Why Do Hedge Funds Avoid Disclosure?
Evidence from Confidential 13F Filings

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Abstract

We study a sample of Form 13F filings where fund advisors seek confidential treatment for some or all of their 13(f)-reportable positions. Consistent with the hypothesis that managers seek confidentiality to protect proprietary information, we find that confidential positions earn positive and significant abnormal returns over the post-filing confidential period. We also find that managers are more likely to seek confidential treatment of illiquid positions that are more susceptible to front-running. Overall, our analysis highlights important benefits of reduced disclosure that are relevant to the current policy debate on hedge fund transparency.

I.   Introduction

A basic challenge facing hedge fund industry participants and regulators is determining the extent to which the composition and performance of investment portfolios should be publicly disclosed. Increased portfolio disclosure, and the associated increased transparency, is considered beneficial to the extent that it allows investors to make more informed investment allocation decisions and reduces potential agency costs that can arise when managerial actions are more opaque. Increased transparency, however, comes at a cost if it reveals proprietary information that allows competitors to free-ride on a fund manager's efforts to identify profitable investments and trading strategies.[1] Increased transparency is also costly when it allows front-runners to trade against a fund that is in the process

[1]Frank, Poterba, Shackelford, and Shoven (2004) demonstrate that hypothetical "copycat" funds created by mimicking the portfolio holdings of actively managed mutual funds earn after-expense returns that are indistinguishable from those of the copied funds.

of accumulating or disposing of a position.[2] Transparency is costly in these regards, not only because of its negative effect on the disclosing fund's profits, but also (from a policy perspective) because it reduces fund manager incentives to become informed, thereby harming price discovery. An assessment of the importance of protecting the ability to profit on proprietary information through reduced disclosure is complicated by the fact that such information, by definition, is difficult to identify. In this paper we sidestep this issue by examining a sample of 13F filings of hedge fund holdings where fund managers seek confidential treatment by the Securities and Exchange Commission (SEC) of some or all of their portfolio positions.

Hedge fund and other institutional investment managers who exercise investment discretion over $100 million or more in Section 13(f) securities are required to report their quarterly holdings on Form 13F to the SEC within 45 days of each quarter end. However, managers may request confidential treatment to delay public disclosure of some or all of their holdings. Holdings that are kept confidential at the time of the original 13F confidential treatment filing are eventually released to the public at a later date through a Form 13F "add-new-holdings" amendment. The ability to examine the characteristics and stock price performance of these confidential positions allows for a useful laboratory in which to develop a better understanding of the determinants of hedge fund managers' disclosure decisions and to contribute to the policy debate on optimal hedge fund disclosure.

Our analysis focuses on all Form 13F confidential filings by a sample of 250 hedge fund managers that file Form 13F over the period 1999–2006. We find that securities that are kept confidential at the time of the original 13F filing earn positive and significant abnormal returns over the post-filing confidential period (i.e., from the time of the original 13F filing until the confidential positions are ultimately revealed to the public through a 13F amendment filing). In contrast, those securities that *are* disclosed at the time of the original filing do not exhibit abnormal stock price performance over this same time period. A probit analysis finds statistically and economically significant evidence that confidential treatment requests are more likely for individual positions that perform well over the confidential period. These results suggest that hedge funds avoid disclosure to protect valuable proprietary information and thereby highlight a benefit of allowing confidential treatment and less transparency.[3,4]

In addition to examining how (forward-looking) confidential period returns affect the disclosure decision, we also investigate how past returns (measured over the filing quarter) affect the likelihood of a confidential treatment request. To the

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[2]See Wermers (2001) for a discussion of front-running.

[3]These results are consistent with findings in Ge and Zheng (2006) that mutual funds with an informational advantage tend to disclose their holdings less frequently.

[4]The returns to confidential positions also constitute new evidence on hedge fund performance and managerial skill. In a contemporaneous paper, Agarwal, Jiang, Tang, and Yang (2013) find some results similar to what we report here but focus on the implications of the returns to confidential positions for assessing hedge fund manager skill. Specifically, they find that confidential holdings exhibit superior performance for different horizons ranging from 2 to 12 months. In another study of hedge fund disclosure, Brown and Schwartz (2013) argue that hedge funds can benefit from disclosing their portfolio holdings on Form 13F due to price pressure resulting from copycat traders.

extent that hedge fund managers seek to protect profitable ongoing investment strategies, we would expect past returns to be positively associated with the likelihood of seeking confidential treatment. An alternative possibility is that managers seek confidentiality in order to strategically hide past losers or "window dress" their portfolios.[5] Consistent with the proprietary information hypothesis, we find that hedge fund managers are more likely to seek confidential treatment for positions that have performed well in the past. We find no evidence consistent with the use of confidential treatment to hide past losers.

We also investigate the extent to which the liquidity of individual holdings affects the disclosure decision. Hedge funds that are seeking to accumulate or dispose of an illiquid position may seek confidentiality to avoid the costs of being front-run; front-running costs can be potentially severe for illiquid securities due to the larger price impact of advanced trading. In addition, because of concern about price impact, the accumulation and disposition of illiquid positions is done more slowly, making it more likely that such activities are ongoing at the time of a 13F filing and thereby making a confidential treatment request more likely. Consistent with these arguments, we find that confidentially held securities are significantly more likely to be illiquid, as measured by Amihud (2002) and by whether the confidential request pertains to less liquid 13(f)-reportable nonequity positions, like equity options and corporate debt.

Finally, we examine whether greater usage of confidential treatment contributes to the success of the advisor's hedge fund *investors*. Net of fees, we find that portfolio returns are positively related to greater usage of confidential treatment in the prior quarter. Specifically, an increase in the percentage of confidential securities from 0% to 25% is associated with a significant increase in subsequent monthly portfolio returns of about 50 basis points (bp). These results suggest that the gains associated with confidential treatment are at least partly captured by hedge fund investors.

The remainder of the paper is organized as follows: Section II describes the data. Section III discusses the methodology and empirical results. Section IV concludes.

II.   Data

A.   Form 13F, Confidential Treatment Requests, and Form 13F Amendments

We obtain quarterly holdings of hedge fund companies from Form 13F filings on the Edgar Web site (http://www.sec.gov/edgar/searchedgar/companysearch .html). Since 1978, all institutional investment managers (including hedge fund managers) who exercise investment discretion over accounts holding at least $100 million are required by Section 13(f) of the Exchange Act to make quarterly disclosures of portfolio holdings to the SEC on Form 13F within 45 days of the quarter end. The types of securities that are required to be reported on Form 13F

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[5]This alternative is motivated, in part, by evidence suggesting that mutual fund managers, prior to disclosure dates, attempt to improve the appearance of their portfolios by selling past losers and buying stocks that have recently performed well (Musto (1997), (1999), Meier and Schaumburg (2006)).

include exchange-traded and NASDAQ-quoted stocks, equity options and warrants, convertible bonds, and shares of closed-end investment companies; short positions, shares of open-end funds, and private securities are not required to be disclosed. All long positions in such securities with more than 10,000 shares or with market values exceeding $200,000 are required to be reported. Form 13F reporting items include the issuers of the securities, the security type, the Committee on Uniform Securities Identification Procedures (CUSIP) number, the number of shares, and the market value of each security owned. Managers can report aggregated holdings across different funds managed by the same management company.

Form 13F must be filed with the SEC no later than 45 days after each calendar quarter end. However, managers may request confidential treatment to delay public disclosure of some or all of the holdings reported on Form 13F. Confidential treatment requests must be made at the time the Form 13F is filed and must include i) reasons why the disclosure of certain positions would likely harm the manager's competitive position and ii) the length of time for which confidential treatment of these positions is requested. In addition, requests for confidential treatment require that Form 13F must indicate (at the appropriate place) that confidential positions have been omitted from the public filing and filed separately with the SEC. The securities receiving confidential treatment are eventually disclosed to the public through a Form 13F add-new-holdings amendment (reported on Edgar), which must be filed within six days of the end of the confidential treatment period granted by the SEC. If a request for confidential treatment is denied by the SEC, a Form 13F amendment that reveals the confidential holdings must be filed within six days of the denial date.[6]

B.   Sample Formation

We form our sample of hedge fund managers using the Lipper/Trading Advisor Selection System (TASS) database and the Bloomberg list of all 13(f)-obligated hedge fund managers. These managers are then manually matched with Edgar to identify which managers are subject to Section 13(f). We then identify all 13F filings by these managers using Edgar. The sample period runs from the first quarter of 1999 (the first quarter for which 13F filings are available in electronic format from Edgar) through the fourth quarter of 2006. Although downloading the individual 13F filings is uncomplicated, the formatting is complex and difficult to sort out due to manager-specific idiosyncrasies in reporting styles. We therefore focus our analysis on a representative sample of 250 advisors.[7]

Over the period from 1999 to 2006, our sample of hedge fund managers filed a total of 5,051 Form 13F filings. Although SEC instructions for Form 13F require that 13F filings that are accompanied by a request for confidential treatment should be clearly marked to that effect, we observe that this is not reliably carried out in practice. Thus, we identify 13F requests for confidential treatment in an ex post fashion by examining all Form 13F amendments filed by these managers

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[6]For additional information on Form 13F filing, see http://www.sec.gov/about/forms/form13f.pdf.
[7]Further details on the sample can be found in Aragon and Martin (2012).

over the period 1999–2008; we identify a total of 771 Form 13F amendments over this period. Form 13F amendments are designated as either a restatement or to add new holdings. If the 13F amendment is used for the purpose of disclosing confidential holdings from an earlier 13F confidential treatment filing, it must be designated as an add-new-holdings amendment. We hand separate the add-new-holdings from restatement amendment filings. There are 250 restatements and 337 add-new-holdings amendments in our sample. There are also 180 amendments in which neither the restatement nor the add-new-holdings boxes are checked and 4 filings where both boxes are checked. We cannot identify whether these are add-new-holdings filings and thus exclude these 184 filings from our study.

The remaining filings include confidential treatment filings corresponding to both approved and denied confidential treatment requests.[8] We include denied filings together with approved filings, since our focus is on a manager's decision to seek confidentiality, as opposed to the granting of confidential treatment by the SEC. Finally, there can be multiple add-new-holdings amendments pertaining to the same (original) 13F confidential treatment filing. To focus our analysis, we concentrate our investigation on the first add-new-holdings amendment pertaining to each 13F confidential treatment filing. This leaves us with a final sample of 187 (169 approved, 18 denied) 13F confidential treatment filings.

C.   Analysis Periods

We consider three distinct analysis periods associated with 13F filings: the quarter that the 13F filing is reporting on (*filing quarter*); the period from the quarter end to the filing date of either the regular or confidential 13F filing (*filing period*); and the period from the date of the confidential 13F filing to the date when the confidential holdings are released to the public through an add-new-holdings 13F amendment filing (*confidential period*). The three periods are illustrated in Figure 1.

FIGURE 1

Time Line of 13F Confidential Treatment Filings

Figure 1 shows three distinct analysis periods associated with 13F filings: the quarter that the 13F filing is reporting on (filing quarter); the period from the quarter end to the filing date of either the regular or confidential 13F filing (filing period); and the period from the date of the confidential 13F filing to the date when the confidential holdings are released to the public through an add-new-holdings 13F amendment filing (confidential period).
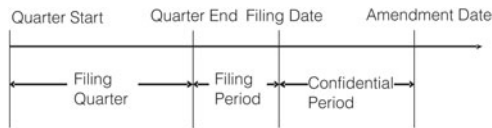
Table 1 presents summary statistics on the length (in days) of the filing and confidential periods. We first note that there are a total of 4,864 regular filings and 187 confidential treatment filings in our sample; confidential treatment filings constitute 3.8% of the full sample of 13F filings. The table indicates that the

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[8]The manager must indicate within each add-new-holdings filing whether the request for confidential treatment was denied by the SEC. See http://www.sec.gov/about/forms/form13f.pdf.

TABLE 1

Summary Statistics on Lengths of Analysis Periods (days)

A total of 5,051 Form 13F filings are filed by our sample of 250 hedge fund advisors from 1st Quarter, 1999, to 4th Quarter, 2006. "Regular Filings" are Form 13F filings that are immediately disclosed to the public once filed with the SEC and no confidential treatment is requested. "Confidential Treatment Filings" are Form 13F filings when confidential treatment is requested to delay public disclosure of some or all of their 13(f)-reportable holdings. Summary statistics on the lengths of the two analysis periods, "Filing Period" and "Confidential Period," are reported in this table. "Filing Period" refers to the period from the quarter end to the filing date of either the regular or confidential 13F filings. "Confidential Period" refers to the period from the filing date of the 13F confidential treatment filing to the date when confidential holdings are released to the public through a Form 13F amendment filing.

Variable	n	Mean	SD	Min	25%	50%	75%	Max
Filing Period								
Regular Filings	4,864	42	33	2	39	44	45	1,866
Confidential Treatment Filings	187	46	15	0	43	45	45	166
Confidential Period								
Confidential Treatment Filings	187	210	317	1	51	95	308	1,916

majority of the 13F filings are made near the 45-day filing deadline; the median and 75th percentile length of the filing period are around 45 days for both the regular and confidential treatment filings. With respect to the sample of confidential treatment 13F filings, the median length of time over which the confidential holdings remain undisclosed (the *confidential period*) is 95 days.

D.   Summary Statistics for Regular and Confidential Treatment Filers

This section presents summary information on the types of advisors that file for confidential treatment as well as the nature of their holdings. Of the total sample of hedge fund advisors, 44 (17.6%) made at least one request for confidential treatment over our 1999 to 2006 sample period. The remaining 206 advisors only file regular 13Fs over the sample period. We refer to these two groups of advisors as "Confidential Filers" and "Regular Filers," respectively.

Table 2 provides descriptive information on Confidential and Regular Filers for our full sample of hedge fund advisors (Panel A) and for a subsample of advisors (Panels B–D) that also have data available on the TASS database. The TASS database provides (self-reported) portfolio returns, assets under management (AUM), and organizational characteristics for individual funds managed by a given advisor. In order to match and facilitate comparison, we aggregate individual fund data at the advisor level. We use the August 2008 version of the TASS database (which includes both live and dead funds) to recover available portfolio returns over the 1999–2006 period. Our TASS subsample contains 125 advisors, including 20 of our 44 Confidential Filers and 105 of our 206 Regular Filers.

Regarding advisor and fund characteristics, the results in Table 2 report that Confidential Filers have longer tenures as 13F filers and tend to make greater use of options (Panel A), and that they require longer redemption periods and have more AUM (Panel B). These results are consistent with Confidential Filers being concerned about protecting proprietary information. Aragon and Martin (2012) show that option holdings of hedge funds predict abnormal future returns and abnormal volatilities of underlying stocks. More broadly, options offer a highly levered channel for traders to profit from their private information about underlying stocks (Black (1975)). With respect to AUM, Berk and Green (2004) predict

TABLE 2

Summary Statistics for Regular and Confidential Filers

Panel A of Table 2 summarizes the characteristics and portfolio returns for Regular and Confidential Filers. "Confidential Filers" are those hedge fund advisors who have requested confidential treatment at least once over our sample period 1999–2006. "Regular Filers" refer to those hedge fund advisors who do not report any amended 13F filing during our sample period. The market value for options is notional since the 13F filing reports the market value of the underlying securities rather than that of the options themselves. "Filing Quarter" is the quarter that the 13F filing is reporting on, and "Post-Filing Quarter" is the quarter immediately after the Filing Quarter. The characteristic-based-benchmark-adjusted returns are equal to raw returns minus the characteristic-based-benchmark returns downloaded directly from Russ Wermers' Web site (http://www.smith.umd.edu/faculty/rwermers/ftpsite/Dgtw/coverpage.htm) (Daniel, Grinblatt, Titman, and Wermers (1997)). The total number of reporting quarters is the total number of quarters each hedge fund advisor filed either regular or confidential treatment 13F filings with the SEC during our sample period. Panels B–D summarize the characteristics and portfolio returns for the subsample of 125 advisors that report to the TASS database. Characteristics and portfolio returns are aggregated across individual funds managed by a given advisor. Each characteristic is computed as the sample mean characteristic of the individual funds managed by the same advisor. Characteristics in Panel B include an indicator for whether the fund imposes a lockup restriction (lockup?), the redemption notice period, and the percentage performance fee and fixed management fee. log(AUM) is the natural logarithm of the sum of the assets under management (AUM) reported to TASS across all advisors' individual funds, and is measured at the end of the sample period. Advisor portfolio returns are aggregated from underlying individual fund monthly returns either as equal- or asset-weighted averages based upon assets reported to TASS at the end of the previous quarter. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Variable	Type	Confidential Filers	Regular Filers	Difference	p-Value (Difference)
Panel A. Characteristics and Performance (Full sample)					
N		44	206		
Market Value	Stock	5,451.30	3,195.86	2,255.44	0.44
(million dollars)	Debt	319.09	765.30	−446.21	0.70
	Option (Notional)	269.04	31.07	237.97***	0.00
	Other	22.97	89.93	−66.96	0.33
Characteristic-Based-Benchmark-Adjusted Returns (%)	Filing Quarter	3.33***	4.51***	−1.18	0.40
	Post-Filing Quarter	0.37	0.33	0.04	0.94
Total # of Reporting Quarters		23.09	19.65	3.44**	0.03
Panel B. Advisor Characteristics (TASS subsample)					
N		20	105		
Lockup?		38.76	37.48	1.29	0.90
Redemption Notice (days)		44.96	36.46	8.50*	0.07
Performance Fee		19.86	19.13	0.73	0.48
Management Fee		1.22	1.25	−0.03	0.79
log(AUM)		6.00	4.75	1.25***	0.01
Panel C. Equal-Weighted Portfolio Returns (TASS subsample)					
N		20	105		
Mean Return		0.98	0.77	0.21	0.15
Volatility of Returns		2.48	3.21	−0.73	0.19
Kurtosis		4.42	5.05	−0.64	0.40
Skewness		0.10	0.13	−0.03	0.91
Sharpe ratio		0.52	0.34	0.18***	0.01
Alpha		0.69	0.48	0.21	0.11
Panel D. Asset-Weighted Portfolio Returns (TASS subsample)					
N		20	105		
Mean Return		1.06	0.71	0.35*	0.06
Volatility of Returns		2.82	3.20	−0.38	0.58
Kurtosis		4.65	4.96	−0.31	0.68
Skewness		0.03	0.09	−0.06	0.79
Sharpe ratio		0.53	0.35	0.18**	0.03
Alpha		0.80	0.44	0.36**	0.02

a positive relation between fund size and manager skill in a rational model of open-ended investment funds.

Turning to investment performance, Panel A of Table 2 presents the average value-weighted characteristic-based-benchmark-adjusted returns to the equity positions reported on Form 13F for the filing and post-filing quarters.[9] Our findings

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[9]Characteristic-based-benchmark-adjusted returns equal raw returns minus the returns on characteristic-based benchmarks constructed based on size, book-to-market, and momentum (prior

here are similar to those reported in Griffin and Xu (2009) and show no significant differences between Confidential and Regular Filers. For the subsample of firms with TASS returns, Panels C and D report the mean, standard deviation, Sharpe ratio, and market-model alpha for equal- and asset-weighted returns (after fees), respectively. Focusing on the asset-weighted portfolio results in Panel D, we see that Confidential Filers have significantly higher mean returns (1.06% vs. 0.71%), Sharpe ratios (0.53 vs. 0.35), and market-model alphas (0.80 vs. 0.44). Results are qualitatively similar using the equal-weighted portfolio returns, albeit with lower levels of significance for the mean returns and alphas. We interpret the superior investment performance of Confidential Filers as preliminary evidence consistent with the idea that confidential treatment is used to protect private information about stock fundamentals.

Next we use a probit model to explicitly study the ex ante reasons why certain advisors that are subject to section 13(f) disclosure rules seek confidentiality.[10] Table 3 reports the results from a pooled estimation in which the dependent variable is an indicator variable that equals 1 if the advisor files a confidential treatment-related amendment during the quarter. As noted above, our sample

TABLE 3
Probit Model of the Decision to Seek Confidential Treatment for the TASS Subsample

Table 3 reports the results from a probit model of a hedge fund advisor's decision to seek confidential treatment on Form 13F at the end of every quarter. All explanatory variables are measured using fund-level TASS data available at the end of the prior quarter. AUM is the aggregate total assets under management across all underlying funds. Mean Return, Sharpe ratio, and Alpha are measures of performance calculated for each advisor using the time series of monthly returns available at the end of the prior quarter. Lockup Period is an indicator variable that equals 1 if the fund has a lockup. Notice Period is the number of days in the redemption notice period. Incentive Fee and Management Fee are parameters in the manager's compensation contract. These variables are averaged across funds each quarter to obtain a single observation for each advisor. Advisor returns are asset-weighted average returns of the underlying funds. All backfilled data are excluded from the return calculations. Estimated marginal effects are reported and are obtained from a single pooled estimation across advisor/quarter observations. All explanatory variables are standardized to have a mean of 0 and a variance of 1. Standard errors account for heteroskedasticity and clustering at the quarter level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Variable	Model						
	1	2	3	4	5	6	7
log(AUM)	0.0088*** (3.71)				0.0071*** (3.19)	0.0090*** (3.78)	0.0074*** (3.10)
Mean Return		0.0114*** (4.12)			0.0078*** (3.50)		
Sharpe ratio			0.0106* (1.84)			−0.0040 (0.97)	
Alpha				0.0142*** (4.50)			0.0091*** (3.54)
Lockup Period	−0.0024 (1.12)	0.0004 (0.16)	0.0017 (0.60)	−0.0001 (0.06)	−0.0017 (0.85)	−0.0020 (0.93)	−0.0021 (1.01)
Notice Period	0.0075*** (4.79)	0.0127*** (7.91)	0.0130*** (6.84)	0.0128*** (7.49)	0.0075*** (4.49)	0.0080*** (4.57)	0.0077*** (4.35)
Incentive Fee	0.0057** (2.55)	0.0074*** (2.80)	0.0078*** (2.88)	0.0079*** (2.86)	0.0061*** (3.18)	0.0065*** (3.17)	0.0065*** (3.22)
Management Fee	−0.0066*** (3.34)	0.0005 (0.23)	−0.0005 (0.25)	0.0009 (0.40)	−0.0041** (2.21)	−0.0062*** (3.25)	−0.0040** (2.03)
No. of obs.	1,864	1,960	1,960	1,905	1,821	1,821	1,775

year return). The characteristic-based-benchmark returns are from Daniel et al. (1997) and are downloaded directly from Russ Wermers' Web site (http://www.smith.umd.edu/faculty/rwermers/ftpsite/Dgtw/coverpage.htm).

[10]We are grateful to Stephen Brown (the editor) for making this suggestion.

includes amendments corresponding to both approved and denied requests, so our dependent variable indeed measures whether confidentiality is being sought. All explanatory variables are measured using TASS data at the end of the prior quarter and include the natural logarithm of AUM and the mean return, Sharpe ratio, and market-model alpha of monthly returns. Advisor-level returns are asset-weighted averages of the underlying fund returns.

The results strongly suggest that ex ante larger and better-performing managers are more likely to seek confidential treatment. Specifically, a one-standard-deviation increase in AUM is associated with a 0.88% increase in the probability of seeking confidential treatment during the quarter (model 1). This effect nearly doubles (1.42%, model 4) for a one-standard-deviation increase in market-model alpha. Both estimates are significant at the 1% level. Our results are similar for other performance measures (mean return, Sharpe ratio) and when we use equal-weighted (vs. asset-weighted) averages of the advisor's underlying fund returns. The effects of liquidity (lockup vs. notice) and fees (management vs. incentive) are mixed, although both notice periods and incentive fees are associated with a higher likelihood of seeking confidential treatment. Overall, the evidence here indicates that confidential treatment requests are more likely among managers with a capacity for informed trading, as reflected in ex ante performance measures.

III.   Empirical Results

A.   Reported and Confidential Holdings: Descriptive Statistics

Table 4 provides summary statistics on the reported holdings and confidential holdings for our sample of 187 Form 13F filings where requests for confidential treatment are made. As indicated earlier, we are able to identify the confidential holdings that are not disclosed at the time of the original filing by examining 13F add-new-holdings amendments that later reveal positions that were undisclosed at the time of the original 13F filing. The results in Table 4 show that the undisclosed holdings in 13F confidential treatment filings constitute a nontrivial fraction of the overall market value of the reportable hedge fund positions. Specifically, the median percentage market value of the confidential holdings is 21.18% of the combined total of the disclosed and undisclosed holdings. With respect to the number of holdings, the median percentage of undisclosed positions is 20% of all holdings.

B.   Probit Analysis of Reported Holdings and Confidential Holdings

We employ a probit analysis to analyze the determinants of hedge fund manager decisions on whether to seek confidential treatment of individual 13(f)-reportable positions. In order to avoid giving larger weight to 13F filings that have larger numbers of holdings, we conduct the probit analysis at the portfolio level rather than at the individual holding level. Specifically, for each 13F confidential treatment filing, we form two portfolios of securities: one made up of "Reported Holdings" and the other made up of "Confidential Holdings." The dependent variable in the probit is set equal to 1 for the Confidential Holdings portfolios and is set equal to 0 for the Reported Holdings portfolios.

TABLE 4

Characteristics of Reported and Confidential Holdings for Confidential Treatment Filings

Table 4 reports the characteristics of "reported" and "confidential" holdings in the confidential treatment filings. "Reported" holdings refer to the holdings that are disclosed to the public immediately after the filing of 13F. "Confidential" holdings are the holdings that are released to the public at a future date. The "% Holdings" for the reported (confidential) holdings is the number of reported (confidential) holdings divided by the total number of holdings reported in each filing. The "% market value" for the reported (confidential) holdings is the market value of reported (confidential) holdings divided by the total market value of all holdings reported in each filing. Stock characteristics include log(SIZE), BOOK-TO-MARKET ratio, log(ILLIQUIDITY), and MOMENTUM. SIZE is the market value, and BOOK-TO-MARKET ratio is the book value divided by market value. Both SIZE and BOOK-TO-MARKET ratio are measured at the quarter end preceding the filing quarter. ILLIQUIDITY is the average daily illiquidity in the quarter preceding the filing quarter, where the daily illiquidity is measured as the absolute change in stock return per dollar trading volume (Amihud (2002)) on that day. MOMENTUM is the cumulative raw return of a stock over the 12-month period preceding the filing quarter. For each 13F confidential treatment filing, we form two portfolios: one made up of the "reported" holdings and the other made up of the "confidential" holdings. The stock characteristics of a portfolio are the value-weighted average characteristics of the stocks in the portfolio.

Variable	Reported Holdings				Confidential Holdings			
	n	Mean	Median	SD	n	Mean	Median	SD
Panel A. No. of Holdings								
All securities	187	589.54	118.00	1,037.14	187	257.65	9.00	832.10
Common stocks	187	492.14	85.00	881.95	187	181.96	6.00	567.27
Debt	187	29.59	1.00	51.45	187	16.77	0.00	51.95
Options	187	63.52	0.00	198.05	187	49.79	0.00	215.35
Other	187	4.28	1.00	7.57	187	9.13	0.00	56.82
Panel B. % Holdings								
All securities	187	72.33	80.00	26.51	187	27.67	20.00	26.51
Common stocks	186	73.66	83.43	27.07	186	26.34	16.57	27.07
Debt	118	69.68	98.44	39.14	118	30.32	1.56	39.14
Options	89	76.06	98.88	98.88	89	23.94	1.12	35.90
Other	115	75.88	100.00	35.86	115	24.10	0.00	35.86
Panel C. Market Value (million $)								
Common stocks	187	10,251.80	365.54	27,315.71	187	7,753.27	73.38	47,995.57
Debt	187	482.97	3.48	1,108.36	187	126.46	0.00	456.93
Options	187	234.64	0.00	677.25	187	123.85	0.00	488.33
Other	187	18.68	0.16	41.01	187	27.93	0.00	198.49
Panel D. % Market Value								
Common stocks	186	68.85	78.82	31.19	186	31.15	21.18	31.19
Debt	118	70.18	99.36	40.51	118	29.82	0.64	40.51
Options	89	77.07	99.56	35.39	89	22.93	0.44	35.39
Other	113	75.86	100.00	38.38	113	24.14	0.00	38.38
Panel E. Stock Characteristics								
log(SIZE)	182	15.02	15.09	1.44	169	14.58	14.83	2.09
BOOK-TO-MARKET	182	0.30	0.55	5.53	165	0.94	0.56	3.67
log(ILLIQUIDITY)	182	−19.70	−20.15	2.20	166	−19.48	−20.11	2.98
MOMENTUM	182	0.27	0.18	0.57	166	0.24	0.16	0.65

To provide evidence on the proprietary information hypothesis, we employ several measures. The first measure is the cumulative abnormal portfolio return over the *confidential period,* that is, over the period from the original 13F confidential treatment filing to the date of the add-new-holdings 13F amendment filing where the confidential holdings are disclosed to the public. In effect, the *confidential period* abnormal return serves as a proxy for the value of the private information that the manager has at the time the decision is made on whether to seek confidential treatment for certain holdings. The proprietary information hypothesis predicts that the average *confidential period* abnormal return will be larger for the Confidential Holdings portfolios relative to that observed for the Reported Holdings portfolios. With respect to the probit analysis, the proprietary information hypothesis predicts a positive coefficient on the *confidential period* abnormal portfolio return.

In addition to the *confidential period* return, we also investigate the effect that the *filing quarter* abnormal return has on the decision to seek confidentiality of individual 13(f)-reportable positions. Unlike the *confidential period* return, which is forward looking, hedge fund advisors know the *filing quarter* returns of the individual holdings at the time the decision is made of whether or not to seek confidential treatment. To the extent that advisors seek to hide profitable ongoing investment strategies, we expect a positive coefficient on the *filing period* abnormal return in the probit analysis.

We also test the proprietary information hypothesis by considering the extent to which the Reported Holdings and Confidential Holdings portfolios are comprised of stock as opposed to other types of securities. Specifically, for each portfolio we define the STOCK_RATIO as the total number of stock holdings divided by the total number of all portfolio holdings:

$$(1) \qquad \text{STOCK\_RATIO} \quad = \quad \frac{\text{TOTAL\_NO\_OF\_STOCK\_HOLDINGS}}{\text{TOTAL\_NO\_OF\_HOLDINGS}}.$$

Portfolio holdings that are not stock consist primarily of options and convertible debt. As discussed earlier, options provide a levered channel through which traders can profit from their private information regarding the underlying stocks. Options also allow traders to profit from private information regarding the volatility of underlying stocks. Similar arguments also apply to convertible debt. Thus, we expect that portfolio holdings are more likely to contain private information the higher the proportion of nonstock holdings. A negative coefficient on STOCK_RATIO would be consistent with the proprietary information hypothesis.

We use three illiquidity measures to test the importance of how the liquidity of hedge fund positions affects the disclosure decision: the STOCK_RATIO (as just discussed), the Amihud (2002) illiquidity measure, and firm size. We use STOCK_RATIO as a measure of illiquidity, since nonstock holdings such as convertible debt and options are traded less frequently and are thus more illiquid than stocks. The Amihud illiquidity measure is calculated as the average daily illiquidity during the quarter preceding the 13F filing quarter (where daily illiquidity is calculated as the absolute return divided by the dollar trading volume on that day):

$$(2) \qquad\qquad \text{ILLIQ}_Q \quad = \quad \frac{1}{N} \sum_{t=1}^{N} \frac{|\text{RET}_t|}{\text{VOL}_t \times \text{PRC}_t},$$

where ILLIQ_Q is quarterly illiquidity, N is the number of days in the quarter, and RET_t, VOL_t, and PRC_t are the daily return, trading volume, and the price on day t, respectively. We employ size as a measure of illiquidity as stocks of smaller firms are in general more illiquid. We measure size as the market capitalization of the firm's equity at the quarter end preceding the 13F filing quarter. The hypothesis that hedge funds are more likely to require confidential treatment of illiquid positions predicts negative coefficients on the STOCK_RATIO and size, and a positive coefficient on the Amihud illiquidity measure.

We include book-to-market, momentum, and the *filing period* return as control variables. Momentum is measured as the 12-month cumulative raw return preceding the 13F filing quarter. All independent variables are standardized to have

a mean of 0 and a variance of 1. We also normalize the stock return measures (for the *filing quarter*, *filing period*, and *confidential period*) to average daily returns. The probit regressions are estimated with advisor and time fixed effects, and standard errors are clustered with respect to time.

The results of our probit analysis are presented in Table 5. The table gives the results of six specifications that differ on i) how cumulative stock returns are calculated (raw returns, market-adjusted returns, and characteristic-based-

TABLE 5

Probit Analysis of Reported and Confidential Holdings for Confidential Filings

Table 5 reports the results from a probit analysis of the portfolios of "reported" and "confidential" holdings for confidential treatment filings. For each 13F confidential treatment filing, we form two portfolios: one made up of the reported holdings and the other made up of the confidential holdings. The dependent variable in the probit is set equal to 1 for the confidential holdings portfolio and is set equal to 0 for the portfolio of reported holdings. Independent variables include log(SIZE), BOOK-TO-MARKET ratio, log(ILLIQUIDITY), MOMENTUM, FILING_QUARTER_RETURN, FILING_PERIOD_RETURN, CONFIDENTIAL_PERIOD_RETURN, and STOCK_RATIO. SIZE is the market value and BOOK-TO-MARKET ratio is the book value divided by market value at the quarter end preceding the filing quarter. ILLIQUIDITY is the average daily illiquidity in the quarter preceding the filing quarter, where the daily illiquidity is measured as the absolute change in stock return per dollar trading volume on that day (Amihud (2002)). MOMENTUM is the cumulative raw return of a stock over the 12-month period preceding the filing quarter. The table gives the results of six specifications that differ on how cumulative stock returns are calculated (raw returns, market-adjusted returns, and characteristic-based-benchmark-adjusted returns) and by whether or not log(SIZE) is included as an independent variable. The market-adjusted returns are equal to raw returns minus the Center for Research in Security Prices value-weighted market returns. The characteristic-based-benchmark-adjusted returns are equal to raw returns minus the characteristic-based-benchmark returns (Daniel et al. (1997)). The portfolio characteristics and returns are the value-weighted average characteristics and returns of the stocks in each portfolio. STOCK_RATIO is the number of stock holdings divided by the total number of holdings in each portfolio. All independent variables are standardized to have a mean of 0 and a variance of 1. We also normalize the stock return measures (filing quarter, filing period, and confidential period) to average daily returns. The probit regressions are estimated with advisor and time fixed effects, and standard errors are clustered with respect to time. The coefficients, *t*-statistics (in parentheses), and the marginal effects (in italics) for each probit model are presented. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

| Variable | Raw Returns | | Market-Adjusted Returns | | Characteristic-Based-Benchmark-Adjusted Returns | |
| | | | | Model | | |
	1	2	3	4	5	6
log(SIZE)	−0.337**		−0.351**		−1.125**	
	(−2.06)		(−2.13)		(−2.43)	
	*−0.134** *		*−0.140** *		*−0.449** *	
BOOK-TO-MARKET	0.313**	0.357**	0.297**	0.342**	−0.001	−0.016
	(2.09)	(2.14)	(2.04)	(2.13)	(−0.01)	(−0.12)
	*0.125** *	*0.143** *	*0.118** *	*0.136** *	*−0.001*	*−0.006*
log(ILLIQUIDITY)	−0.072	0.151	−0.077	0.158	−0.782	0.356***
	(−0.36)	(1.52)	(−0.39)	(1.61)	(−1.64)	(2.60)
	−0.029	*0.060*	*−0.031*	*0.063*	*−0.312* *	*0.142*** *
MOMENTUM	0.096	0.117	0.088	0.110	0.115	0.042
	(0.57)	(0.68)	(0.51)	(0.63)	(0.72)	(0.27)
	0.038	*0.047*	*0.035*	*0.044*	*0.046*	*0.017*
FILING_QUARTER_RETURN	1.279***	1.357***	1.235**	1.307***	0.344***	0.301**
	(2.61)	(2.89)	(2.48)	(2.74)	(2.61)	(2.38)
	*0.510*** *	*0.541*** *	*0.493*** *	*0.521*** *	*0.137*** *	*0.120** *
FILING_PERIOD_RETURN	0.043	0.039	0.034	0.030	−0.092	−0.124
	(0.23)	(0.22)	(0.28)	(0.26)	(−0.56)	(−0.77)
	0.017	*0.015*	*0.014*	*0.012*	*−0.036*	*−0.049*
CONFIDENTIAL_PERIOD_RETURN	0.536**	0.525***	0.468*	0.446*	0.752*	0.696*
	(2.53)	(2.63)	(1.81)	(1.84)	(1.96)	(1.87)
	*0.214** *	*0.209*** *	*0.187* *	*0.178* *	*0.300* *	*0.277* *
STOCK_RATIO	−0.324*	−0.365**	−0.301*	−0.343*	−0.288*	−0.317*
	(−1.74)	(−1.98)	(−1.65)	(−1.91)	(−1.75)	(−1.82)
	−0.129 *	*−0.146** *	*−0.120* *	*−0.137* *	*−0.115* *	*−0.127* *
Constant	−1.805**	0.229	0.354	−2.477**	0.214	−2.627**
	(−2.11)	(0.39)	(0.51)	(−2.25)	(0.30)	(−2.06)
No. of obs.	302	302	302	302	278	278

benchmark-adjusted returns) and ii) whether or not size is included as an independent variable. In addition to reporting coefficients and *t*-statistics, the table also reports marginal effects for each probit model. Consistent with the proprietary information hypothesis, we find for all six specifications that the coefficient on the *confidential period* return is positive and statistically significant. Focusing on the specification in column 5, the coefficient implies a marginal effect of 0.30, which indicates that a one-standard-deviation increase in the *confidential period* return is associated with a 30.0% increase in the probability that the manager chooses to seek confidentiality. This result is robust across each measure of portfolio returns.

We also find that the coefficient on the *filing quarter* return is positive and significant across all six specifications. This finding implies that managers are more likely to seek confidential treatment of positions that have performed well in the past. This result is consistent with the proprietary information hypothesis that managers seek to keep ongoing profitable investment strategies confidential. Furthermore, the positive and significant coefficient on the *filing quarter* return is not consistent with an alternative hypothesis that hedge fund managers attempt to hide past losers in order to "window dress" their portfolios.[11]

Also consistent with the proprietary information hypothesis, we find that the coefficient on STOCK_RATIO is negative and significant. This finding implies that hedge fund managers that seek confidentiality are more likely to request confidential treatment of nonstock positions than stock positions. Focusing on the specification in column 1, the coefficient implies that a one-standard-deviation decrease in STOCK_RATIO is associated with a 12.9% increase in the likelihood of confidential treatment.

The negative coefficient on STOCK_RATIO is also consistent with the hypothesis that hedge funds are more likely to seek confidential treatment of illiquid positions. The negative and statistically significant coefficient on size is also consistent with the illiquidity hypothesis; the smaller the size, the more likely managers choose to seek confidential treatment of the position. We also run the probit regression after excluding the size variable, because the Amihud (2002) illiquidity measure is highly correlated with size. In all three specifications, the coefficient on illiquidity is positive, but it is only significant in the last specification.

In summary, the results of our probit analysis suggest that protection of proprietary information and concerns about illiquidity are important to the hedge fund managers' disclosure decision. The evidence is not consistent with managers seeking confidential treatment to window-dress portfolios in order to hide poor past performance.

C. Abnormal Returns of Confidential Holdings Over the Confidential Period

The results of the probit analysis suggest that hedge fund managers are more likely to seek confidential treatment of those securities that subsequently have

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[11]We note that the coefficient on the *filing period* return is not significant. One possible explanation for this finding is that the *filing period* return horizon is relatively short. Another possibility is that the decision to seek confidentiality may be tied to whether or not the private information is revealed during the *filing period*.

greater post-filing returns as measured over the *confidential period*. In this section, we test whether the confidential holdings actually outperform their benchmarks. The results of this analysis are not only of interest to the disclosure decision that hedge fund managers make, but also to the broader question of the extent to which hedge fund performance reflects managerial skill (i.e., choosing not to disclose securities that *subsequently* perform well would be inconsistent with luck driving the returns).

To test for abnormal stock price performance over the *confidential period*, we follow the standardized abnormal return approach for measuring statistical significance outlined in Dodd and Warner (1983). Two aspects of this method are especially important for our purposes. First, the method allows us to control for the fact that the interval over which *confidential period* returns are measured varies across our sample of 13F confidential treatment filings. As discussed earlier, the confidential return interval varies across managers and over time because the confidential period itself is part of the confidentiality request. In addition, the standardized abnormal return procedure allows us to control for differences in portfolio variances that can be driven, in part, by differences in the number of stocks that comprise each confidential treatment portfolio.

We assume that continuously compounded excess returns for portfolio j at day t (denoted by $\mathrm{ER}_{j,t}$) have a normal distribution with a mean of 0 and a variance of σ_j^2. The cumulative excess return ($\mathrm{CER}_{j,t}$) for each portfolio j is the sum of the continuous compounded returns over the confidential period from day d_{1j} (the 13F filing date) to day d_{2j} (the add-new-holdings amendment date). Specifically,

$$(3) \qquad \mathrm{CER}_{j,t} \quad = \quad \sum_{t=d_{1j}}^{t=d_{2j}} \mathrm{ER}_{j,t}.$$

The cumulative excess returns are standardized by dividing by the estimated standard deviation $\hat{\sigma}_j$ times the square root of the number of days in the confidential period for that portfolio:

$$(4) \qquad \mathrm{SCER}_{j,t} \quad = \quad \frac{\mathrm{CER}_{j,t}}{\hat{\sigma}_j \sqrt{d_{2j} - d_{1j} + 1}}.$$

The resulting standardized cumulative excess return (SCER) is assumed to have a standard normal distribution with a mean of 0 and a variance of 1. The average SCER (across portfolios) multiplied by the square root of the number of the portfolios N is assumed to be unit normal:

$$(5) \qquad \frac{\sum_{j=1}^{N} \mathrm{SCER}_j}{N} \cdot \sqrt{N} \quad \sim \quad N(0, 1).$$

We estimate the standard deviations of portfolio excess returns $\hat{\sigma}_j$ using the 150 trading days preceding the 13F *filing quarter*, with a requirement of a minimum of 30 nonmissing daily excess return observations. If there are fewer than 30 nonmissing observations available, the 150 trading days after the confidential

period are also used. The filing quarter, the filing period, and the confidential period are also included in the estimation if there are still fewer than 30 nonmissing observations available to estimate the standard deviation.

Table 6 reports average raw and adjusted stock returns for the Reported and Confidential Holdings portfolios over the various analysis periods we consider. The table also reports the average CERs calculated based on Dodd and Warner (1983). We focus the discussion here on the *confidential period* stock price performance. The results show that the confidential holdings earn positive and significant

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TABLE 6

Portfolio Returns of Reported and Confidential Holdings for Confidential Treatment Filings

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Table 6 reports the average returns of "reported" and "confidential" holdings portfolios over four analysis periods: the filing quarter, the post-filing quarter, the filing period, and the confidential period. To test for abnormal stock price performance over the confidential period, we follow the standardized abnormal return approach for measuring statistical significance outlined in Dodd and Warner (1983). We assume that continuously compounded excess returns for portfolio j at day t (denoted by $ER_{j,t}$) have a normal distribution with a mean of 0 and a variance of σ_j^2. The cumulative excess return ($CER_{j,t}$) for each portfolio j is the sum of the continuously compounded returns over the confidential period from day d_{1j} (the 13F filing date) to day d_{2j} (the add-new-holdings amendment date). Specifically,

$$CER_{j,t} = \sum_{t=d_{1j}}^{t=d_{2j}} ER_{j,t}.$$

The CERs are standardized by dividing by the estimated standard deviation $\hat{\sigma}_j$ times the square root of the number of days in the confidential period for that portfolio:

$$SCER_{j,t} = \frac{CER_{j,t}}{\hat{\sigma}_j \sqrt{d_{2j} - d_{1j} + 1}}.$$

The resulting standardized cumulative excess return (SCER) is assumed to have a standard normal distribution with a mean of 0 and a variance of 1. The average SCER (across portfolios) multiplied by the square root of the number of the portfolios N is assumed to be unit normal:

$$\frac{\sum_{j=1}^{N} SCER_j}{N} \cdot \sqrt{N} \sim N(0,1).$$

We estimate the standard deviations of portfolio excess returns $\hat{\sigma}_j$ using the 150 trading days preceding the 13F filing quarter, with a requirement of a minimum of 30 nonmissing daily excess return observations. If there are fewer than 30 nonmissing observations available, the 150 trading days after the confidential period are also used. The filing quarter, the filing period, and the confidential period are also included in the estimation if there are still fewer than 30 nonmissing observations available to estimate the standard deviation. The average CERs across portfolios of "reported" or "confidential" holdings and their statistical significance are reported in the table. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Variable	Reported Holdings			Confidential Holdings			Difference		
	n	Mean	% Positive	n	Mean	% Positive	n	Mean	% Positive
Panel A. Raw Return (%)									
Filing quarter	182	5.81***	71.04***	170	9.90***	71.93***	352	4.09**	0.89
Post-Filing quarter	181	1.97**	58.47**	158	4.08**	66.08***	339	2.11	7.61
Filing period	181	1.32*	57.38**	170	2.71**	61.40***	351	1.38	4.03
Confidential period	181	3.44**	59.02***	163	6.10***	64.32***	344	2.66	5.31
Confidential period (CER)	180	2.19***	61.11***	163	3.96***	63.80***	343	1.77	2.69
Panel B. Market-Adjusted Return (%)									
Filing quarter	182	4.60***	73.22***	170	9.06***	77.78***	352	4.45***	4.55
Post-Filing quarter	181	0.96	55.19	158	2.97*	60.23***	339	2.02	5.04
Filing period	181	0.32	56.83*	170	1.49	54.97	351	1.17	−1.86
Confidential period	181	−0.28	51.91	163	3.88**	63.74***	344	4.16**	11.83**
Confidential period (CER)	180	−0.85	55.00	163	2.89***	60.74***	343	3.74*	5.74
Panel C. Characteristic-Based-Benchmark-Adjusted Return (%)									
Filing quarter	182	2.36***	65.93***	150	7.90***	72.00***	332	5.55***	6.06
Post-Filing quarter	179	0.00	46.15	135	1.83	54.00	314	1.83	7.85
Filing period	181	0.03	54.39	149	1.38	50.67	330	1.35	3.73
Confidential period	180	−1.96***	40.66**	144	3.15**	66.00***	324	5.12***	25.34***
Confidential period (CER)	179	−2.82	49.72	143	2.38***	62.24**	322	5.20***	12.52**

abnormal returns over the *confidential period*.[12] Specifically, the average *confidential period* cumulative market-adjusted and characteristic-based-benchmark-adjusted returns of the Confidential Holding portfolio are 2.89%($p = 0.0001$) and 2.38%($p = 0.001$), respectively. In contrast, the average *confidential period* cumulative abnormal return of the Reported Holdings portfolio is not statistically significant from 0. The difference between the Confidential Holdings and Reported Holdings portfolio returns is 3.74%($p = 0.10$) for market-adjusted returns and 5.20%($p = 0.01$) for characteristic-based-benchmark-adjusted returns. The percent positive tests confirm the above findings. Overall, the results here are consistent with the proprietary information hypothesis that hedge fund managers seek confidential treatment to protect private information about stock fundamentals and trading strategies.[13,14]

D.   Hedge Fund Portfolio Returns and Confidential Holdings

Our analysis in the previous section focuses on the abnormal returns to undisclosed equity positions to provide evidence that hedge fund advisors use confidential treatment to protect private information about stock fundamentals. Although we find that undisclosed positions earn positive abnormal returns over the *confidential period*, two questions remain unanswered. First, how do positions that do not require disclosure (e.g., short positions) perform over the *confidential period*? Second, to what extent does confidential treatment contribute to the success of hedge fund *investors*? To address these questions, we study the overall portfolio returns of the TASS-matched subsample for which portfolio returns are available.

We estimate the following pooled regression model to test whether usage of confidential treatment is a determinant of portfolio returns:

$$
\text{(6a)} \qquad \text{PRET}_{i,t+k} = \alpha + \beta_{i,t}\text{MKTRF}_{t+k} + \gamma\text{CTUSE}_{i,t} \\
+ \Sigma_j \beta_j\text{CONTROL}_{j,t+k} + \varepsilon_{i,t+k},
$$

$$
\text{(6b)} \qquad \beta_{i,t} = b_0 + b_1\text{CTUSE}_{i,t} + u_{i,t},
$$

---

[12] As noted earlier, 18 confidential treatment requests in our sample corresponding to seven separate advisors were denied by the SEC. Our findings here are qualitatively unchanged when these filings are excluded from the sample. In untabulated analysis, we find that denied requests tend to have more stocks and weaker *filing quarter returns*. Moreover, the *confidential period* abnormal returns to confidential positions that were denied by the SEC are insignificantly different from 0. This finding is consistent with the SEC's authority to deny confidential treatment requests that are not aimed at protecting ongoing profitable transactions and trading strategies. We caution that it is difficult to draw definitive conclusions regarding the denied filings given the small sample size.

[13] For example, merger arbitrage is one well-known trading strategy (see, e.g., Mitchell and Pulvino (2001)). In our sample, 19.9% of the confidential holdings were targets at the time of the disclosure decision as compared to only 7.4% of disclosed holdings. This difference is significant at the 1% level. Consistent with the proprietary information hypothesis, we find that confidential targets are associated with higher success rates (92.4% vs. 88.3%; significant difference at the 5% level).

[14] We also examine (as suggested by the referee) the stock price performance over the 12 months following the confidential period (in the spirit of Coval and Stafford (2007)) for evidence of whether there is a reversal in stock price performance. Our examination shows no evidence of a reversal for either the full sample or the subsample of firms where there has been an accumulation in shares over the confidential period (and where we would most likely observe a price pressure effect). This bolsters confidence in our conclusion that the confidential period abnormal returns reflect proprietary information that hedge fund managers have at the time they make the decision to seek confidentiality.

where u_{it} is a zero-mean independent noise term that is uncorrelated with each independent variable. The dependent variable, $PRET_{i,t+k}$ is the excess portfolio return of advisor i during the kth month ($k = 1, 2, 3$) following quarter t. Excess returns are computed by subtracting the 1-month T-bill rate from raw returns.

The key independent variable in the above regression model is based on a fund manager's reported holdings at the end of each quarter. $CTUSE_{it}$ is the proportion of advisor i's 13(f)-reportable holdings in quarter t that are reported separately (not reported to the public) in a confidential treatment filing. From γ we can infer the marginal effect of the proportion of undisclosed holdings (in a confidential treatment filing) on the monthly portfolio returns over the post-filing quarter. Our earlier finding that the positions reported in confidential treatment filings are associated with abnormal stock returns suggests that an investment in the manager's underlying hedge funds will also be profitable. Therefore, to the extent that the funds' other holdings don't offset these gains and that the net gains are not completely captured by the hedge fund advisors, we expect the coefficient on CTUSE to have a positive sign.

The regression model also includes the monthly return on the value-weighted NYSE, AMEX, and NASDAQ index minus the 1-month T-bill rate (MKTRF). Models relating portfolio returns with fund attributes may be misspecified if variation in the attribute proxies for variation in the fund's exposure to factor risk. This concern is relevant here because we find that the characteristics of confidentially held securities are significantly different from those that are disclosed. For example, option positions are more likely to be reported separately in the confidential treatment filing, and options might significantly alter a fund's risk exposure. Therefore, in the regression we allow a fund advisor's market risk exposure to vary with the extent of confidential treatment. In effect, our approach here represents a conditional performance evaluation model in the sense that we allow a fund's risk exposure to vary across market conditions (see, e.g., Ferson and Schadt (1996)).

We estimate the regression model using all available nonbackfilled returns over the 1999–2006 period. Advisor-level returns are equal-weighted averages of their individual fund returns.[15] As control variables, we include the return on size, book-to-market, and momentum benchmark portfolios, quarterly fixed effects, the advisor's lagged quarterly AUM (aggregated across funds), and the advisor's lockup and redemption notice period (averages across funds). Standard errors are clustered by quarter and account for heteroskedasticity.

The results, reported in Table 7, show that hedge fund portfolio returns are significantly higher following quarters with greater usage of confidential treatment. For example, we estimate that an increase in the proportion of confidential positions from 0% to 10% is associated with higher excess portfolio returns of about 21 bp per month (model 2). This finding adds to our earlier evidence on the proprietary information hypothesis that is based solely on the observed returns to 13(f)-reportable securities. Specifically, because portfolio returns reflect the performance of both the reportable and nonreportable positions, they provide

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[15]We find very similar results when we calculate advisor returns as the asset-weighted average of the underlying fund returns.

TABLE 7

Hedge Fund Portfolio Returns and Confidential Treatment Usage

Table 7 reports coefficient estimates from the following regression model:

$$\text{PRET}_{i,t+k} = \alpha + \beta_{i,t}\text{MKTRF}_{t+k} + \gamma\text{CTUSE}_{i,t} + \sum_j \beta_j\text{CONTROL}_{j,t+k} + \varepsilon_{i,t+k},$$

$$\beta_{i,t} = b_0 + b_1\text{CTUSE}_{i,t} + u_{i,t}.$$

The dependent variable ($\text{PRET}_{i,t+k}$) is the excess portfolio return of advisor i during the kth month following quarter t ($k = 1, 2, 3$). Excess returns are computed by subtracting the 1-month T-bill rate from raw returns. Advisor-level returns are equal-weighted averages of underlying individual fund monthly returns. The key independent variable, $\text{CTUSE}_{i,t}$, is the proportion of advisor i's 13(f)-reportable holdings in quarter t that are reported separately in a confidential treatment filing. MKTRF is the market return in excess of the 1-month Treasury yield. Control variables include the monthly return on size (SMB), book-to-market (HML), and momentum (UMD) benchmark portfolios; the advisor's lagged quarterly assets under management (AUM); and the advisor's lockup and redemption notice periods. Quarter fixed effects are included in all models. Models 1–2 include portfolio returns that are dated before the fund was added to the database (backfilled data), and models 3–4 exclude backfilled data. Standard errors are clustered by quarter and account for heteroskedasticity. *, **, and ** indicate significance at the 10%, 5%, and 1% levels, respectively.

Variable	Model			
	1	2	3	4
CTUSE	1.950**	2.112***	1.671**	1.897***
	(2.61)	(3.45)	(2.22)	(3.05)
MKTRF	0.329***	0.329***	0.341***	0.333***
	(10.10)	(10.57)	(9.50)	(9.28)
SMB	0.254***		0.241***	
	(9.25)		(8.80)	
HML	0.140***		0.159***	
	(3.30)		(4.22)	
UMD	0.002		0.005	
	(0.09)		(0.29)	
MKTRF × CTUSE	−0.163	0.019	−0.218	0.021
	(0.76)	(0.14)	(1.00)	(0.16)
SMB × CTUSE	0.057		0.055	
	(0.43)		(0.46)	
HML × CTUSE	0.377		0.455	
	(1.28)		(1.49)	
UMD × CTUSE	−0.271		−0.346*	
	(1.34)		(1.77)	
Lockup?	0.030	0.029	−0.045	−0.041
	(0.27)	(0.27)	(0.45)	(0.42)
log(1 + REDEMPTION_NOTICE_PERIOD)	0.223*	0.224*	0.267**	0.257**
	(1.75)	(1.76)	(2.29)	(2.28)
log(AUM)	−0.084*	−0.084*	−0.078	−0.074
	(1.97)	(1.95)	(1.57)	(1.51)
Constant	0.981	1.238*	0.641	0.889
	(1.55)	(1.96)	(0.91)	(1.26)
No. of obs.	5,813	5,813	5,336	5,336
No. of quarters	31	31	31	31
R^2	0.12	0.07	0.12	0.08

a more complete measure of the value of the advisor's proprietary information. In addition, because portfolio returns are measured net of fees, the results here suggest that the gains associated with confidential treatment are at least partially captured by hedge fund investors.

IV.   Conclusions

In this study, we use a sample of Form 13F confidential treatment filings to investigate the determinants of hedge fund managers' disclosure decisions. Consistent with the hypothesis that managers seek confidentiality to protect

proprietary information, we find that positions that are not disclosed to the public in confidential treatment filings earn significantly positive abnormal returns over the post-filing period over which the positions are not revealed to the public. We also find that proprietary information (as proxied by the post-filing performance over the confidential period) is an important determinant of the decision to seek confidential treatment of individual positions. These findings, taken together with evidence that fund advisors are more likely to seek confidential treatment of positions that have been performing well in the past, suggest that managers seek confidential treatment in order to protect proprietary information that is used to generate superior returns.

We also find evidence suggesting that hedge fund managers seek confidential treatment in order to avoid the costs of front-running by outsider investors who anticipate a fund's trades and then trade against the fund. Specifically, we find that fund advisors are more likely to seek confidential treatment of illiquid securities that are more susceptible to front-running by third-party investors. Reducing front-running costs acts to increase the returns associated with identifying profitable trading strategies.

Finally, our analysis does not reveal a dark side to confidentiality requests by hedge fund managers. Specifically, we do not find any evidence that hedge fund advisors seek confidentiality in order to hide poorly performing fund positions. Furthermore, our analysis of after-fee portfolio returns shows that the gains associated with confidential treatment appear to accrue, at least in part, to hedge fund investors. Overall, our analysis suggests that there are important benefits of reduced disclosure that should be taken into account in the current policy debate on hedge fund transparency.

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