How Smart Are the Smart Guys? A Unique View from Hedge Fund Stock Holdings

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Compared to mutual funds, hedge funds prefer smaller, opaque value securities, and have higher turnover and more active share bets. Decomposing returns into three components, we find that hedge funds are better than mutual funds at stock picking by only 1.32% per year on a value-weighted basis, and this result is insignificant on an equal-weighted basis or with price-to-sales benchmarks. Hedge funds exhibit no ability to time sectors or pick better stock styles. Surprisingly, we find only weak evidence of differential ability between hedge funds. Overall, our study raises serious questions about the perceived superior skill of hedge fund managers. (*JEL* G11, G23)

An underlying assumption by many on Wall Street is that the best and brightest migrate to the hedge fund industry. This assumption is often touted as a contributor to the sixty-five-fold increase in hedge fund assets under management from roughly $38 billion in 1990 to $2.48 trillion in mid-2007. While hedge funds typically are known for investing in a variety of positions, 42% of hedge funds (and 32% of assets under management) are simply invested in long/short equity strategies.[1] While the other activities of hedge funds are not usually replicated outside of hedge funds, the long-equity environment provides a unique laboratory for comparing the stock preferences and ability of hedge funds to that of mutual funds. This article provides a comprehensive examination of long-equity holdings, both in terms of the propensity of hedge fund managers to own stocks with certain characteristics and their ability to make profits through these stocks relative to their mutual fund peers.

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[1] These strategies are typically net long in individual stocks. The equity market-neutral category contains 8% of funds and 5% of assets in the equity-neutral category. Dedicated short funds are only 1% of funds and 0.2% of assets under management. These summary statistics are reported by Fung and Hsieh (2006) using TASS data in 2004. Other categories that contain equity positions include event driven, convertible arbitrage, and emerging markets, which represent 19%, 6%, and 4%, respectively, of assets under management.

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Evaluating hedge fund performance using hedge fund returns is extremely difficult. First, hedge fund data sources suffer from self-selected reporting (returns are reported following good performance) and survivorship bias, as discussed by Fung and Hsieh (2000), among others. Second, hedge fund returns exhibit large autocorrelations that are likely due to hedge funds holding illiquid assets and return smoothing (Asness, Krail, and Liew 2001; Getmansky, Lo, and Makarov 2004). Third, Liang (2000, 2003) finds that reported returns may vary for the same hedge fund in different datasets, and Bollen and Pool (2008) and Agarwal, Daniel, and Naik (2007) find evidence that some hedge funds systematically manipulate returns. Fourth, hedge fund payoffs are option-like and highly nonlinear, and hence, traditional linear factor models do a poor job in characterizing returns in hedge funds as compared to mutual funds (Fung and Hsieh 2001). One type of option-like position that is difficult to detect is "informationless" strategies (Weisman 2002) such as writing options on low-probability events—they can increase a fund's Sharpe ratio at the expense of increasing downside risk. While the hedge fund literature brings a variety of innovative methods to control for these problems (e.g., Fung and Hsieh 2001; Agarwal and Naik 2004), basic issues like misreporting, return manipulation, and "informationless" strategies remain nearly impossible to correct without better data. Moreover, the presence of these issues biases researchers toward finding positive abnormal returns, which is what the literature generally finds.

Our approach suffers from none of the above problems, since we do not rely on self-reported hedge fund returns but rather on hedge fund firms' required 13F equity filings. A cost of our approach is that we can only examine long-equity position performance and need to ignore intraquarter trading. We investigate these limitations and view them as extremely reasonable given that equity trading comprises a substantial sector of the hedge fund industry and the many problems mentioned above with self-reported hedge fund returns. Our basic proposition is to investigate whether hedge fund managers are, in fact, better at picking stocks and sectors than their counterparts in the mutual fund industry.

Since hedge funds cater to sophisticated investors, they are afforded an extra level of secrecy by the SEC and are not required to report their holdings semiannually like mutual funds. However, this article backs out the stock holdings of 306 hedge fund holding companies from 1980 to 2004 from 13F filings. We use the term "hedge fund" or "hedge fund firm" interchangeably to refer to the holding company that contains the stock activity of one or more hedge funds. This method of gathering hedge fund holding data follows and extends the approach of Brunnermeier and Nagel (2004). They examine quarterly 13F holdings of hedge funds, but their focus is on whether fifty-three hedge fund firms increased or decreased their positions and made money in high price-to-sales (P/S) stocks during the technology bubble from 1998 to 2000. Brown et al. (2005) also use hedge fund holding data, but their focus is on the gaming behavior of forty Australian managers. To our knowledge, this

is the first article to use a holdings-based approach to examine the large-scale issues of what hedge funds own and how they perform.

This article first sheds some light on hedge funds in the equity market by examining their trading intensity, their relative weights compared to the market and mutual funds, and the types of securities they hold. Second, we examine the ability of hedge fund and mutual fund aggregate holdings, changes in holdings, and large position bets to predict the cross-section of future stock returns. Third, hedge fund stock picking, sector selection, and average style are compared relative to mutual funds. Finally, we examine differences in ability within the hedge fund industry.

Toward the goal of better understanding the trading intensity and the activeness of hedge funds, we find that although there is broad heterogeneity, the median hedge fund has almost twice the quarterly turnover of the median mutual fund. As compared to mutual fund weights, hedge fund weights deviate more from the market portfolio. When examining the average holdings in twenty-five portfolios formed according to size and BE/ME or size and momentum, we find that relative to mutual funds, hedge funds are overweight in the bottom three size quintiles and underweight in the largest two size quintiles. Hedge funds tend to prefer medium-sized value stocks but strongly avoid the largest quintile of value stocks. Cross-sectional regressions demonstrate that in comparison to mutual funds, hedge funds in aggregate seem to prefer stocks with fewer analysts, less liquidity, and more volatility despite their increased trading intensity.

We now turn to examining hedge fund performance. Our first method follows the approach used with mutual funds by Chen, Jegadeesh, and Wermers (2000), which relies on the aggregate opinion, or consensus of the fund industry on each security. We find that for hedge funds, neither the level nor changes in fund holdings forecast returns. Since a major advantage of hedge funds is their ability to speculate, we also examine the profitability of large positions taken by hedge funds and find weak evidence that large bets are profitable for the next quarter but negative predictors at longer horizons. Overall, these findings suggest that while hedge funds on average are not profiting from their long-equity picks, there may be useful information to be garnered from their trading.

In our second and main method of performance evaluation, we follow Daniel et al. (1997) and classify the return space using 125 benchmark portfolios formed on size, BE/ME, and stock-return momentum, due to the general agreement that these patterns have been consistently related to past realized stock returns. Over the entire 1986–2004 period, we find that hedge funds' stock picking added 2.15% per year to returns, compared to only 0.82% for mutual funds. This 1.32% outperformance of hedge funds over mutual funds in stock selection is marginally significant. However, most of this performance is generated in 1999 and 2000, and the differences between hedge funds and mutual funds become insignificant if examining equal-weighted performance or using price-to-sales benchmarks to partially capture the technology focus.

A major selling point of hedge funds is that they are said to contain the ability to time stock picks across asset classes.[2] At least in the long-equity stock universe, this assertion is unfounded. Over the entire period, there is no evidence that hedge funds are better at rotating between sectors (with size, BE/ME, and momentum portfolios) than mutual funds. In terms of the average style, hedge funds earn lower returns than mutual funds (an insignificant −0.96% per year).

A potential problem with our analysis is that the equities in our portfolios may be used primarily for hedging purposes. Boehmer, Jones, and Zhang (2008) find that large short-sale orders in NYSE securities are extremely profitable, whereas Diether, Lee, and Werner (2009) find that small short-sale trades in NASDAQ and NYSE-listed stocks trading on NASDAQ are predictive of future returns, but large short-sale trades are not profitable. If hedge funds are making the most of their returns through short positions, then our long-equity returns should bear little relation to their total returns. We investigate this in two main ways. First, for funds where we have reported return data (i.e., the total hedge fund return), we find that only 8.5% exhibit a negative correlation between the total returns and the holding (long-equity) returns, indicating that for the vast majority of our funds, the long-equity performance bears the largest influence on performance. Second, it is possible that our overall finding of no performance differences between hedge funds and mutual funds is driven by extremely negative returns in those funds that primarily hold short securities and use long positions as a hedge. In contrast, we find that hedge fund stock picking and sector timing performance are similar irrespective of whether the hedge fund makes most of its return from long or short positions.

We examine differential ability within the hedge fund industry by examining whether hedge funds with large returns last year outperform the next year. Hedge funds in the top quintile of past gross returns outperform those in the lowest quintiles in average return, but this pattern is erratic and only holds true in 50% of the years examined. We find similar insignificant evidence of "hot hands" irrespective of whether we rank managers by past stock selection or both stock selection and timing ability. We also rank funds based on their entire past history of stock selection performance and find that these funds do exhibit some abnormal stock picking ability, but they are mostly offset by large negative timing ability leading to insignificant gross returns. Funds with a positive past history of high positive stock picking and timing performance do not outperform going forward on any dimension.

Ackermann, McEnally, and Ravenscraft (1999); Brown, Goetzmann, and Ibbotson (1999); Agarwal and Naik (2000); Agarwal, Boyson, and Naik (forthcoming); Ibbotson and Chen (2006); Kosowski, Naik, and Teo (2006); Tiu (2006); and others find that hedge funds deliver at least some abnormal returns. In his survey article of the academic hedge fund literature, Stulz (2007) states, "The bottom line of hedge fund research is that, at the very least, hedge

[2] Evidence for this assertion is recently provided by Chen and Liang (2007).

funds have a nonnegative alpha net of fees on average." And in discussing after-fee hedge fund performance, he concludes, "Such performance appears better than the performance of a randomly selected mutual fund. Being able to pick good hedge funds can therefore be highly rewarding." Nevertheless, a few studies like Asness, Krail, and Liew (2001); Amin and Kat (2003); and Kat and Palaro (2006) find that hedge funds do not deliver alpha. Fung et al. (2008) find that funds-of-funds only deliver alpha from October 1998 to March 2000—a period where we also find abnormal returns coming from technology stocks. Our findings fit with this minority view, since our examination of long-equity performance generally finds little evidence that hedge funds deliver abnormal stock picking, sector timing ability, or evidence of differential performance within the industry even before the inclusion of hefty fees.

The remainder of the article is as follows. Section 1 explains the sample construction and displays simple summary statistics. Section 2 examines the activeness of hedge funds relative to mutual funds. Section 3 examines the preference of hedge funds for firm characteristics. Section 4 examines the predictive power of hedge fund holdings and changes in holdings. Sections 5 and 6 examine the stock picking, sector timing, and average style performance of hedge funds and their performance persistence followed by a conclusion in Section 7.

1. Data

1.1 Data collection procedure

Here we describe the particulars of the labor-intensive collection procedure for compiling our hedge fund sample. Since 1978, all institutions with over $100 million under management are required to fill out 13F forms quarterly for all U.S. equity positions worth over $200,000 or consisting of more than 10,000 shares. Domestic and foreign hedge funds with over $100 million of 13F securities under management are not exempted from these requirements.[3] Despite the claims of a universal filing requirement, some hedge fund firms may request secrecy from the SEC, with filings typically released one year later if the SEC agrees with the firm's claim that making the filings public immediately might do damage to the firm.[4] These confidential SEC filings that are later released are apparently not captured as part of the CDA/Spectrum

[3] The SEC website posts the commonly asked question of whether a foreign institutional investment manager must file the 13F form and says: "Yes, if they: (1) use any means or instrumentality of United States interstate commerce in the course of their business; and (2) exercise investment discretion over $100 million or more in Section 13(f) securities." See http://www.sec.gov/divisions/investment/13ffaq.htm for details. As of December 2004, the filing requirement is extended to hedge funds with assets over $25 million and more than fourteen individual U.S. investors. Aragon and Martin (2007) detail how option positions are also reported in 13F and find that filings in options are a small proportion of a typical hedge fund's stock position.

[4] Beginning in 1998, SEC staffers apparently tightened the requirements and they are quoted as saying that they will "deny any confidential-treatment request that does not make a compelling showing of need" and is not in "the public interest" (Beckett 1998).

database. Since SEC statements regarding the exemptions and most of the press articles we locate are in regard to filings prior to acquisitions, it is reasonable to assume that our sample may be missing the returns to some positions filed prior to acquisitions. Cauchi (2005) indicates that the SEC made filing requirements much tougher in December 2004 as part of a general focus on increasing disclosure for hedge funds. If confidential filings were widespread beforehand and came to a sudden end in December 2004, then we would expect to see a dramatic increase in the number of stock filings in the fourth quarter of 2004.[5] Nevertheless, after excluding D. E. Shaw (who had to suddenly file all of its positions in December 2004), we find that the number of stock filings (34,572) in the fourth quarter of 2004 is actually slightly less than those filed in the third quarter (36,007), suggesting that very few hedge funds used the confidential filings.[6] Nevertheless, we attempt to eliminate these firms that may primarily file confidentially from our sample by excluding funds that report less than five stock positions in a quarter.[7]

A limitation of the 13F data is that the shorting activity of hedge funds is not historically contained in these reports, so all of our results will be based on examining the long side of the portfolio strategy. Additionally, some non-hedge funds' holdings, such as separate accounts, may be included in the filings. Our overall task is to identify hedge funds from several sources, find their management or holding company names, and match them up with the 13F holdings data. Finally, we check the management company to find its main line of business and exclude all funds whose primary business is not in the hedge fund industry, as we describe in detail below.

Our overall process of backing out hedge fund holdings from 13F filings is similar in spirit to the pioneering approach of Brunnermeier and Nagel (2004). However, we use a much more comprehensive list of hedge funds (both cross-sectionally and over time) to start with and apply a more stringent filter (the firm must own no mutual funds). The end result is that our final sample from 1980 to 2004 contains nearly six times as many hedge fund firms as the fifty-three hedge fund firms in their 1998–2000 sample.

[5] In a WSJ article, Cauchi (2005) uses D. E. Shaw as an example of a hedge fund that used this exemption but was forced to stop in December 2004. In 1998 we find that D. E. Shaw filed 116 positions but then did not file or would only file one or two positions until the fourth quarter of 2004, when the fund filed positions on 1591 securities (consistent with Cauchi's article).

[6] Including D. E. Shaw, eight funds went from zero (or in one case six) positions filed in the third quarter of 2004 to over ten positions in the fourth quarter. Thus, on a broad scale, the much stricter requirement seemed to have affected at most eight funds. Yet it likely affected fewer funds, because the increasing positions could be due to funds shifting strategies, a new fund, or periodically missing filings; consistent with these periodic fluctuations, seven funds filed positions in the third quarter that subsequently filed no positions in the fourth quarter.

[7] A bias might be introduced in our sample if we include funds, like D. E. Shaw, that only file their noninformative positions. To control for filers of this nature, for all of our DGTW (1997) performance analysis, we eliminate funds (thirty-five) that file positions on less than five stocks for the portion of the sample where they report less than five positions. For Sections 2 through 4, we want to avoid inferences based on firms with few stock holdings, so we require hedge and mutual funds to have at least twenty stocks in their portfolio for each quarter that they are included in.

We obtain hedge funds from six sources: AltVest, the MAR graveyard of dead funds, firms from Hoovers.com (premium access, information as of 1997), firms in Tables 2–4 in Cottier (1997) that have management in excess of $500 million as of December 1995, hedge funds listed in the annual Nelson's Directory of books from 1988 to 2002, and TASS from 1978 to May 2000 containing both alive and dead funds. Although TASS includes the largest number of hedge funds, we find that other databases are equally important in obtaining the final sample. We primarily use these databases to obtain fund names and the names of companies holding these funds, the latter being necessary for tracking down funds' 13F filings. However, for robustness analysis, we compare the total returns from these databases (when available) to those calculated from 13F long-equity holdings.

Many hedge funds have a holding company firm with a different name than the hedge fund, and it is the holding company name that we must identify in the 13F database. An advantage of Nelson's Directory is that it includes both hedge funds and their affiliated (or holding) firm names and the fraction of hedge fund business in their affiliated firms. We then use the holding company names (when they differ) to match the firms up to the 13F institutional holdings database, which matches funds in each of the above data sources. We manually check the matches and remove any mismatches. To avoid spurious matches, for firms where the matches are less than perfect, we obtain additional verifying information, like the location and total net assets, from fund websites.

After matching the holding firm names, we examine whether the holding firm's major line of business is in hedge funds by using one of four criteria. First, we look up the holding company names in Nelson's Directory and only include firms with hedge fund assets that constitute over 50% of a holding company's total assets. Second, we include firms whose major line of business is described as a hedge fund in Cottier (1997). Third, if firms are unavailable from Nelson's Directory, we manually check the SEC ADV forms and (like Brunnermeier and Nagel 2004) require a company to have over 50% of its investment listed as "other pooled investment vehicles" (private investment companies, private equity, and hedge funds) or over 50% of its clients as "high net worth individuals." In addition to this criterion, we also require that the fund charge performance-based fees. Fourth, for funds whose names are found in 13F filings but are still unidentified in any of these ways, we check their websites to see if their primary business is hedge funds and when the business started. Funds not identified in any of these four ways are not included in our sample.

Additionally, for all of these funds, we perform a further check by examining whether a mutual fund in the CDA/Spectrum database has a holding company of the same name as one of the hedge funds. Since hedge fund companies that perform well may later open mutual funds, to avoid any delisting bias we keep hedge fund firms in our sample until they begin to offer mutual funds.

The 13F database has some reporting issues that we are aware of and carefully address.[8]

Mutual fund holdings are from Thomason Financial CDA/Spectrum S12 data, which are largely gathered from the SEC N-30D forms. The funds that we include have the following self-declared investment objectives: aggressive growth, growth, growth and income, and balanced—codes 2, 3, 4, and 7, respectively. Sector, bond, preferred, international, and any fund with an investment objective that is not oriented to general equity are excluded.

The main differences between the mutual fund (from form N-30D) and hedge fund holding (from form 13F) databases are as follows: (i) mutual fund holdings are at the fund level, whereas hedge fund holdings are at the holding company or firm level. (ii) There is no threshold that we are aware of on mutual fund reporting size, whereas only hedge fund firms above $100 million must file.[9] (iii) Hedge fund filings are required to be reported quarterly, whereas mutual funds are only required to report semiannually.[10] (iv) Mutual funds are required to report all of their long stock holdings, whereas 13F filings are only required on security positions that are greater than 10,000 shares or $200,000. These differences logically seem to lead to smaller mutual funds and smaller mutual fund positions being reported. The distinctions are potentially more relevant in equal-weighting performance across funds, but in value-weighted returns, the distinctions become less relevant. We think that using N-30D data for mutual funds is preferred since it maps to existing studies and the focused objective at the mutual fund level is similar to focus objectives at most hedge fund firms.[11] We explore empirical differences in the datasets below.

1.2 Sample summary statistics

Panel A of Table 1 identifies how many hedge funds are available in each of our data sources and how many of these funds end up in our final sample of hedge fund holdings. Many funds are available from multiple sources, but we identify a fund according to its earliest reported source. The majority of our firms come from Nelson's Directory, Altvest, TASS, and the MAR graveyard. Our TASS database ends in 2000 and MAR and Nelson's Directory end in 2002. This is not problematic for our analysis, since we continue to examine their holdings after this period. In all, we are able to obtain quarterly stock positions for over 306 fund firms. It is important to note that each of these fund firms often

[8] For example, we address the reuse of identifiers in the 13F database by assuming that there is a different fund if there is a gap of more than one year in reporting for the same identifier. We also carry forward the report of holdings from the previous quarter if the report is missing in one quarter. Solutions to these and additional problems are handled similar to the treatment in Griffin, Harris, and Topaloglu (2007).

[9] However, Wermers (1999) notes that some small mutual funds do not report.

[10] Nevertheless, there are missing quarters of data on the 13F database, and mutual funds often voluntarily report quarterly.

[11] For example, even a large hedge fund firm with several funds is likely to have a similar model or preferences applied to its equities. In contrast, most large mutual fund complexes will have both value and growth funds, and hence look more like the market index.

has multiple hedge funds under management. It is easily conceivable that our sample of 306 firms represents over one thousand funds; however, we have no accurate method to judge the ultimate number of funds represented.

Because examining portfolio performance is one of our objectives, we are particularly concerned with constructing a sample free of potential biases. Thus, we construct two samples. The first sample, named hedge sample A, is larger and contains holdings of firms that appeared in our database at any point in time both before and after the time when we locate their name in one of our

Table 1
Summary statistics for hedge fund firms and mutual funds

Panel A: Source distribution

Source	Total number	Hedge fund firms matched	Start year	End year
AltVest	1226	80	1978	2003
Cottier	27	7	1995	1997
Hoovers	32	8	1997	2003
MAR graveyard	921	54	1978	2002
Nelson's Directory	1010	91	1988	2002
TASS graveyard	501	22	1978	2000
TASS/Hedge world	2077	44	1978	2000
Total		306		

Panel B: Year-by-year statistics

	Number of funds			Average number of stocks owned each quarter			Total number of stocks owned		
Year	Hedge A	Hedge B	Mutual	Hedge A	Hedge B	Mutual	Hedge A	Hedge B	Mutual
1980	25		453	152		43	1697		2493
1981	26		456	147		48	1978		2757
1982	31		449	121		47	1947		2844
1983	34		486	146		56	2195		3427
1984	36	1	497	157	144	60	2396	168	3634
1985	44	1	556	187	160	56	2750	244	3947
1986	49	4	619	214	196	62	3347	618	4225
1987	61	5	705	176	134	91	3401	966	4238
1988	71	6	763	160	155	64	3376	956	4218
1989	79	9	843	134	191	66	3331	1245	4096
1990	87	11	906	143	152	75	3271	1485	3891
1991	97	25	1045	178	146	68	3630	2006	3960
1992	106	37	1210	152	162	85	4113	3055	4185
1993	116	61	1952	196	204	81	4571	4021	5333
1994	125	78	2307	155	141	84	4812	4320	5823
1995	143	105	2479	161	154	97	5173	4890	6224
1996	152	113	2845	183	180	96	5718	5475	6744
1997	188	151	3092	184	179	94	6100	5900	6944
1998	202	162	3032	175	145	96	6047	5839	6745
1999	211	169	2773	146	137	98	5871	5677	6415
2000	231	193	2653	169	163	97	5443	5309	6221
2001	225	190	2493	174	164	119	4893	4780	5621
2002	214	181	2392	186	164	107	4410	4358	5098
2003	198	168	2229	178	168	116	4280	4234	4780
2004	191	162	2072	219	200	113	4215	4145	4640

(*Continued overleaf*)

Table 1
(Continued)

Panel C: Fund size statistics

	Hedge A			Hedge B			Mutual funds		
	Mean ($ million)	Median ($ million)	% CRSP	Mean ($ million)	Median ($ million)	% CRSP	Mean ($ million)	Median ($ million)	% CRSP
1980–1984	963	335	1.84				121	40	3.49
1985–1989	1471	511	2.87	396	352	0.05	222	66	5.19
1990–1994	1475	393	3.51	1506	308	1.27	295	68	8.22
1995–1999	1958	434	3.10	1984	406	2.42	648	98	14.78
2000–2004	2105	351	3.02	1975	326	2.42	1058	178	16.63

This table reports the summary statistics of our two hedge fund firm samples (hedge sample A and hedge sample B). Panel A presents the eight data sources for the hedge funds. Total number is the number of hedge funds. Several of these funds may be owned by the same parent firm. We obtain the parent firm of each fund and ascertain if the parent firm is predominantly a hedge fund. For parent firms whose business is primarily in the hedge fund industry, we additionally require that the firm's holding company not own mutual funds on the CRSP mutual fund database while in our sample period. We report only those hedge fund firms that both meet these criteria and match to firms in the CDA/Spectrum (13F) holdings database. In panel B, for each year, we report the average number of securities owned per hedge fund firm each quarter, the number of firms, and the total number of securities that hedge fund firms own. Hedge sample A includes firms over the whole period whenever their 13F filings are available. Firms in the hedge sample B are included one year after they first appear in one of our data sources for hedge fund names. If a firm has funds appearing in more than one source, we take the earliest sample as the source. Quarterly 13F filings are from March 1980 to December 2004. For mutual funds, we use holdings data from the CDA/Spectrum mutual fund holdings, which report SEC N-30D filings on a fund (not firm) basis. In panel C, we report the mean and median of hedge fund firms' average total market capitalization of long-equity holdings during each five-year period from 1980 to 2004. Similar values are reported for mutual funds. We also report the aggregate market value of common stock holdings of all funds as a percentage of total market value of all CRSP common stocks (% CRSP).

sources for hedge fund names. The issue we are concerned with is as follows. Since reporting of a hedge fund is voluntary, hedge funds may choose to report their performance to standard data sources such as TASS after they have had a period of good performance (and their equity performance is a component of this). In hedge sample A, we may exhibit upward return bias since we examine their long-equity (13F) performance over the entire period, including the years prior to the first occurrence of observing their name in one of the databases. To control for this possible self-selection reporting bias, we also construct another sample, hedge sample B, which only contains hedge fund firms in the years after we obtain their first appearance in one of our databases where we capture their name. Hedge sample B should not suffer from self-selection bias and is more applicable to measuring performance whereas both samples can provide information about hedge fund holdings.

Annual summary statistics on both hedge fund samples are contained in panel B of Table 1. In 1980, our hedge sample A contains 25 hedge fund firms, but it grows slowly throughout the 1980s and 1990s to include 231 firms in 2000, before falling slightly to 191 firms in 2004.[12] Hedge sample B starts much later (because of the later start of hedge fund data sources). Although we

[12] Since our TASS sample ends in 2000, there are likely new funds in 2001–2004 that are not included in our sample. The exclusion of these funds should not result in any systematic biases.

only have one hedge sample B firm tracked in 1984 and 1985, the number of firms grows rapidly and includes 37 hedge fund holding companies in 1992, 105 firms in 1995, and 193 firms in 2000. It is important to note that although the period considered in hedge sample B is relatively short, it is longer than the period covered in many other important hedge fund studies.

We also examine the average and total number of stocks held in both hedge fund samples and in mutual funds. As seen in panel B of Table 1, the average number of stocks held by each hedge sample A holding company is 152 in 1980, 143 in 1990, 169 in 2000, and 219 in 2004. The numbers for the hedge sample B companies are in general slightly lower. The average mutual fund holds fewer firms, particularly earlier in the sample. The total number of stocks held by hedge sample A holding companies is 1697 in 1980, which is 68.1% of the stocks with reported holdings by mutual funds. However, this number grows to 84.1% in 1990 and 87.5% in 2000. The findings indicate that there are plenty of firms with which to perform cross-sectional firm comparisons.

Panel C of Table 1 shows that the mean and median size of hedge fund firms are around twice as large as the average mutual fund in 2000–2004 but the differences are greater in earlier years. Our hedge sample A represents slightly more than 3% of CRSP ownership. We note that since our process of identifying hedge funds is conservative and many hedge funds are not captured, this number is similar to a lower bound on hedge fund ownership.

1.3 Representativeness

One important issue is whether the hedge fund holdings in our sample are representative of the broader composition of where these hedge funds are generating their returns. We examine the relation between firms' total returns and their returns from long-equity holdings as follows. For the funds that appear in one of our sources that report return histories [Altvest, TASS (including graveyard), and MAR graveyard], we gather monthly returns from all three sources.[13] For hedge fund firms with multiple funds, we value-weight all their returns to have a comparable hedge firm return. We are left with 130 hedge fund firms with at least six months of return data. From the firm's quarterly 13F filings, we compute a monthly return series based on their last quarter end holdings. Given that there may be other funds in the hedge fund holding firm that we are not capturing, that the holding weights are only updated quarterly but returns are calculated monthly using the previous quarter's weight, and that short-term trading is not captured, we would expect the correlation to be substantially less than 1 even for those firms that are completely long equity only.

Monthly correlations are then computed between the entire monthly time series of the total returns reported from the hedge fund databases (that include their returns from short or derivative positions) and the holdings returns that are

[13] Note that even for funds in these databases, we often do not have valid return data.

only from long-equity positions. We estimate a mean correlation of 0.55 and a median correlation of 0.64. These correlations indicate substantial linkages between the holdings and the total returns. However, in contrast, Kacperczyk, Sialm, and Zheng (2008) find a correlation between mutual funds' reported returns and those of holdings of 0.98, which indicates that mutual fund return movements are almost entirely driven from long-equity, longer term holdings. Nevertheless, only 8.5% (11 of 130) of the hedge funds exhibited a negative correlation between the total returns and the holding returns, indicating that the number of funds where shorting is driving their returns is extremely small. We also estimate market-model regressions for the hedge fund returns and find that only 12.3% of firms exhibit negative betas, again indicating that the funds are net long, not net short.[14] Overall, this simple comparison illustrates that our holdings-based analysis is representative of the total returns of the funds in our sample.

A related issue is whether the hedge funds in our sample have total returns that are representative of the literature at large. In an unreported test, we estimate the standard four-factor model (MTB, SMB, HML, and WML) on the individual fund returns (net of fees) and find an average annual alpha of 4.2%. This large alpha is similar to that found in the literature using factor models, which indicates that our hedge funds seem to be representative.

2. How Active Are Hedge Funds?

We examine how actively hedge funds trade by first examining turnover and then looking at how far a fund's weights deviate from the S&P 500 Index.

2.1 Turnover

Hedge funds are not required to report their turnover, so we must estimate turnover from quarterly stock positions. This measure is by nature an understatement of true turnover, since intraquarter trades will not be captured, but this can serve as a useful measure of turnover from long-term positions.

Figure 1 reports the distribution of estimated turnover for both hedge funds and mutual funds. Most hedge funds have turnovers above those of most mutual funds. The median annual turnover using quarterly holdings for hedge funds of 102% is much greater than the 63% median mutual fund turnover. These findings reinforce the conventional wisdom that hedge funds are active traders. Nevertheless, it is only a small fraction of funds that exhibit 400% turnover, indicating that most hedge funds in our sample are holding securities across quarters.[15]

[14] The mean and median market beta is 0.46 and 0.32.

[15] Funds engaging in extremely high frequency strategy might liquidate positions overnight and hence not need to report.

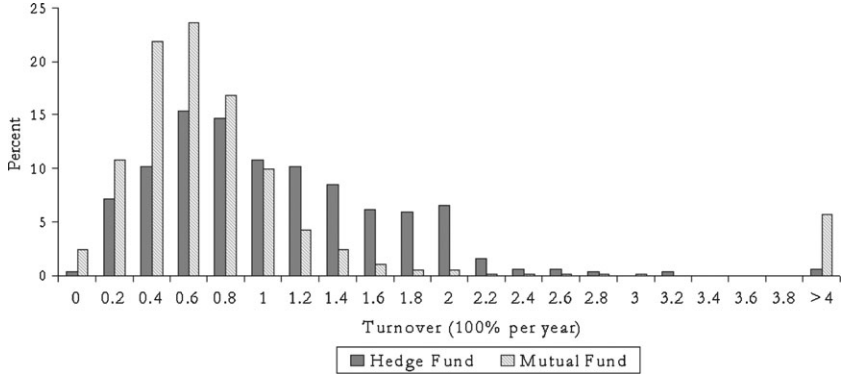

Figure 1
Histogram of trading turnover of hedge and mutual funds
In this figure, we plot the histogram of trading turnover across funds in the managed mutual funds sample and for hedge fund firms (sample A). Turnover is calculated quarterly as follows: $Turnover_{i,t} = min(Sale_{i,t}, Buy_{i,t})/Holdings_{i,t-1}$, where $Sale_{i,t}$ is the total value of stocks sold by a fund i in quarter t, $Buy_{i,t}$ is the total value of stocks bought by a fund i in quarter t, and $Holdings_{i,t-1}$ is the total equity holdings of fund i at quarter $t-1$. To avoid sales due to flows of capital, the smaller of the buys and sells is picked and normalized by the firm's beginning of the period capitalization. We then sum this dollar value of trading across all stocks. The turnover is the total annualized quarterly fund turnover for the entire time period. If a fund is of the same size and turned over all of its securities each quarter, then the maximum annual turnover is 400%. However, if a small fund suddenly receives substantially more funds the following year, the new buying can lead to annual turnover greater than 400%. This occurs less than 1% of the time in hedge funds and less than 7% of the time in mutual funds (due to their smaller initial capitalization). If the fund does not file for a particular quarter, then we carry over all the positions and no turnover occurs that quarter. This procedure follows the CRSP mutual fund database and is described and developed in Chen, Jegadeesh, and Wermers (2000, p. 349). Hedge sample A is from 1980 to 2004 and contains all firms, even before they were found in one of our hedge fund databases. The mutual fund sample consists of funds that have the following self-declared investment objectives: aggressive growth, growth, growth and income, and balanced—codes 2, 3, 4, and 7, respectively.

2.2 Active share

We compare weights using a deviation approach similar to that of Cremers and Petajisto (forthcoming) by taking the difference between the weights in each stock (dollar holding in each stock/dollar total position in all stocks for a fund) and the weights of the S&P 500 market index in each stock. For each fund, the value-weighted sum of these deviations in each stock is then summed up across stocks and divided by 2, since for every position overweight there is an offsetting underweight. Because Cremers and Petajisto show that smaller funds have larger active shares, we also wish to examine the joint relation of active share and market capitalization.[16] Figure 2 shows that there is a wide array of hedge fund activeness, and, consistent with the findings in panel C of Table 1, hedge fund firms are larger in size than mutual funds. Hedge funds appear to have slightly larger active shares as compared to mutual funds, but to formally examine this relation, we need a more thorough analysis.

[16] Here to be consistent with Cremers and Petajisto (forthcoming), funds are excluded with an active share below 0.2. We also exclude funds that have words that indicate that they are replicating an index (as described in Figure 2) and mutual funds with below $10 million in average equity holdings. Cremers and Petajisto use multiple indices and pick the one with the lowest active share. We only use the S&P 500 Index since it seems unlikely for a hedge fund to benchmark it relative to a specialty index like the Russell 2000.

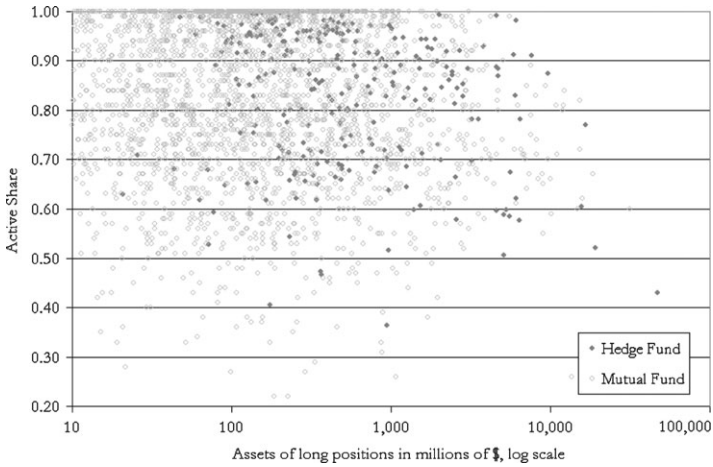

Figure 2
Average correlation of a particular fund's weights and market weights
Individual hedge funds (from sample A) and mutual funds from 1992 to 2004 are plotted according to their active share and size. Active share is calculated using the deviation of a fund's portfolio from the S&P 500 Index. A fund with portfolio weights identical to those of the S&P 500 has an active share of 0 and those with no positions in the S&P 500 have an active share of 1. Size is the average market value of equity assets of a fund's long portfolio. Hedge funds are denoted by red dots and mutual funds with blue circles. Funds must have at least $10 million on average of long-equity positions and active share greater than 0.2 in order to be included in the plot. In addition, to exclude index funds, if a mutual fund has "INDEX," "S&P," "S & P," "RUSSELL," "WILSHIRE," "INDX," "NASDAQ," and "100," "500," "1000," "2000," "3000," "4500," "400," or "600" in its name, then it is not included in the plot.

To gauge whether the active share of hedge funds is significantly larger than that of mutual funds after controlling for size differences between hedge funds, we use the mutual fund sample as the population and bootstrap samples from it that are close in market equity to each matching hedge fund. We find that the mean mutual fund active share is as large as the mean hedge fund active share in only 3.42% of the replications.[17] Across all draws, the average matching mutual fund active share is 0.774, compared to 0.831 for the hedge fund sample. After controlling for differences in market value, hedge funds are more active in taking positions further from the market index.[18]

3. A Comparison of the Composition of Hedge and Mutual Fund Holdings

We examine whether hedge funds have preferences for stocks with certain characteristics. We do this in two main ways. First, we examine hedge fund weights on twenty-five size and book-to-market equity (BE/ME) portfolios relative to market weights (in the CRSP Stock Index) and mutual fund weights.

[17] For each hedge fund of size x, we sample a mutual fund within a size range of $\ln(x + 0.6)$ or $\ln(x \pm 0.5)$. This exercise is repeated ten thousand times.

[18] By including hedge funds at the firm level and mutual funds at the fund level, the active share of hedge funds is a lower bound, in the sense that it would be greater if it could be calculated at the individual fund level.

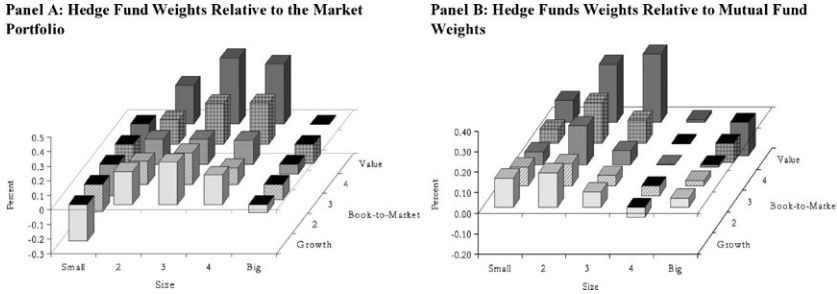

Figure 3
Comparison between hedge and mutual funds' weights based on size and book-to-market portfolios
This figure depicts the difference between the weights ($w_{i,t}$) of hedge funds (sample A) and CRSP market weights (in panel A) or weights relative to mutual funds (in panel B) for the twenty-five dependent-sort portfolios. In each quarter, the weight ($w_{i,t}$) of all hedge fund firm j in stock i is calculated as follows:

$$w_{i,t} = \frac{\sum_{j=1}^{N} \text{Dollar value of shares held}_{j,i,t}}{\text{Total value of hedge fund}_t},$$

where the dollar value of shares held by all hedge funds in the equity i is divided by the total market value of all equity held by hedge funds. Size and book-to-market equity (BE/ME) portfolios are used where we sort all CRSP stocks according to NYSE size breakpoints into five size quintiles. Then within each size quintile, we perform an additional sort into five smaller quintiles according to each stock's book-to-market ratio from the prior year. We calculate the weights of (i) the market portfolio (all CRSP common stocks), (ii) mutual funds, and (iii) hedge funds (sample A) for those twenty-five portfolios. Next, for each portfolio in panel A (panel B), we divide the difference between fund weights and market weights (mutual fund weights) by the market weights. Thus, the columns in the figures depict the time-series averages of the percentage of fund weights deviating from market weights.

We then compare these weights relative to mutual funds. Second, we perform cross-sectional regressions across firms of hedge fund holdings on a variety of characteristics, including firm age, analyst coverage, beta, turnover, price-to-sales (P/S), standard deviation of returns, as well as size, BE/ME, and momentum, and compare their holding preferences to mutual funds.

3.1 Hedge fund weights in size and BE/ME portfolios

Panel A of Figure 3 presents the positions of our hedge sample A firms in stocks of a particular size and book-to-market equity quintile. The twenty-five portfolios are formed by first sorting into quintiles on size (with NYSE breakpoints) and then subdividing by BE/ME. We measure weights for all hedge fund holdings (sample A) in each stock and then measure these weights in excess of market weights (panel A). The weights in each portfolio are standardized by the market weights in each group so that percentage weightings are comparable across portfolios. Interestingly, averaging across the three medium size quintiles (fifteen bins when interfaced with BE/ME), hedge funds are on average 23.8% overweight in medium stocks compared to market weights. Hence, hedge funds are generally underweight in the smallest (−23.1%) and largest quintile (−7.3%) relative to the market. Hedge funds are the most overweight in the medium-sized value stocks.

Panel B of Figure 3 compares hedge funds to mutual funds. Relative to mutual funds, hedge funds have a strong positive preference for stocks in the smallest three quintiles and are generally underweight stocks in the largest two market capitalization quintiles. Hedge funds also tend to show a preference for value stocks in the smaller quintiles, although to a lesser degree they are overweight growth stocks in these quintiles as well. In unreported results we also examine holdings for securities sorted on size and momentum. Hedge funds prefer high-momentum stocks in the medium-sized groups but not in the smallest size quintile. They have an even stronger preference for loser stocks in all size groups. Nevertheless, these relationships are too simply examined, since stocks with a negative stock return in the previous year are also often value stocks. The sorting approach has the advantage that it can allow for nonlinear patterns in ownership but has the disadvantage in that only several characteristics can be examined together.

3.2 Regressions of stock ownership on firm characteristics

We seek to understand the preference of hedge funds for holding firms with a variety of firm characteristics. Our approach to understanding the relation between ownership and firm characteristics is similar to that of Falkenstein (1996) for understanding the stock preference of mutual funds in 1991 and 1992. The fraction of hedge fund ownership (f) in a particular equity is calculated as follows:

$$f_{i,t} = \frac{\sum_{j=1}^{N} \text{Number of shares held}_{i,j,t}}{\text{Total shares outstanding}_{i,t}}, \tag{1}$$

where the number of shares held in equity i at time t is calculated by summing all shares held in the N hedge funds holding that equity. Each year, we estimate a cross-sectional Tobit regression of $\text{Ln}(1 + f)$ for a particular stock on firm characteristics from the previous year. We use the yearly time series to construct Fama-MacBeth coefficients and standard errors. The firm characteristics we consider are the age of the stock measured by the number of months on the CRSP database, the number of IBES analysts, the monthly Dimson (1979) betas, the BE/ME, turnover, firm market equity, price-to-sales (P/S), the previous twelve-month return (momentum), and a stock's standard deviation.

Table 2 reports regressions for both mutual funds and hedge funds. Hedge funds exhibit a strong preference for more liquid and high-priced stocks as compared to other firm characteristics. However, mutual funds tend to have an even stronger preference for stocks with more liquidity and higher price and additionally exhibit a strong preference for stocks with many analysts.

Preferences for these categories may vary over time, so Figure 4 traces the dynamics over time through plots of the annual cross-sectional regression

Table 2
Fama-MacBeth regressions of hedge fund and mutual fund fraction of ownership

	Hedge funds			Mutual funds			Difference		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Age	−0.04	−0.03	−0.02	−0.04	−0.01	0.00	−0.01	−0.02	−0.02
	(−3.17)	(−2.18)	(−2.14)	(−6.75)	(−1.37)	(0.16)	(−0.33)	(−1.05)	(−1.30)
Analyst		0.05	0.05		0.22	0.22		−0.16	−0.16
		(2.91)	(3.55)		(13.15)	(13.42)		(−8.49)	(−9.07)
Beta	0.02	0.01	0.02	0.02	0.01	0.02	0.00	0.00	0.00
	(1.25)	(1.16)	(1.37)	(1.34)	(1.24)	(2.03)	(−0.30)	(0.02)	(−0.30)
BE/ME	−0.02	0.01	0.04	−0.05	−0.02	0.03	0.03	0.03	0.01
	(−2.34)	(1.27)	(4.44)	(−3.74)	(−2.26)	(3.93)	(3.56)	(4.51)	(1.68)
D/P		−0.08	−0.08		−0.09	−0.08		0.00	0.00
		(−4.64)	(−5.52)		(−4.96)	(−6.11)		(0.06)	(0.07)
Liquidity	0.21	0.18	0.18	0.40	0.34	0.33	−0.20	−0.15	−0.15
	(21.30)	(16.76)	(16.67)	(36.88)	(31.89)	(34.42)	(−17.33)	(−11.92)	(−11.91)
Ln(*Price*)			0.12			0.24			−0.12
			(11.50)			(19.38)			(−7.89)
Ln(*Size*)	−0.05	−0.08	0.25	0.12	−0.04	0.75	−0.16	−0.04	−0.50
	(−2.12)	(−3.56)	(1.11)	(1.84)	(−0.81)	(5.37)	(−2.74)	(−0.54)	(−3.43)
Ln(*Size*)^2			−0.39			−0.92			0.53
			(−1.81)			(−8.64)			(3.51)
P/S	−0.05	−0.04	−0.05	−0.09	−0.07	−0.09	0.04	0.03	0.04
	(−4.78)	(−4.37)	(−5.30)	(−5.44)	(−4.47)	(−4.59)	(2.38)	(2.03)	(2.43)
Momentum	0.03	0.03	0.02	0.08	0.07	0.06	−0.05	−0.05	−0.04
	(2.87)	(2.49)	(1.42)	(5.56)	(5.41)	(3.76)	(−4.90)	(−5.13)	(−4.18)
Std. dev.	−0.05	−0.07	−0.02	−0.20	−0.20	−0.10	0.15	0.13	0.08
	(−2.46)	(−3.60)	(−1.10)	(−9.50)	(−11.20)	(−5.14)	(11.50)	(8.56)	(6.02)
Average adjusted R^2	0.06	0.07	0.08	0.22	0.24	0.27			

This table estimates cross-sectional Tobit regressions of the fraction of ownership of a stock as a function of various stock characteristics. Fund portfolio formation begins every June for the period 1980–2004. Unless calculated from the prior time series as specified below, explanatory variables are taken from the December prior to the year in which portfolio holdings are estimated. The stocks included in these regressions consist of a subset of the CRSP database spanning 1980–2004 that meets the criteria documented in the article. The dependent variable in the regression is $\text{Ln}(1+f_{i,t})$, where $f_{i,t}$ is the fraction of hedge fund (or mutual fund) ownership in a particular equity i calculated as follows:

$$f_{i,t} = \frac{\sum_{j=1}^{N} \text{Number of shares held}_{i,j,t}}{\text{Total shares outstanding}_{i,t}}.$$

The number of shares held in equity i at time t is calculated by summing all shares held in the N funds holding that equity. All dependent and independent variables are standardized cross-sectionally. *Age* is the number of months from when the stock first appeared in CRSP to the time of the fund holdings snapshot. *Analyst* is the number of analysts covering a stock in the past year according to the I/B/E/S Analyst database. *Beta* is the sum of the coefficients from a regression of monthly stock returns on the current and lagged value-weighted CRSP market returns (Dimson's betas). *Beta* is updated quarterly using the past twenty-four to sixty months, depending on availability. *BE/ME* is the book-to-market ratio. *D/P* is the dividend yield. *Liquidity* is the natural logarithm of (turnover + 1), where turnover is defined as the average monthly trading volume over the previous twelve months divided by shares outstanding. Ln(*Size*) represents market capitalization of equity. *P/S* is the price-to-sales ratio. *Momentum* is calculated each June from the prior twelve months' net returns. Variance is the total variance of monthly returns for the prior two to five years, depending on availability, while standard deviation is the square root of variance. The table reports regressions first with the fraction of hedge fund ownership ($f_{i,t}$), from hedge sample A, then with the fraction of mutual fund ownership as the dependent variable, and finally with the difference between the coefficients of the two. Only funds with twenty stocks are included in the analysis. The Fama-MacBeth regressions (hedge fund and mutual fund) are the time-series average of the difference between the two samples' (hedge fund and mutual fund) yearly cross-sectional regression coefficients. *t*-statistics calculated using Newey-West standard errors are in parentheses.

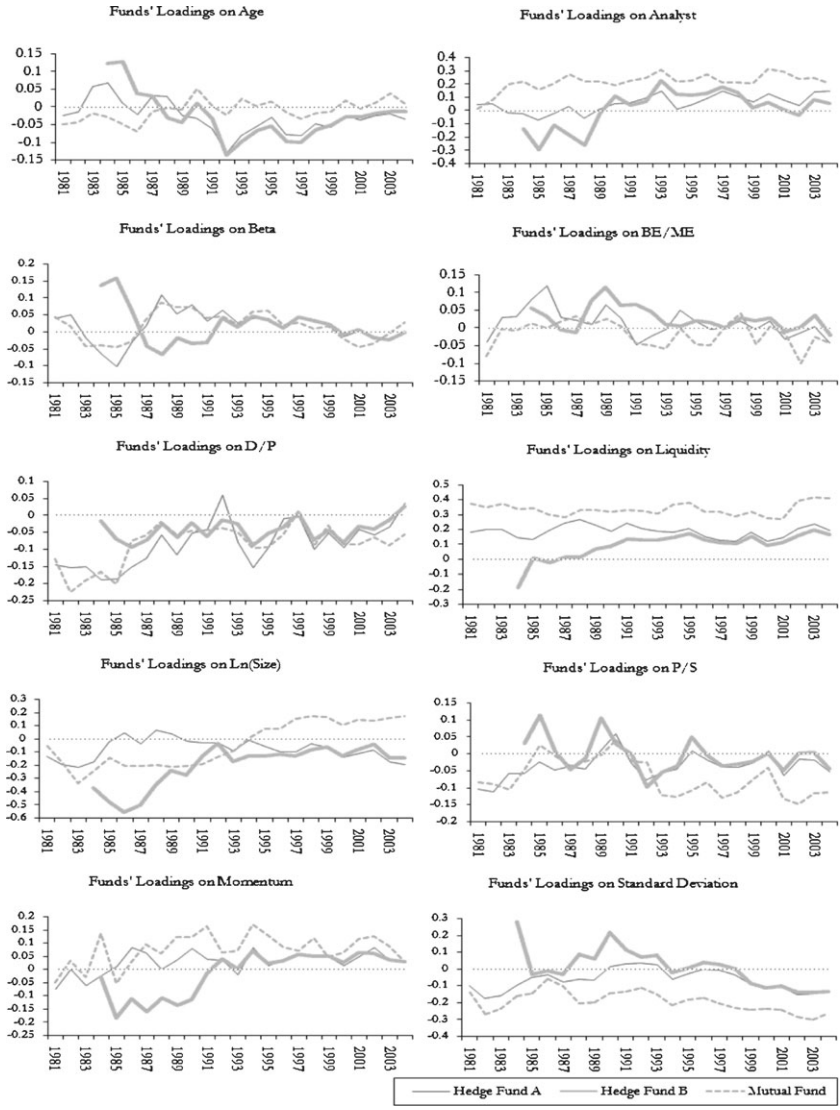

Figure 4
Funds' loadings on various stock characteristics
Loadings are from annual cross-sectional Tobit regressions of the fraction of stock ownership as a function of various stock characteristics. Fund portfolio formation begins every June for the period 1980–2004. Unless calculated from the prior time series as specified below, explanatory variables are taken from the December prior to the year in which portfolio holdings are estimated. The dependent variable in the regression is $\mathrm{Ln}(1 + f_{i,t})$, where $f_{i,t}$ is the fraction of hedge (or mutual fund) ownership in a particular equity calculated as follows:

$$f_{i,t} = \frac{\sum_{j=1}^{N} \text{Number of shares held}_{i,j,t}}{\text{Total shares outstanding}_{i,t}}.$$

(Continued overleaf)

Figure 4
(Continued)
The number of shares held in equity *i* at time *t* is calculated by summing all shares held in the *N* funds holding that equity. All the dependent and independent variables are standardized cross-sectionally. Age is the number of months from when the stock first appeared in CRSP to the time of the fund holdings snapshot. Analyst is the number of analysts covering a stock in the past year according to the IBES analyst database. Beta is the sum of the coefficients from a regression of monthly stock return on the current and lagged value-weighted CRSP market return (Dimson's betas). Beta is updated quarterly using the past twenty-four to sixty months, depending on availability. BE/ME is the book-to-market ratio and D/P is the dividend yield. *Liquidity* is the natural logarithm of (turnover + 1), where turnover is defined as the average monthly trading volume over the previous twelve months divided by shares outstanding. Ln(*Size*) represents market capitalization of equity and P/S is the price-to-sales ratio. Momentum is calculated each June from the prior twelve months' net return. Variance is the total variance of monthly returns for the prior two to five years, depending on availability, while standard deviation is the square root of variance. Loadings are calculated separately for hedge funds in both samples A and B and mutual funds.

coefficients.[19] Mutual funds exhibit a large and growing preference for holding stocks with analyst coverage whereas hedge funds show little concern for analyst coverage. The preference of hedge funds for liquidity is consistently lower than that of mutual funds, and in the case of hedge sample A, this preference has slightly decreased. Relative to mutual funds, hedge funds had a preference for small firms since the mid-1990s. In the 1990s, mutual funds displayed an aversion to P/S that is not observed for hedge funds. Mutual funds tend to have a stronger preference for momentum through most of the period, although this preference in both hedge funds and mutual funds seems to have diminished greatly in 2004.[20] Hedge funds do not display the strong aversion to standard deviation that mutual funds exhibit throughout the period.

The final columns of Table 2 compare the hedge fund samples to the mutual fund sample and further clarify the average statistical differences between mutual funds and hedge funds. Relative to mutual funds, hedge funds prefer stocks with fewer analysts, less liquidity, smaller size, higher P/S, lower past returns, and higher standard deviation. These findings are generally robust to both hedge fund samples, as might be inferred from the similarities observed in Figure 4.

Taken together, these results indicate that hedge funds prefer more opaque firms that may be more costly to trade and less analyzed. These results for stock selection are consistent with the findings of Fung and Hsieh (1997) that the factor exposures of hedge funds' and mutual funds' returns are dramatically different. Our findings indicate a potentially important and different role for hedge funds in generating abnormal returns. We now turn to assessing this ability.

[19] Bennett, Sias, and Starks (2003) examine in detail how and why the preferences of institutions have changed through time and find that institutions have a growing preference for smaller stocks with more idiosyncratic volatility.

[20] Note that our momentum variable is from the past twelve months and the regressions are updated annually. These findings do not speak to short-term, rapidly updated momentum strategies.

4. The Predictive Power of Holdings for the Cross-section of Stock Returns

While any one fund may contain scant information, if a particular group of investors is informed, then their aggregate activity may be quite informative for future stock returns. We examine the ability of hedge fund trading, holdings, and large bets to predict future returns. For all of our performance analysis, we focus on hedge sample B; thus, our sample period is from the first quarter in 1992 to the last quarter in 2004.

4.1 Trading and holdings

Chen, Jegadeesh, and Wermers (2000) show that mutual fund trading, but not their holdings, has predictive power for the cross-section of returns, but Bennett, Sias, and Starks (2003) find that the trading of all institutions fails to predict future returns. We examine a similar question of whether aggregate hedge fund trading and ownership can predict future returns.

We aggregate all mutual fund or hedge fund ownership in each security on a quarterly basis and calculate this fraction of ownership ($f_{i,\,t}$ as defined in Equation 1) and changes in this ownership, $f_{i,\,t}-f_{i,\,t-1}$, across quarters. We will also refer to these changes in ownership simply as trades: cross-sectional Fama-MacBeth regressions of quarterly stock returns on the previous four quarters' trading in panel A of Table 3 and the level of ownership in panel B. Panel A shows that mutual fund trades are not predictive of future stock returns,[21] but hedge fund trades are predictive of future returns in the first three specifications. However, once past returns are controlled for in the cross-sectional regression, both hedge fund and mutual fund trades are insignificant predictors of future returns and the economic magnitude of the forecasting power is negligible. Panel B shows that the level of hedge fund ownership does have some predictive power for next-quarter returns, but not after controlling for past quarterly returns. Overall, these results indicate that hedge funds are no better at predicting returns than using simple momentum strategies.

4.2 Large bets

Although aggregate hedge fund trading or holdings is not a forecaster of future returns, it is possible that a subset of hedge fund equity positions contain important information. A purported advantage they have over mutual funds is that their investor base is often thought to be more stable and committed to longer term holdings that enable them to place larger and riskier bets. Our earlier analysis shows that hedge funds are more likely than mutual

[21] Our cross-sectional regression approach is similar in nature to the sorting results of Chen, Jegadeesh, and Wermers (2000). However, they find predictive power for mutual funds over a much earlier 1975–1995 period, whereas our sample period is from 1992 to 2004. One possibility to obtain more power is to lengthen our sample through hedge fund sample A. Despite using the longer sample period (1980–2004) with the potential of upward predictability estimates due to self-selection bias in sample A, we still find that both hedge fund trading and ownership is unimportant for future returns.

Table 3
Return predictability and fund ownership

Panel A: Returns regressed on change of fund ownership

	Change of mutual fund ownership				Change of hedge fund ownership				Returns				Adj. R^2
	$t-1$	$t-2$	$t-3$	$t-4$	$t-1$	$t-2$	$t-3$	$t-4$	$t-1$	$t-2$	$t-3$	$t-4$	
(1)	0.006	0.006	−0.001	−0.003									0.003
	(1.82)	(1.94)	(−0.29)	(−1.17)									
(2)					0.008	0.007	0.005	−0.001					0.003
					(2.95)	(2.49)	(1.77)	(−0.34)					
(3)	0.009	0.003	0.000	−0.002	0.006	0.004	0.005	0.000					0.007
	(2.38)	(1.13)	(−0.10)	(−0.67)	(2.30)	(1.63)	(1.80)	(0.07)					
(4)	0.004	−0.001	−0.003	−0.004	0.003	0.001	0.002	−0.001	0.009	0.028	0.028	0.015	0.044
	(1.53)	(−0.37)	(−1.42)	(−1.38)	(1.51)	(0.59)	(0.77)	(−0.25)	(1.02)	(3.50)	(2.47)	(1.23)	

Panel B: Returns regressed on fraction of fund ownership

	Fraction of mutual fund ownership				Fraction of hedge fund ownership				Returns				Adj. R^2
	$t-1$	$t-2$	$t-3$	$t-4$	$t-1$	$t-2$	$t-3$	$t-4$	$t-1$	$t-2$	$t-3$	$t-4$	
(1)	0.021	−0.015	−0.014	−0.002	0.013	−0.004	−0.002	−0.011					0.011
	(1.71)	(−1.30)	(−1.25)	(−0.21)	(2.18)	(−0.57)	(−0.31)	(−1.67)					
(2)	0.007	−0.013	−0.011	0.005	0.006	−0.005	−0.004	−0.002	0.008	0.027	0.027	0.014	0.047
	(0.74)	(−1.18)	(−1.07)	(0.73)	(1.24)	(−0.66)	(−0.66)	(−0.42)	(0.84)	(3.56)	(2.56)	(1.26)	

Individual cross-sectional stock returns are regressed on the past quarterly changes in mutual fund and hedge fund ownership, as well as past stock returns. Panel A reports the predictability of the change in fund ownership ($f_{i,\,t-1} - f_{i,\,t-2}$), while panel B reports the predictability of the fraction of fund ownership ($w_{i,\,t-1}$). Hedge funds are from hedge sample B that should be free of self-selection bias issues. For reasonable coverage (as shown in Table 1), the regression period is 1992–2004. Each quarter, we standardize all the variables by transforming the standard deviation and mean to 1 and 0, respectively. Fama-MacBeth coefficients are the time-series averages of the quarterly cross-sectional regressions. *t*-statistics (reported in parentheses) are calculated using Newey-West standard errors.

funds to take bets, which deviate from passive benchmarks, so we conjecture that their largest trades consist of their bets with the highest expected profits.

We define an equity position that is larger than 5% of the total 13F equity holdings of the hedge fund firm (or N-30D for mutual funds) as a large position (bet). We examine several sensible alternatives in constructing large bets. First, we assign a dummy variable of 1 to an equity that has at least one large-bet shareholder. These large-bet measures are calculated separately for mutual funds and hedge funds. There may be information if multiple funds hold large positions on a security, so our second measure of large bets is the number of funds that hold 5% of their long positions in a given equity. Third, we calculate a Herfindahl Index of funds that own a given equity. We estimate regressions with both mutual fund and hedge fund large-bet measures and additionally control for the important influence of past return.

Table 4 shows that the number of funds with large bets has a positive coefficient at lag 1 but is negatively related to returns in the second and fourth quarters.[22] There is evidence in some specifications of a significant hedge fund large-bet relation at lag 4, but the coefficient is negative. There is generally more evidence of large hedge fund positions being associated with negative than positive returns, with the exception of weak predictability in the next quarter.

Overall, we find little evidence of hedge funds making profits through their holdings or trading, but our large-bet analysis provides some weak evidence to suggest that more complicated versions of hedge fund ownership may garner information for predicting future prices. We now turn to more carefully disentangling performance at the firm level after controlling for benchmarks.

5. DGTW Performance Analysis

We decompose performance at the hedge fund firm level using the decomposition approach of Daniel et al. (DGTW) (1997). This metric allows us to decompose performance into stock picking, sector timing, and average style.

DGTW (1997) list many benefits to their holdings-based approaches. The first main advantage is that characteristic matching allows for benchmarks that explain more of the realized variance in returns than those based on factor loadings and "should have more statistical power to detect abnormal performance than factor models." Second, the benchmark allows for a more comprehensive and accurate return decomposition into the components of stock selection ability [characteristic selectivity (CS), characteristics timing (CT), and average style (AS)]. However, for hedge funds this approach has even more advantages

[22] In unreported results, we obtain extremely similar findings with the fraction of large bets. In a somewhat related vein, Brav et al. (2006) find that the buying of activist hedge funds is followed by positive returns.

Table 4
Large positions and future stock returns

Mutual fund large-bet measure				Hedge fund large-bet measure				Returns				Adj. R^2
$t-1$	$t-2$	$t-3$	$t-4$	$t-1$	$t-2$	$t-3$	$t-4$	$t-1$	$t-2$	$t-3$	$t-4$	
						Large-bet dummy						
−0.007	−0.007	0.002	0.000	0.004	−0.004	0.003	−0.013	−0.011	0.010	0.010	0.006	0.030
(−1.13)	(−1.21)	(0.39)	(−0.01)	(0.83)	(−0.90)	(0.87)	(−3.50)	(−1.57)	(1.90)	(1.46)	(0.74)	
						Number of funds with large bets						
−0.001	0.031	−0.022	0.005	0.023	−0.032	0.006	−0.017	−0.013	0.010	0.010	0.008	0.027
(−0.06)	(1.88)	(−1.67)	(0.32)	(2.32)	(−2.80)	(0.96)	(−2.21)	(−1.92)	(1.74)	(1.50)	(1.03)	
						Herfindahl Index of funds with large bets						
−0.011	0.010	0.010	0.008	−0.009	−0.009	0.007	0.007	0.001	−0.006	0.003	−0.008	0.028
(−1.65)	(1.77)	(1.43)	(0.94)	(−1.75)	(−1.66)	(1.31)	(1.34)	(0.33)	(−1.46)	(0.80)	(−2.58)	

This table reports Fama-MacBeth cross-sectional regressions of stock returns on past measures of large positions (bets). The regression for large bets (panel A) at quarter t is as follows:

$$\text{Return}_t = \alpha + \sum_{j=1}^{4} \beta_j \text{ Mutual funds with large bets}_{t-j} + \sum_{j=1}^{4} \gamma_j \text{ Hedge funds with large bets}_{t-j} + \sum_{j=1}^{4} \lambda_j \text{ Return}_{t-j} + \varepsilon_t.$$

A fund has a large bet on a stock if the weight of the stock in the fund's portfolio relative to other qualified CRSP stocks is more than 5%. We have three measures of large bets in the regressions. The first one is a dummy variable that is equal to 1 if there is a fund that has the stock with a large bet and 0 otherwise. The second measure is the number of funds that have a large position on them. The third is a Herfindahl Index that denotes the concentration of funds that have the stock. We sort the stocks in a fund's portfolio into ten deciles based on their weights in the manager's portfolio. Stocks in decile 1 have the lowest weights in the fund and stocks in decile 10 have the highest weights. Thus for each fund, every stock is assigned a decile number. We normalize each fund's decile number for a stock by the sum of all funds' decile numbers for the stock and calculate the Herfindahl Index of fund large bets for stock i that N funds are holding at quarter t. We report the time-series average of the coefficients from the quarterly cross-sectional regressions below. t-statistics (reported in parentheses) are calculated using Newey-West standard errors. Since hedge sample B is used, the regression period is 1992–2004.

since factor models fit even less precisely to hedge fund returns for the reasons discussed in the beginning of the article.

5.1 Standard DGTW performance

We closely follow DGTW (1997) and Wermers (2000) in calculating performance relative to the benchmarks. Excess returns are measured relative to the DGTW 125 size, industry-adjusted BE/ME, and momentum benchmarks.[23] CS measures the ability of managers to pick stocks within the size, BE/ME, and momentum benchmarks. The CT measure calculates the returns of the 125 portfolios with current weights on these portfolios relative to the returns with the previous year's weights. It captures the ability of funds to time characteristics across the benchmark portfolios. The AS uses the previous year's portfolio weights to measure the returns due to a manager's propensity to hold stocks of a particular style. The combination of AS, CT, and CS equals a fund's average return. For hedge fund firms or mutual funds, we calculate the performance measures on a quarterly basis for each firm and then perform value- or equal-weighted averages across firms. Because the hedge sample B database has few firms in early years of the sample, we begin reporting in 1986, when four hedge fund firms report, but we recognize that the reliability of our estimates increases as more hedge fund firms are available (as shown in panel B of Table 1).

Panel A of Table 5 reports year-by-year value-weighted performance measures and subperiod summary statistics of value-weighted performance measures. The gross return indicates that there is substantial variation in the returns from hedge funds and those from both the market indices and actively managed mutual funds. We examine the causes of that return through the benchmark decomposition. In panel A, the CS measure is positive in thirteen of nineteen years for hedge funds and fifteen of nineteen years for mutual funds. Nevertheless, hedge fund CS measures are larger than mutual fund CS measures in thirteen of nineteen years. The largest deviation in the characteristic selectivity measure for hedge funds is 15.8% in 1999, when hedge funds outperformed mutual funds by 9.74%.

Both hedge funds and mutual funds tend to generate negative characteristic timing in many years of the sample, and hedge funds exhibit higher CT measures in only nine of nineteen years. Hedge funds exhibit better average returns to the style benchmarks (AS) compared to mutual funds in only seven of nineteen years.

Panel A of Table 5 also presents summary statistics for 1986–1994, 1995–2004, and 1986–2004. We choose to divide the sample in 1995 because our sample (hedge sample B) includes more than a hundred hedge fund firms from 1995 on and this is roughly the midpoint of our nineteen-year sample. The average return of hedge funds is higher than mutual funds in the second subperiod

[23] The industry-adjusted book-to-market equity is from Wermers (2003). We thank Russ Wermers for graciously providing the benchmark returns. The DGTW (1997) benchmarks are available at http://www.smith.umd.edu/faculty/rwermers/ftpsite/Dgtw/coverpage.htm.

Table 5
DGTW performance measures of hedge funds and mutual funds

Panel A: Value-weighted performance measures with size, BE/ME, and momentum benchmarks

Year	CRSP w/Dividends		Gross returns			CS performance			CT performance			AS performance		
	VW	EW	H	M	H − M	H	M	H − M	H	M	H − M	H	M	H − M
1986	15.57	7.87	14.08	16.97	−2.88	3.44	0.07	3.37	−4.77	−0.18	−4.58	16.62	15.47	1.15
1987	1.82	−8.47	−1.02	2.61	−3.64	1.23	0.63	0.60	0.34	0.45	−0.11	2.21	1.58	0.63
1988	17.55	18.82	24.44	17.64	6.80	3.30	−0.12	3.42	−0.96	−0.99	0.03	17.19	18.05	−0.85
1989	28.43	11.84	31.12	29.27	1.85	2.59	0.38	2.21	−0.50	−0.71	0.21	20.28	28.25	−7.96
1990	−6.08	−21.61	−8.29	−6.79	−1.50	−1.32	0.16	−1.48	0.18	0.30	−0.12	−2.09	−6.09	4.00
1991	33.64	51.60	42.20	37.56	4.64	3.81	1.13	2.68	−0.16	−0.42	0.26	26.24	34.05	−7.81
1992	9.06	26.84	8.26	10.31	−2.05	−1.71	0.70	−2.41	−1.36	−1.46	0.10	10.21	10.46	−0.25
1993	11.59	26.88	13.28	13.37	−0.09	2.92	2.55	0.37	0.30	0.51	−0.21	3.97	8.67	−4.70
1994	−0.76	−5.08	−0.54	0.19	−0.73	−0.61	0.13	−0.74	−0.02	0.01	−0.03	1.82	0.10	1.72
1995	35.67	30.23	36.91	37.69	−0.78	0.49	0.73	−0.24	−0.81	−0.13	−0.68	30.73	33.74	−3.00
1996	21.16	17.93	22.48	22.03	0.45	0.93	0.23	0.70	0.84	0.50	0.34	18.92	19.55	−0.63
1997	30.35	20.16	28.67	30.26	−1.60	−0.84	−0.97	0.13	−0.93	0.09	−1.02	29.18	29.44	−0.27
1998	22.30	−2.90	23.69	23.14	0.56	2.70	−0.43	3.13	1.96	1.31	0.65	18.14	21.81	−3.66
1999	25.26	33.76	43.73	29.57	14.16	15.80	6.06	9.74	5.52	3.99	1.53	18.71	17.81	0.90
2000	−11.04	−11.13	0.17	−5.48	5.65	7.84	3.19	4.64	−0.33	−1.25	0.91	−6.40	−6.31	−0.09
2001	−11.27	22.10	−11.27	−10.87	−0.39	−0.45	1.29	−1.75	4.24	5.63	−1.39	−15.02	−16.40	1.38
2002	−20.85	−10.94	−21.83	−21.33	−0.49	−1.87	−0.80	−1.07	1.18	1.63	−0.45	−21.09	−20.17	−0.92
2003	33.15	72.60	35.28	32.14	3.14	1.06	0.43	0.63	−1.31	−1.29	−0.03	35.42	32.96	2.45
2004	13.01	21.77	14.92	12.09	2.83	1.52	0.29	1.23	1.13	0.15	0.98	11.25	11.55	−0.30
1986–1994	12.31	12.08	13.73	13.46	0.27	1.52	0.63	0.89	−0.77	−0.28	−0.50	10.72	12.28	−1.57
			(2.10)	(2.39)	(0.43)	(1.41)	(1.28)	(1.12)	(−1.96)	(−1.17)	(−1.25)	(2.85)	(2.46)	(−0.70)
1995–2004	13.77	19.36	17.28	14.92	2.35	2.72	1.00	1.71	1.15	1.06	0.08	11.99	12.40	−0.41
			(2.44)	(2.29)	(1.74)	(1.72)	(1.47)	(1.62)	(1.40)	(1.36)	(0.36)	(1.95)	(2.04)	(−0.52)
1986–2004	13.08	15.91	15.59	14.23	1.36	2.15	0.82	1.32	0.24	0.43	−0.19	11.38	12.34	−0.96
			(3.24)	(3.30)	(1.55)	(2.22)	(1.94)	(1.98)	(0.50)	(1.00)	(−0.84)	(3.10)	(3.14)	(−0.80)

(*Continued overleaf*)

Table 5
(Continued)

Panel B: Equal-weighted DGTW Measures with size, BE/ME, and momentum benchmarks

Year	CRSP w/Dividends		Gross returns			CS performance			CT performance			AS performance		
	VW	EW	H	M	H − M	H	M	H − M	H	M	H − M	H	M	H − M
1986–1994	12.31	12.08	13.56	13.50	0.06	0.53	0.75	−0.22	−0.48	−0.27	−0.21	13.76	13.14	0.61
			(2.02)	(2.32)	(0.19)	(0.41)	(1.60)	(−0.17)	(−0.62)	(−1.07)	(−0.29)	(2.30)	(2.35)	(1.00)
1995–2004	13.77	19.36	18.19	15.44	2.75	2.66	0.87	1.79	1.27	0.76	0.51	14.35	13.85	0.49
			(2.46)	(2.37)	(1.98)	(1.65)	(1.20)	(1.74)	(2.13)	(1.19)	(1.37)	(2.22)	(2.19)	(1.05)
1986–2004	13.08	15.91	16.00	14.52	1.48	1.65	0.81	0.84	0.44	0.27	0.17	14.07	13.52	0.55
			(3.20)	(3.32)	(1.58)	(1.56)	(1.85)	(1.11)	(0.91)	(0.76)	(0.43)	(3.20)	(3.20)	(1.46)

Panel C: Equal-weighted CS performance within P/S deciles

			Price/Sales deciles										
Year		Other	Low	PS2	PS3	PS4	PS5	PS6	PS7	PS8	PS9	High	Total
1998	H	−0.07	0.22	0.62	−0.43	−0.73	0.19	−0.75	−2.03	0.10	0.87	2.19	0.10
	M	−0.02	0.02	0.35	−0.49	−0.47	−0.46	−0.69	−0.88	0.29	0.35	0.94	−1.06
	H − M	−0.06	0.20	0.27	0.06	−0.26	0.64	−0.06	−1.15	−0.19	0.52	1.25	1.17
		(−0.63)	(0.63)	(0.92)	(0.26)	(−1.15)	(2.29)	(−0.15)	(−2.25)	(−0.88)	(1.23)	(1.71)	(0.85)
1999	H	0.02	−0.58	−0.45	−0.11	0.12	0.00	0.94	0.34	2.07	2.14	11.37	16.02
	M	−0.02	−0.38	−0.46	−0.46	−0.35	−0.38	−0.10	−0.13	0.67	0.89	7.06	6.30
	H − M	0.05	−0.20	0.01	0.35	0.47	0.37	1.04	0.47	1.40	1.25	4.30	9.72
		(0.94)	(−0.66)	(−0.03)	(1.19)	(2.09)	(1.53)	(2.08)	(1.31)	(1.17)	(1.94)	(3.05)	(3.66)
2000	H	−0.03	0.26	−0.51	0.06	0.86	1.73	0.72	0.31	0.66	1.56	1.79	7.48
	M	−0.03	−0.23	−0.17	−0.17	0.65	1.34	−0.14	0.35	0.15	1.13	1.42	4.39
	H − M	0.00	0.49	−0.34	0.23	0.21	0.39	0.86	−0.04	0.51	0.42	0.37	3.09
		(−0.03)	(1.37)	(−0.62)	(0.87)	(0.99)	(0.81)	(3.26)	(−0.07)	(0.98)	(0.62)	(0.26)	(1.83)

Table 5
(Continued)

Panel D: Value-weighted DGTW performance measures with P/S benchmarks

Year	CRSP w/Dividends		Gross returns			CS performance			CT performance			AS performance		
	VW	EW	H	M	H − M	H	M	H − M	H	M	H − M	H	M	H − M
1986–1994	12.31	12.08	13.80	13.45	0.35	1.45	0.65	0.80	−0.73	−0.29	−0.43	13.27	13.25	0.02
			(2.06)	(2.38)	(0.33)	(1.16)	(1.28)	(0.83)	(−1.51)	(−1.16)	(−0.95)	(2.25)	(2.46)	(0.19)
1995–2004	13.77	19.36	17.23	14.94	2.30	2.70	0.99	1.72	1.22	1.11	0.11	13.10	12.80	0.30
			(2.44)	(2.29)	(1.74)	(1.74)	(1.45)	(1.65)	(1.40)	(1.28)	(0.39)	(2.01)	(1.97)	(1.12)
1986–2004	13.08	15.91	15.61	14.23	1.38	2.11	0.83	1.28	0.30	0.45	−0.15	13.18	13.01	0.17
			(3.21)	(3.30)	(1.43)	(2.10)	(1.93)	(1.80)	(0.57)	(0.94)	(−0.59)	(3.00)	(3.08)	(0.66)

This table reports DGTW measures for hedge fund firms (hedge sample B) and actively managed mutual funds with different benchmarks. For both the mutual funds (M) and hedge funds (H) samples, and their difference (H − M), the three DGTW performance measures (CS, CT, and AS) are reported. We also report CRSP value-weighted (VW) and equal-weighted (EW) portfolio returns. The CS (characteristic selectivity) measure for a fund in quarter t is calculated as follows:

$$\mathrm{CS}_t = \sum_{i=1}^{N} w_{i,t-1} \left(R_{i,t} - R_t^b\, i, t-1 \right),$$

where $w_{i,\,t\,-\,1}$ is the manager's portfolio weight on stock i at the end of quarter $t-1$, $R_{i,t}$ is the quarterly return of stock i, and $R_t^b\, i, t-1$ is the quarter t benchmark portfolio that is matched to stock i at quarter $t-1$. The quarterly fund numbers are compounded to compute annual returns, resulting in a full-period CS measure for each fund. The CS measure is then averaged across firms both value weighted (using a fund's total equity holdings from the prior quarter end (panels A and D) and equal weighted (panels B and C). The CT (characteristic timing) measure captures the ability of the fund to switch between investment styles. The CT measure for a fund at quarter t is

$$\mathrm{CT}_t = \sum_{i=1}^{N} w_{i,t-1}\, R_t^b\, i, t-1 - w_{i,t-5}\, R_t^b\, i, t-5.$$

This CT measure is the difference between the returns of the benchmark portfolio using quarter $t-1$ and quarter $t-5$ fund weights. The Average Style (AS) measure is calculated, for quarter t, by matching the portfolio weight of each stock held by a fund at quarter $t-5$, $w_{i,\,t\,-\,5}$, with the benchmark portfolio for that stock at quarter $t-5$, $R_t^b\, i, t-5$:

$$\mathrm{AS}_t = \sum_{i=1}^{N} w_{i,t-5}\, R_t^b\, i, t-5.$$

AS + CT + AS equals the gross (total) return of each fund in a quarter but the annual results do not match since quarterly returns are compounded to annual returns. Panels A, B, and C report the DGTW (1997) performance measures with size, industry-adjusted BE/ME, and momentum (from Wermers 2003) as benchmarks. Panel A reports performance numbers that are value weighted according to the market capitalization in equities at the end of the previous quarter. Both year-by-year and subperiod numbers are reported. Panel B reports summary performance numbers that are equal weighted across funds. Panel C reports CS performance measures for 1998, 1999, and 2000 for firms divided into eleven equal-weighted portfolios on price-to-sales (P/S). Even though we divide the firms into eleven P/S groups, the benchmark portfolios for the CS measure are still the 125 size, BE/ME, and momentum portfolios. Panel D uses value-weighted performance with size, momentum (prior year returns), and P/S, as benchmarks. For all stocks with sales information, we divide them into ten deciles according to their most recent price/sales ratios. All stocks without sales information (missing or no sales) are classified as others or P0. For firms with a valid P/S, benchmark portfolios are 132 portfolios based on dependent sorts on size (three groups), momentum (four groups), and P/S ratio (eleven groups). All returns are annualized and in percentage per year. Only funds with five or more securities for the quarter are included in the analysis. t-statistics for differences within a year in panel C are computed cross-sectionally across funds by performing a nonpaired t-test (assuming unequal variances) of the difference in quarterly (CS, CT, or AS) measures between hedge funds and mutual funds. t-statistics across years are calculated based on average quarterly measures for each fund type. t-statistics for time-series differences between hedge funds and mutual funds are calculated from the quarterly time series of hedge funds and mutual funds with a paired t-test assuming unequal variances. t-statistics are given in parentheses.

(2.35% per year) for a statistically insignificant difference between hedge funds and mutual funds of 1.36% for the entire period. This positive performance generally consists of positive CS performance and negative average CT and AS. The positive performance of mutual funds in terms of their CS measures of 0.82 is in line with the 0.72 for the total net asset-weighted performance found by Wermers (2000) in an earlier 1975–1994 period. In comparison to the 125 benchmark portfolios, hedge funds outperform mutual funds in stock picking (CS) in both the first (0.89% per year) and second (1.71% per year) subperiod. Over the whole 1986–2004 period, both hedge funds and mutual funds deliver positive and significant stock selection ability. The difference in stock selection between hedge funds and mutual funds is 1.32% per year and marginally significant, with a *t*-statistic of 1.98. Over the entire period, the difference between the hedge and mutual fund CT measure is −0.19% per year, and the average style difference is −0.96; both are insignificantly different from zero.[24]

Using portfolio measures that equal-weight across portfolios in Panel B of Table 5 demonstrates differences between mutual funds and hedge funds that are similar in economic magnitude to results found with value-weighted portfolios. Both mutual funds and hedge funds exhibit positive abnormal returns, but this is due to their average style. In comparison to mutual funds, hedge funds exhibit higher overall CS (0.84% per year), CT (0.17), and AS (0.55) measures, but none of these differences, nor their total, is statistically different from zero. While the total returns of hedge funds are extremely similar whether measured with equal or value weighting, value-weighted returns exhibit more evidence of security selection ability, largely because of the outperformance of large hedge funds in 1999 and 2000.

5.2 Abnormal returns from 1998 to 2000

We specifically wish to address whether hedge funds' performance during the late 1990s was confined to high returns on technology stocks. Brunnermeier and Nagel (2004) argue that P/S adequately captures tech stocks and find that hedge funds made large returns on these stocks from 1998 to 2000. Since book-to-market benchmarks are inadequate for classifying tech stocks, but sales numbers are more relevant, we reexamine performance using ten P/S deciles, knowing that most tech stocks fall into the higher P/S categories.

Panel C of Table 5 shows returns to stocks in ten P/S deciles plus one group for stocks that did not report sales. Like in panels A and B, portfolio returns are again in excess of the 125 size, BE/ME, and momentum benchmarks. So that the results are not dominated by a couple of firms within groups, returns are equal weighted within each P/S group. Out of the 9.72% equal-weighted CS performance difference between hedge funds and mutual funds in 1999, 6.95% (1.40% + 1.25% + 4.30%) comes from the three highest P/S deciles. Hedge

[24] Although we believe the factor model approach to be substantially less accurate, because of convention we also estimate the standard four-factor model (MTB, SMB, HML, and WML) on our value-weighted hedge fund holding returns. We obtain slightly negative (and insignificant) alphas for hedge funds.

funds earned 1.58% more than mutual funds in these top three deciles in 1998 and 1.30% in 2000. Although P/S is an imperfect proxy to capture tech stocks, it appears that much of the returns during the 1998–2000 period cluster in the high P/S quintiles, which confirms Brunnermeier and Nagel's (2004) finding that hedge funds earned abnormal returns within high P/S stocks in the tech stock boom. However, our overall analysis shows that their finding of large returns in 1998–2000 is specific only to high price-to-sales stocks and only to the bubble period.

To gauge abnormal returns after controlling for Internet stocks, we reformulate benchmark portfolios using three groups on size, four on momentum, and eleven on price-to-sales. Panel D of Table 5 presents aggregate performance information with these 132 benchmark portfolios. Due to more year-to-year variation, the value-weighted CS performance difference of hedge funds minus mutual funds is a statistically insignificant 1.28% per year, which is between the average CS difference measures of 1.32 and 0.84 in panels A and B. The CT and AS performance differences are −0.19 and 0.17%, respectively.

5.3 Performance related to stock turnover

Perhaps hedge funds do not outperform because a subset uses stocks primarily for hedging option positions, or they may specialize in high-frequency trading. Since funds that use stocks for hedging purposes will likely hold their positions for only short periods of time, we can partially address these concerns by focusing on the performance of hedge funds with lower turnover. Since our median turnover as previously discussed is 102%, we stratify hedge funds into two groups based on whether the estimated annual turnover in the previous year is less than or greater than 100%. Panel A of Table 6 presents value-weighted DGTW (1997) performance numbers for both of these groups. High-turnover hedge funds earn higher average returns, and this comes primarily through high CS performance (4.16%, t-statistic = 1.90). Nevertheless, consistent with Wermers (2000), high-turnover mutual funds outperform low-turnover mutual funds, so that the difference between high-turnover hedge funds and mutual funds is a statistically insignificant 1.57% per year.[25] Since the group of hedge funds with lower turnover is more likely to capture hedge funds that trade in equity purely for traditional purposes rather than hedging or short-term trading, it is surprising that their performance is so poor.

5.4 Performance related to long-equity focus

Earlier results showed that our samples of hedge funds are predominately long equity in nature. Nevertheless, to the extent that there are funds focusing on short selling, and using their equity positions simply for hedging purposes, this might drag down returns for the entire sample. We segment our sample

[25] Note that these returns do not encompass the higher transactions costs incurred through more frequent trading. It is also interesting to note that differences in turnover may also proxy for differential ability.

Table 6
Performance based on groupings of turnover and return similarity

Panel A: Hedge funds and mutual funds in two turnover categories

Turnover	Gross returns			CS performance			CT performance			AS performance		
	H	M	H − M	H	M	H − M	H	M	H − M	H	M	H − M
Low	16.93	14.84	2.10	1.89	0.86	1.03	0.85	0.69	0.16	13.57	13.01	0.56
	(3.21)	(3.06)	(2.09)	(1.90)	(1.84)	(1.47)	(1.30)	(1.18)	(0.76)	(2.80)	(2.80)	(1.35)
High	19.32	16.97	2.35	4.16	2.59	1.57	0.66	0.59	0.08	14.07	13.10	0.96
	(2.97)	(2.83)	(1.28)	(1.90)	(2.07)	(1.02)	(0.96)	(0.98)	(0.15)	(2.77)	(2.67)	(1.28)

Panel B: Hedge funds categorized by correlations between reported returns and holding returns

Correlation	Number of funds	Equity holding returns	CS	CT	AS
[−1, 0]	11	15.25	2.93	1.47	10.52
		(2.62)	(1.94)	(1.69)	(2.12)
[0, 0.5]	41	13.87	2.62	0.15	8.98
		(2.21)	(1.51)	(0.21)	(1.73)
[0.5, 1]	78	15.90	2.88	0.47	10.82
		(2.67)	(1.81)	(0.83)	(2.28)

This table reports the value-weighted DGTW (1997) performance of funds based on their turnover (panel A) and the correlation between total returns for all aspects of the hedge fund and their long-equity holding returns. Panel A reports the DGTW measures of the hedge fund firm and the actively managed mutual fund sample for funds that fall into two categories: high (>100% per year) and low (≤100% per year) turnover category. For the mutual funds sample (M) and hedge sample B (H), three DGTW performance measures (CS, CT, and AS) are reported. The differences (H − M) of measures between the two samples are also reported. Panel B reports the DGTW performance of hedge funds sorted on their correlations between reported returns (net of fees) from our hedge fund sources (Altvest, TASS, and MAR graveyard) that match up with the firm and the returns from their long-equity holding returns as calculated from 13F holdings. In Panel B we calculate the correlation for each fund between its total returns and equity holding returns and then stratify the sample into three groups: correlation less than or equal to 0, correlation between 0 and 0.5, and correlation greater than 0.5. The equity holding returns and three DGTW performance measures (CS, CT, and AS) are reported. Both panels use the hedge sample B, and due to fewer hedge funds in late 1980s, we report their performance from 1992 to 2004. *t*-statistics across years are calculated based on average quarterly measures for each fund type. *t*-statistics for time-series differences between hedge funds and mutual funds are calculated from the quarterly time series of hedge funds and mutual funds with a paired *t*-test assuming unequal variances. *t*-statistics are given in parentheses.

into three groups based on the correlations between their long-equity (13F) holdings returns and total returns of the hedge funds, as discussed previously. Panel B of Table 6 shows that while both high and low correlation funds have higher average style returns, the CS and CT performances across the three categories are extremely similar. It does not appear that our previous CS or CT findings are being driven by funds with a shorting focus. Nevertheless, we also take the net of fee returns in the hedge fund return databases minus the returns on the stocks from long positions and regress this return difference on the standard four-factor model (MTB, SMB, HML, and WML). We obtain an insignificant and economically small alpha of 0.09% per month or 1.12% per year. These findings indicate that the inclusion of the component of the return that is missing for our long-equity sample of large, well-known hedge funds does little to improve performance.

5.5 Discussion

In sum, there is no evidence that on average hedge funds have an ability to time styles or pick better styles. There is some statistically weak evidence on a value-weighted basis that hedge funds are better at picking stocks (1.32%) within size, book-to-market, and momentum benchmarks than mutual funds. More importantly, however, this performance is driven by 1999 and 2000, and hence statistically fragile—when examining equal-weighted results or after controlling for price-to-sales benchmarks, the differences between hedge funds and mutual fund stock selection become slightly smaller economically and statistically insignificant.

It is important to note that our result is not simply about statistical significance. Over longer horizons, the stock picking differences between hedge funds and mutual funds may become significant. Yet, even under the assumption that the differences between hedge funds and mutual funds are significant, the 1.32% stock picking or 1.36% difference in gross performance (over 1986–2004) is small. Although it is difficult to address after-fee performance, since there is no reliable source on hedge fund leverage ratios available that we are aware of, some simple extrapolations with standard fees can provide valuable intuition. Consider the unlevered hedge fund earning an average return from 1986 to 2004, with a standard 2% management fee and 20% performance fee over LIBOR. This means that after paying roughly 3.68% in fees, hedge fund investor return would be 11.91%, as compared to the estimated mutual fund net return of 13.24%.[26] Over our sample period, the unlevered hedge fund earning the average return did not come close to justifying its 20% performance fee on its long-equity investments. Given the substantial costs to leverage, transactions

[26] The average value-weighted return of hedge funds over 1986–2004 is 15.59% and we use the average LIBOR benchmark rate of 5.21% over the period. For mutual funds, we take the gross return of 14.23% (from panel A of Table 5) and subtract the expense of 99 basis points for 1994 as calculated in Wermers (2000). These calculations for both mutual funds and hedge fund ignore transactions costs. To make the calculation simple, we do not consider high water marks.

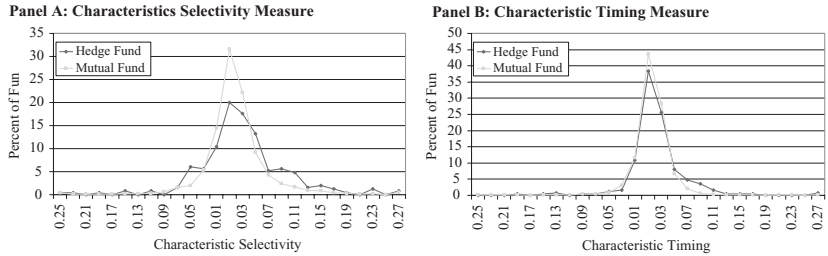

Figure 5
The distribution of fund performance
This figure depicts the distribution of hedge fund performance across hedge fund firms (sample B) and actively managed mutual funds. Panel A is the distribution of funds' characteristic selectivity (CS) measure, and panel B is the distribution of funds' characteristic timing (CT) measure. The CS (characteristic selectivity) measure for a fund is the weighted average of the return on each stock minus the characteristic benchmark return of each stock in the fund's portfolio. The CT (characteristic timing) measure captures the ability of the fund to switch between investment styles. The CT measure for a fund at quarter t is the difference between portfolio weights of the average return and weights of the benchmark portfolio during quarter t in excess of the return using weights of the fund held at quarter $t - 5$. Annual percentage returns for both measures are displayed. All measures are computed over the life of each fund.

costs, and the high performance fees, it seems highly unlikely that the average long-equity hedge fund was able to earn enough to justify its higher fees even with leverage. Abstracting from statistical significance, the performance difference between hedge fund and mutual fund performance is simply economically small.

A large selling point of hedge funds is the value they appear to create by investing in various asset classes and timing capital between asset classes. While we can only examine long stock positions here, the inability of hedge funds to create any positive returns in timing characteristics (like picking growth, value, or momentum at the right times) casts doubt on the assertion that hedge funds can time markets.

6. Are Some Hedge Funds Better Than Others?

Although the average hedge fund is not much better than mutual funds, there may be more variation in ability for hedge funds, particularly given that they are less likely to have positions similar to the market as compared to mutual funds. We evaluate this (i) by plotting the distribution of CS and CT measures, (ii) more formally by focusing on differential ability ranked by variations of last year's performance, and (iii) then by comparing funds according to their entire history of performance.

6.1 The distribution of performance

Consistent with hedge fund firms taking positions further away from the market index, panel A of Figure 5 shows that hedge fund firms have wider, both positive and negative, tails. More importantly, panel A of Figure 5 shows that there

seems to exist a slightly larger group of hedge funds (in the right-hand tail) that outperform than is found in the mutual fund industry. This finding seems to exist both with CS stock picking (panel A) and with characteristic timing (panel B). Nevertheless, the weight in the right tail is small, and such analysis does not control for time-series clustering.

6.2 Performance persistence

To examine managers' ability more formally, we consider whether hedge funds that perform well in one year also perform well in the next (exhibit "hot hands"). Using the benchmark approach, DGTW (1997) found that the previously identified patterns of "hot hands" were largely due to momentum. We rank funds according to their ability to generate gross return and then examine the three components of the return in the following year. Because of the limited number of hedge fund firms (in sample B) in earlier years of the sample, we begin the ranking in 1991 and examine returns for 1992–2004.

Panel A of Table 7 examines the gross return and return components of five quintiles of past gross hedge fund or mutual fund return performance. Hedge funds with the highest past quintile of fund performance in the previous year tend to outperform those with low past performance by an economically large but statistically insignificant 5.54% per year. Most of this difference is from stock selection, but the differences between high and low performance are insignificant. Given the large economic magnitudes but insignificant *t*-statistics, in unreported results we examine the year-by-year calculations and find large positive returns in 1998 and 1999, as well as 1993 and 2002. Overall, the gross returns to performance persistence are negative in six of twelve years. For mutual funds, the return differences between best and worst performing funds are similar to those of hedge funds and these gross returns are negative in five of twelve years. The top hedge fund performer earns about 2% more than the top performing mutual funds. Like DGTW (1997), we find that mutual fund managers' CS measures are insignificant between the best and worst past performing funds.

Panel B of Table 7 shows that ranking by the prior year's CS measure also generates a spread in CS performance, but the differences between the best and worst performers are again insignificant. Perhaps our findings of lack of negative style timing are due to ranking only on stock picking ability and not the joint ability to time styles, as well as to select equities. Also shown in panel B, ranking by past year's CS + CT performance again generates positive but insignificant spreads in CS performance but negative CT differentials. Ranking according to last year's performance, we can find no reliable evidence of "hot hands" either in hedge funds or mutual funds.

6.3 Performance using each firm's whole history

Table 8 examines performance for hedge fund firms based on their entire past stock picking (CS) performance (panel A) and stock picking and timing ability

Table 7
Performance persistence of hedge funds and mutual funds

Panel A: Portfolios ranked by the prior year gross returns

	Hedge fund performance						Mutual fund performance					
	Worst				Best		Worst				Best	
	P1	P2	P3	P4	P5	P5 − P1	P1	P2	P3	P4	P5	P5 − P1
Gross returns	15.00	15.63	16.82	18.87	20.54	5.54	12.88	13.33	13.49	15.89	18.41	5.53
	(2.18)	(2.61)	(2.73)	(3.11)	(2.52)	(1.19)	(2.06)	(2.43)	(2.55)	(2.86)	(2.84)	(1.41)
CS	1.03	1.90	2.28	3.28	5.37	4.34	0.60	0.51	0.41	1.31	2.54	1.93
	(0.54)	(1.72)	(1.65)	(2.48)	(1.88)	(1.47)	(0.61)	(0.75)	(0.84)	(2.08)	(1.93)	(1.21)
CT	1.06	0.38	0.88	1.16	0.19	−0.87	0.42	0.76	0.74	0.91	0.74	0.32
	(1.11)	(0.58)	(1.45)	(1.72)	(0.24)	(−0.72)	(0.62)	(1.16)	(1.17)	(1.45)	(1.14)	(0.34)
AS	12.71	13.12	13.33	13.95	14.38	1.67	11.76	11.95	12.24	13.45	14.75	2.98
	(2.17)	(2.33)	(2.41)	(2.58)	(2.46)	(0.89)	(2.02)	(2.19)	(2.29)	(2.49)	(2.57)	(1.21)

Panel B: Portfolios ranked by the prior year performance

	Hedge fund performance (P5 − P1)				Mutual fund performance (P5 − P1)			
Ranked by	Gross returns	CS	CT	AS	Gross returns	CS	CT	AS
CS measure	2.71	4.15	−1.53	−0.15	1.69	1.96	−0.23	−0.23
	(0.58)	(1.41)	(−1.32)	(−0.13)	(0.45)	(1.04)	(−0.40)	(−0.15)
CS + CT measure	3.31	3.59	−1.89	1.46	1.71	1.70	−0.53	0.41
	(0.74)	(1.23)	(−1.77)	(0.97)	(0.47)	(0.97)	(−0.83)	(0.24)

This table presents the average quarterly buy-and-hold gross return over 1992–2004 for equal-weighted portfolios of mutual funds and hedge fund firms (sample B) ranked on prior year performance of gross return, CS measure, or CS + CT measure. To select these funds each period, all funds/firms that exist during the entire prior period are ranked on their gross return, CS measures, or CS + CT measure in the prior period. Quintile portfolios are formed, and the gross return for the equally weighted portfolio of funds/firms in each quintile is measured over the following year. Equal-weighted performance within each group is used to avoid domination of results by a few funds since the size of funds may vary dramatically within past-performance groups. All funds/firms that exist during a given quarter are included in the following year return calculation even if the fund/firm did not survive the entire period. The entire sort process is repeated each year. Finally, the time-series average return for each portfolio is calculated. The "best" quintile had the highest prior period return and "worst" had the lowest prior period return. The return of the portfolio that buys the winners and sells the losers is also reported (P5 − P1). Also presented are the three DGTW (1997) measures of performance for each quintile. Panel A reports the results based on portfolio quintiles ranked by the prior year's gross return, and panel B reports summary statistics of the best minus worst quintiles for portfolios formed according to the previous year's CS performance measure and CS + CT measure. *t*-statistics across years are calculated based on average quarterly measures for each fund type. *t*-statistics for time-series differences between portfolios are calculated from the quarterly time series of each portfolio with a paired *t*-test assuming unequal variances. *t*-statistics are given in parentheses.

Table 8
Performance according to the entire prior performance history

Panel A: Portfolio quartiles ranked by CS measure

	Hedge fund performance					Mutual fund performance				
	Worst			Best		Worst			Best	
	P1	P2	P3	P4	P4 − P1	P1	P2	P3	P4	P4 − P1
Gross returns	16.95	16.38	16.98	18.63	1.68	14.81	14.19	14.01	14.44	−0.36
	(2.96)	(3.11)	(2.82)	(2.43)	(0.41)	(3.08)	(2.92)	(2.70)	(2.22)	(−0.13)
CS	−0.22	1.37	2.95	4.88	5.10	0.48	0.66	0.97	1.44	0.96
	(−0.15)	(1.31)	(1.92)	(2.02)	(2.03)	(0.85)	(1.37)	(1.78)	(1.09)	(0.68)
CT	2.64	1.24	0.58	−0.15	−2.79	0.57	0.80	0.61	0.27	−0.30
	(1.88)	(2.08)	(1.06)	(−0.22)	(−1.95)	(1.17)	(1.36)	(1.03)	(0.45)	(−0.49)
AS	14.21	13.52	13.07	13.44	−0.77	13.68	12.61	12.27	12.59	−1.09
	(2.78)	(2.70)	(2.51)	(2.36)	(−0.59)	(2.78)	(2.57)	(2.40)	(2.26)	(−0.71)

Panel B: Portfolio ranked by CS + CT measure

Hedge fund performance (P4 − P1)				Mutual fund performance (P4 − P1)			
Gross returns	CS	CT	AS	Gross returns	CS	CT	AS
0.89	3.29	−3.49	1.13	−0.49	0.98	−0.47	−1.02
(0.21)	(1.04)	(−2.05)	(0.77)	(−0.18)	(0.75)	(−0.78)	(−0.70)

This table presents the average quarterly buy-and-hold gross return over 1992–2004 for equal-weighted portfolios of mutual funds and hedge fund firms (sample B) ranked on each fund's prior entire history of the CS measure (panel A) or CS + CT measure (panel B) during the prior year. To select these funds each period, all funds/firms that exist during the entire prior period are ranked on their gross CS measures, or CS + CT measure of the prior period. Due to the possibility of a small number of firms per portfolio, quartile portfolios are formed, and the gross return for the equally weighted portfolio of funds/firms in each quartile is measured over the following year. The entire sort process is repeated each year and the time series average return for each portfolio is calculated. The "best" quartile had the highest prior period return and the "worst" had the lowest prior period return. The return of the portfolio that buys the winners and sells the losers is also reported (P4 − P1) along with the three DGTW (1997) measures of performance for each quintile. *t*-statistics across years are calculated based on average quarterly measures for each fund type. *t*-statistics for time-series differences between portfolios are calculated from the quarterly time series of each portfolio with a paired *t*-test assuming unequal variances. *t*-statistics are given in parentheses.

(panel B). In panel A, the difference between stock picking in the best minus worst past portfolio is a statistically significant 5.10% per year. Nevertheless, the market timing of these funds is −2.79% and marginally significant (*t*-statistic = −1.95). Good stock pickers continue to outperform in terms of stock picking ability, but they are bad market timers, resulting in insignificant total return differences.

In panel B of Table 8 we rank according to past CS + CT and again find that high past winners outperform past losing hedge funds on stock picking going forward (3.29, *t*-statistic = 1.04), but significantly underperform in timing ability (−3.49, *t*-statistic = −2.05). Mutual funds also exhibit no significant ability for past performance histories to translate into future returns.

6.4 Discussion

Our results contrast with the recent finding by Jagannathan, Malakhov, and Novikov (2007) of strong performance persistence in total hedge fund returns. However, it is important to note that since the distribution of hedge fund stock picking ability exhibits a hint of a slightly fatter right tail to stock picking, it seems plausible that with a longer and larger hedge fund sample, one may find statistically significant evidence of "hot hands" in equity returns. The performance persistence based on the past year's return, though only positive in half of the years, is on average an economically large (but statistically insignificant) 5.54% per year. It is puzzling that our performance persistence results deliver higher differential hedge fund returns than the rankings over the whole period. These patterns are consistent with hedge funds exhibiting decreasing returns to scale (as found recently by Fung et al., 2008), but might also be due to funds using strategies that only work under certain market conditions (like the tech bubble).

Most investors pick funds based on a fund's entire track record and not simply the prior year's performance. When ranking on the whole past history of performance, the (insignificant) gross return average performance differential of only 1.68% per year between those firms with the best and worst past quartile of past stock picking and a 0.89 per year difference between rankings on both stock picking and timing suggest that the magnitude of differences in ability is relatively small. Given the small economic benefits to picking funds and the extra layer of fees, our findings question the usefulness of funds-of-funds.

7. Conclusion

We provide the first comprehensive examination of the nature of hedge fund holdings in U.S. stocks and a holdings-based analysis of the equity performance of hedge funds. In comparison to mutual funds, hedge fund firms have much higher turnover and deviate more from market positions. Despite these preferences for trading more intensely, hedge funds overweight stocks with fewer analysts, less liquidity, and more volatility.

Turning to performance measurement, we find that neither the fraction of hedge fund stock ownership nor the changes in that fraction are useful for predicting future returns beyond what can be forecast from past returns. These findings indicate that hedge fund holdings and trading are not adding value on average. Using the DGTW (1997) performance decomposition, we classify hedge fund performance by (i) stock picking, (ii) moving in and out of styles, and (iii) the average style of the fund. In terms of stock picking, there is some weak evidence that hedge funds outperform mutual funds on a value-weighted basis, but these superior returns are largely concentrated in the high price-to-sales (technology) sector in 1999 and 2000. This difference in stock picking ability between hedge funds and mutual funds weakens economically and becomes statistically insignificant when looking at equal-weighted performance or when gauging stock picking with price-to-sales benchmark assets. Hedge funds exhibit no ability to rotate capital among different asset styles at opportune times and their average style selection slightly underperforms mutual funds. We find that our results are robust to hedge funds that trade frequently or infrequently and are not driven by hedge funds that are primarily shorting.

There is no consistent evidence that hedge funds performing well in one year exhibit hot performance the next year. However, our results do indicate consistent return patterns when ranking on past performance, such that we speculate that with a longer return horizon and cross-section, it may be possible to show statistically reliable differential ability in hedge fund performance. This seems particularly true when ranking on recent histories or hot hands, where there are larger return spreads between winning and losing funds than when ranking on the fund's entire history. However, investors, money managers, and fund-of-funds managers typically evaluate hedge funds based on their whole return history. The performance differences between the managers with the best and worst past stock picking histories are economically small (1.68% per year) and likely not enough to justify the additional fees of fund-of-funds.

Overall, we find that hedge funds seem to be no better at long-equity investment than mutual funds. Given that hedge funds generate higher turnover and trade in less liquid securities, our performance comparisons would look even worse if transaction costs were included. Back-of-the-envelope calculations using a standard hedge fund fee structure suggest that hedge funds are a worse vehicle than mutual funds over our sample period. In sum, our findings question the ability of hedge fund management to add value, particularly in the realm of long-equity investing. While one can easily argue that hedge funds provide value in other venues, it is important to note that equity investing is a large part of hedge fund activity and that in these other venues, performance is nearly impossible to properly benchmark. Our findings suggest that those evaluating hedge funds should, when possible, push toward a holdings-based analysis of performance rather than relying on factor models. We predict that

as data quality improves, more studies will begin to question the wisdom of hedge fund investment.

We believe that our examination of hedge fund holdings has shed more light on the secrecy of hedge funds, but it also raises a host of interesting questions for future work. For example, if hedge funds cannot pick stocks or time sectors, should they be better at picking commodities? Are hedge funds substantially more profitable in short positions or high-frequency trades? How can more sophisticated forms of information from hedge fund trading be used for predicting future price moves? And finally, on net, do hedge funds stabilize or destabilize markets?

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