QIX
Franklin Templeton Investments	9219	FRANKLIN TEMPLETON INVESTIMENT	094307	MSC	QIX
CWM Advisors LLC	9244	CWM ADVISORS, L.L.C.	095948	MSC	QIX
DBX Advisors LLC	9339	DBX ADVR LLC.	096568	MSC	QIX
WILLIAM BLAIR & COMPANY LLC	9400	WILLIAM BLAIR & CO, L.L.C.	037367	IIA	QIX
BB&T Asset Management Inc	10000	BB&T ASSET MANAGEMENT, INC.	046160	BNK	QIX
Calvert Investments Inc	10064	CALVERT INVESTMENT MGMT, INC.	086570	INS	QIX
Diamond Hill Capital Management Inc	10100	DIAMOND HILL CAPITAL MGMT INC.	063932	INV	QIX
BMO Asset Management Corp	10250	BMO GLOBAL ASSET MANAGEMENT	096350	IIA	QIX
Tortoise Capital Advisors LLC	10473	TORTOISE CAPITAL ADVISORS, LLC	064546	IIA	QIX
PROSHARE ADVISORS LLC	11317	PROSHARE ADVR LLC	037575	IIA	QIX
Cushing MLP Asset Management LP	11490	CUSHING MLP ASSET MGMT, LP	094593	IIA	QIX
ALPS Advisors Inc	11669	ALPS ADVISERS, INC.	093736	IIA	QIX
INVESTEC ASSET MGMT US LTD	11701	INVESTEC ASSET MANAGEMENT LTD.	014086	IIA	QIX
CSat Investment Advisory LP	12467	CSAT INVESTMENT ADVISORY L P	092514	IIA	QIX
Guggenheim Investments	12598	GUGGENHEIM INVESTMENTS	086326	IIA	QIX
E*TRADE ASSET MANAGEMENT INC	12673	E*TRADE CAPITAL MANAGEMENT LLC	009916	IIA	QIX
Motley Fool Asset Management LLC	12706	MOTLEY FOOL ASSET MGMT, LLC	093085	IIA	QIX
Global X Management Company LLC	12786	GLOBAL X MANAGEMENT CO LLC	097815	IIA	QIX
SUMMIT INVESTMENT PARTNERS INC	12806	SUMMIT INVESTMENT PTNR	042048	IIA	QIX
Shelton Capital Management	12970	SHELTON CAPITAL MANAGEMENT	006996	MSC	QIX
Copeland Capital Management LLC	13027	COPELAND CAPITAL MGMT, LLC	057765	IIA	QIX
Sage Advisory Services Ltd Co	13140	SAGE ADVISORY SERV LTD. CO.	092454	IIA	QIX
Equinox Fund Management LLC	13144	EQUINOX FUND MANAGEMENT, LLC	051413	IIA	QIX
AGF Investments LLC	13660	AGF INVESTMENTS AMERICA INC.	063367	IIA	QIX
Allianz Global Investors	14007	ALLIANZ GLOBAL INVESTORS GMBH	092773	IIA	QIX
BNY Mellon Investment Management	14063	BNY MELLON INV MGMT CAYMAN LTD	088514	IIA	QIX
Blue Sky Asset Managemet LLC	14107	BLUE SKY ASSET MANAGEMENT, LLC	090340	IIA	QIX
Newfound Research LLC	14136	NEWFOUND RESEARCH LLC	061334	IIA	QIX
Empowered Funds LLC	14153	EMPOWERED FUNDS, LLC	097950	IIA	QIX
FFCM LLC	14166	FFCM LLC	063367	IIA	QIX
Pacer Advisors Inc	14216	PACER ADVISORS, INC.	097056	INS	QIX
Virtus ETF Advisers LLC	14299	VIRTUS ETF ADVISERS LLC	097836	BNK	QIX
ARK Investment Management LLC	14305	ARK INVESTMENT MANAGEMENT LLC	092722	BNK	QIX
Jackson National Asset Management LLC	14421	JACKSON NATL ASSET MGMT, LLC	093980	INS	QIX
Elkhorn Investments LLC	14435	ELKHORN INVESTMENTS, LLC	087744	INS	QIX
ETF Managers Group LLC	14452	ETF MANAGERS GROUP, LLC	097027	INS	QIX
TIMESSQUARE CAPITAL MGMT	16180	TIMESSQUARE CAPITAL MGMT, LLC	007262	INS	QIX
Columbia Funds	18970	COLUMBIA FUNDS MGMT CO	061483	IIA	QIX
Redwood Investment Management LLC	21709	REDWOOD INVESTMENT MGMT, LLC	094300	IIA	QIX
Brighthouse Investment Advisers LLC	21755	BRIGHTHOUSE INVT ADVISERS, LLC	092786	IIA	QIX
DELAWARE MANAGEMENT COMPANY	22620	DELAWARE MGMT. COMPANY	009045	IIA	QIX
Tortoise Index Solutions LLC	22712	TORTOISE INDEX SOLUTIONS, LLC	094932	IIA	QIX

Table A8: Index fund managing QIXs, continued

The table lists the names of the institutions that have permanent classification as "quasi-indexers" (QIX) in the database of Bushee (2001), which manage at least one CRSP index fund (with the flag "D" in CRSP). The table reports corresponding identification information from CRSP, 13f, and the assigned classification in the database of Bushee (2001).

Managing Company Name (CRSP Index Funds)	TFN-MGRNO	Company Name (TR 13f)	Example Index Fund Held (CRSP-FUNDNO)	Permanent Spectrum Type (Bushee's Database)	Permanent QTD Type (Bushee's Database)
SL Advisors LLC	22746	SL ADVISORS, LLC	092754	IIA	QIX
Dimensional Fund Advisors LP	23000	DIMENSIONAL FUND ADVISORS, LP	009104	IIA	QIX
Federated Investors	27330	FEDERATED INVESTORS, INC.	054408	INV	QIX
Fidelity Management & Research Company	27800	FIDELITY MGMT & RES CORP	097533	INV	QIX
Fifth Third Asset Management Inc	28200	FIFTH THIRD ASSET MGMT, INC.	012251	BNK	QIX
FBR Fund Advisers Inc	39390	FBR FUND ADVISERS, INC	010934	IIA	QIX
MERRILL LYNCH INV MANAGERS/FAM	39539	MERRILL LYNCH INV MANAGERS(NJ)	020480	IIA	QIX
GE Asset Management Inc	39547	GE ASSET MANAGEMENT INC	038073	CPS	QIX
Goldman Sachs & Co	41260	GOLDMAN SACHS & COMPANY	040853	IIA	QIX
GW Capital Management LLC	41900	GW CAPITAL MANAGEMENT, INC.	091048	INS	QIX
GUARDIAN INVESTOR SERVICES LLC	42760	GUARDIAN INVESTOR SVCS.	023808	INV	QIX
John Hancock Life Insurance Company	43290	JOHN HANCOCK MUT LIFE INS CO	056606	INS	QIX
Hartford Investment Management Company	43885	HARTFORD INVESTMENT MGMT CO	014705	INS	QIX
Highland Capital Management LP	44625	HIGHLAND CAPITAL MGMT, LLC	064277	IIA	QIX
AMERICAN EXPRESS FINANCIAL CORPORATION	45639	AMERICAN EXPRESS FINL ADVR	026866	IIA	QIX
Columbia Management Inv Advisers LLC	45639	COLUMBIA MGMT INV ADVISERS LLC	039478	IIA	QIX
RiverSource Investments LLC	45639	RIVERSOURCE INVESTMENTS, LLC	039478	IIA	QIX
Invesco Capital Management LLC	47400	INVESCO CAPITAL MANAGEMENT INC	097718	IIA	QIX
Allegiant Asset Management Company	47635	ALLEGIANT ASSET MANAGEMENT CO	003980	IIA	QIX
Knights of Columbus Asset Adv LLC	49450	KNIGHTS OF COLUMBUS	096480	CPS	QIX
Legg Mason	50130	LEGG MASON CAPITAL MGMT	091551	IIA	QIX
Advantus Capital Management Inc	53000	ADVANTUS CAPITAL MGMT, INC.	055411	INS	QIX
Securian Asset Management Inc	53000	SECURIAN ASSET MGMT, INC.	055411	INS	QIX
Everence Capital Management Inc	53020	EVERENCE CAPITAL MGMT, INC.	051318	INS	QIX
MMA Capital Management Inc	53020	MMA CAPITAL MANAGEMENT	046125	INS	QIX
MANAGERS FUNDS LLC	53245	MANAGERS FUNDS, LLC	019652	IIA	QIX
MFS Investment Management	54600	MFS INVESTMENT MANAGEMENT	041006	INV	QIX
Metropolitan Life Insurance Company	57070	METROPOLITAN LIFE INS CO. (US)	047040	INS	QIX
JPMorgan Investment Advisors Inc	58835	JPMORGAN CHASE & CO.	039051	BNK	QIX
Munder Capital Management	59450	MUNDER CAPITAL MANAGEMENT	047982	IIA	QIX
Mutual of America Cap Mgmt Corporation	59500	MUTUAL AMER CAPITAL MGMT CORP.	097695	INS	QIX
NATIONAL CITY BANK	61230	NATL CITY BANK	003980	BNK	QIX
GARTMORE MUTUAL FUND CAPITAL TRUST	62900	GARTMORE MUT FD CAPITAL TRUST	021951	INV	QIX
NORTHERN TRUST COMPANY	65260	NORTHERN TRUST COMPANY	022376	BNK	QIX
OppenheimerFunds Inc	67470	OPPENHEIMERFUNDS, INC.	092487	IIA	QIX
Pacific Life Insurance Company	67730	PACIFIC LIFE INSURANCE COMPANY	096332	INS	QIX
Pax World Management LLC	67995	PAX WORLD MANAGEMENT LLC	060748	IIA	QIX
ING Investments LLC	70460	ING INVESTMENTS, LLC	054289	IIA	QIX
T. Rowe Price Associates Inc	71110	T. ROWE PRICE ASSOCIATES, INC.	097808	IIA	QIX
Principal Management Corporation	71500	PRINCOR MGMT CORP	064804	INS	QIX
Russell Investment Group	75100	RUSSELL INVESTMENT GROUP (US)	053605	IIA	QIX
Charles Schwab Investment Management Inc	76760	CHARLES SCHWAB INVT MGMT, INC.	095939	IIA	QIX
Deutsche Investment Mgmt Americas Inc	76960	DEUTSCHE INV MGMT AMERICAS INC	091259	IIA	QIX
State Farm Investment Mgmt Corporation	81130	STATE FARM INVT MGMT	038936	INS	QIX
State Street Corporation	81540	STATE STREET CORP	064237	BNK	QIX
Sterling Capital Funds	81900	STERLING CAPITAL MGMT	046160	IIA	QIX
Teachers Insurance & Annuity Association	82810	TEACHERS INSUR & ANNUITY	086034	INS	QIX
TD WATERHOUSE ASSET MANAGEMENT	82840	TD WATERHOUSE ASSET MANAGEMENT	029548	IIA	QIX
TIAA-CREF	84205	TIAA-CREF	039294	BNK	QIX
Citi Fund Management Inc	84900	CITIGROUP INC	062298	INS	QIX
USAA Investment Manaagement Company	85770	USAA INVESTMENT MANAGEMENT COM	030722	INV	QIX
Variable Annuity Life Insurance Company	90415	VARIABLE ANNUITY INS CO	030895	IIA	QIX
Van Eck Associates Corporation	90440	VAN ECK ASSOCIATES CORPORATION	097861	INV	QIX
Vanguard Group Inc	90457	VANGUARD GROUP, INC.	097456	INV	QIX

References

Amihud, Y. 2002. Illiquidity and stock returns: Cross-section and time-series effects. *Journal of Financial Markets* 5:31–56.

Ben-David, I., F. Franzoni, and R. Moussawi. 2012. Hedge fund stock trading in the financial crisis of 2007–2009. *The Review of Financial Studies* 25:1–54.

Bushee, B. J. 2001. Do institutional investors prefer near-term earnings over long-run value? *Contemporary Accounting Research* 18:207–246.

Carhart, M. M. 1997. On persistence in mutual fund performance. *The Journal of Finance* 52:57–82.

Cooper, M. J., H. Gulen, and M. J. Schill. 2008. Asset growth and the cross-section of stock returns. *the Journal of Finance* 63:1609–1651.

Daniel, K., M. Grinblatt, S. Titman, and R. Wermers. 1997. Measuring mutual fund performance with characteristic-based benchmarks. *The Journal of finance* 52:1035–1058.

Fama, E. F., and K. R. French. 1993. Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics* 33:3–56.

Fama, E. F., and K. R. French. 2008. Dissecting anomalies. *The Journal of Finance* 63:1653–1678.

Fama, E. F., and K. R. French. 2015. A five-factor asset pricing model. *Journal of Financial Economics* 116:1–22.

Frazzini, A., and L. H. Pedersen. 2014. Betting against beta. *Journal of Financial Economics* 111:1–25.

Hirshleifer, D., K. Hou, S. H. Teoh, and Y. Zhang. 2004. Do investors overvalue firms with bloated balance sheets? *Journal of Accounting and Economics* 38:297–331.

Novy-Marx, R. 2013. The other side of value: The gross profitability premium. *Journal of Financial Economics* 108:1–28.

Ohlson, J. A. 1980. Financial ratios and the probabilistic prediction of bankruptcy. *Journal of Accounting Research* 18:109–131.

Pástor, L., and R. F. Stambaugh. 2003. Liquidity risk and expected stock returns. *Journal of Political Economy* 111:642–685.

Titman, S., K. J. Wei, and F. Xie. 2004. Capital investments and stock returns. *Journal of Financial and Quantitative Analysis* 39:677–700.

Xing, Y. 2008. Interpreting the value effect through the Q-theory: An empirical investigation. *The Review of Financial Studies* 21:1767–1795.