Discretion, Managerial Incentives, and Market Conditions: The Misreporting of Hedge Fund Returns

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Abstract

Jeremiah R. Green: Discretion, managerial incentives, and market conditions:
The misreporting of hedge fund returns
(Under the direction of John Hand)

In this study, I document patterns in hedge fund returns that suggest that reporting manipulation is significant and pervasive for hedge funds with discretion in valuing their portfolios of illiquid assets. I show that hedge funds with such discretion report Sharpe ratios that are twice as large as do funds without discretion. I document that manipulation extends beyond the small-loss-to-small-gain kink in the pooled distribution of hedge fund returns to the shoulders and tails of the distribution. I also find that contractual incentives are associated with a larger likelihood of reporting small gains and less extreme returns. Finally, I show that funds with the most discretion report monthly returns that are on average 0.8% higher than funds without discretion. During market downturns, the difference in reported returns between funds with and without discretion increases to 1.3%. These findings bear on the current debates regarding hedge fund regulation, standard-setting for fair-value accounting, and the role of information during market crises.

To Tammy

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I. Introduction

The substantial discretion hedge fund managers have in reporting performance concerns the SEC, FBI, Congress, practitioners, and the media, who suggest that reporting manipulation[1] is common and problematic. [2] However, empirical evidence on such manipulation is limited. In this paper, I investigate the extent and significance of reporting manipulation by examining patterns in the reported returns of carefully selected subsamples of hedge funds that vary in the liquidity of the assets they hold in their portfolios. Regulatory bodies have identified asset illiquidity as a potential indicator of hedge fund fraud because hedge fund managers may misstate the value of illiquid assets, which are difficult to value.[3] I find evidence of reporting manipulation in patterns in the conditional and unconditional distributions of hedge funds' reported returns that are difficult to reconcile with alternative explanations. The results suggest that for funds investing in illiquid assets, reporting manipulation distorts the entire unconditional return distribution, measures of fund performance such as the Sharpe ratio, the relation between

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[1] Throughout the paper, I define manipulation as any reporting action by managers that makes reported returns differ from economic returns. This definition for manipulation encompasses deliberate attempts to alter reported returns as well as a failure to incorporate information available to managers into the valuation of assets.

[2] http://www.sec.gov/answers/hedge.htm, http://www.fbi.gov/page2/march07/hedge_fund.htm, http://grassley.senate.gov/news/Article.cfm?customel_dataPageID_1502=19024, http://www.bis.org/publ/joint24.pdf, http://www.markovprocesses.com/download/mpi_Madoff_Fraud_Analysis_2008Q4.pdf, http://kanjorski.house.gov/index.php?option=com_content&task=view&id=1571&Itemid=114,Aiken (2010), Bollen and Pool (2009).

[3] http://www.fbi.gov/page2/march07/hedge_fund.htm,

reported returns and contractual provisions, and the sensitivity of reported performance to market downturns.

In my analyses, I focus on two types of reporting manipulation, specifically, overstating returns and return smoothing. Hedge fund managers have incentives to smooth reported returns in order to inflate Sharpe ratios—a crucial performance metric for most hedge fund managers—and to overstate returns to increase the frequency of reporting positive raw returns, consistent with hedge funds' emphasis in marketing themselves as "absolute return" investors.

Because it is difficult to identify evidence of reporting manipulation empirically, and because such evidence may be consistent with alternative explanations, I select a subset of hedge funds for which manipulation and alternative explanations produce different expectations for patterns in the reported return distribution. Thus, sample selection is a critical aspect of my research design. I select and compare subsamples of funds investing in the least liquid and the most liquid assets and use the illiquidity of fund investments as a proxy for the level of managerial reporting discretion to distinguish between managers with varying levels of discretion in valuing their portfolios. I use two proxies for the level of portfolio illiquidity, namely funds with a private vs. a public equity focus and funds that do and do not have contractual provisions (specifically, long lock-up periods and restrictions on investors' withdrawals) that increase funds' ability to invest in illiquid assets.[4] Private equity funds invest in start-up companies, leveraged buy-outs, real estate, and private investments in public equity (PIPES), among other investments with relatively illiquid markets. Unlike private equity funds, which have low

[4] Throughout the paper, I refer to funds with an investment focus on private equity as private equity funds and those with an investment focus on public equity as public equity funds.

liquidity and thus a high level of discretion, public equity funds have high liquidity and a low level of discretion. Similarly, funds that place restrictions on investors' withdrawals are more likely than funds without these restrictions to invest in illiquid assets and to have discretion in valuing their portfolios. .

I use two proxies for the variation in managers' incentives to manipulate reported returns to achieve key performance targets. The first is whether a fund has a "high water mark" provision that allows managers to collect performance fees only after prior losses are recovered in gains. This contractual incentive provides a strong incentive for managers to report gains. The second proxy is whether excess market returns are negative. During market downturns, managers have an increased incentive to report relatively higher returns to reduce the risk of fund outflows as investors withdraw funds from poorly performing investments.

I evaluate patterns in common outcomes of reported hedge fund performance that are likely to influence hedge fund investors' decision making, are consistent with reporting manipulation, and are difficult to reconcile with other explanations. In doing so, I answer the following questions: (1) How large is the effect of manipulation on common hedge fund performance measures? (2) To what degree does manipulation distort the measured relation between contractual incentives and reported performance (Agarwal, Daniel, and Naik, 2009a; Cornett, Marcus, and Tehranian, 2008)? (3) And how do market conditions affect manipulation?

I first test whether the evidence of manipulation in the pooled distribution of hedge fund returns extends beyond the small-loss-to-small-gain kink documented in Bollen and Pool (2009). I find that the effects of reporting manipulation extend beyond this kink to the shoulders and tails of the return distribution. Funds investing in illiquid assets (high discretion funds), in particular private equity hedge funds, have fewer than expected losses of *all* magnitudes, fewer than expected large gains, and more than expected small-to-moderate gains. Second, I find that private equity funds report Sharpe ratios that are two times higher than those of public equity funds and have 7% fewer losses, despite expectations based on prior research that would predict the opposite result (Cochrane, 2005). Although I cannot directly attribute the difference in Sharpe ratios to manipulation, the large difference between funds with more vs. less reporting discretion, combined with the other results in this study, suggests that the effects of manipulation have a substantial economic effect on reported performance.

To determine whether manipulation distorts the relation between reported returns and provisions in hedge fund managers' compensation contracts, I examine the effects of key contractual provisions on reported returns across the distribution of returns. Agarwal, Daniel, and Naik (2009a) find a positive relation between contractual provisions (high water marks and long restriction periods on investor redemptions) and performance. Using quantile regressions, I relax the assumption that the effect of these contractual provisions on performance is constant across the return distribution. Results show that high water marks and restriction periods are positively associated with fund returns for quantiles of the return distribution with losses and small-to-moderate gains; however, in contrast to the evidence in Agarwal, Daniel, and Naik (2009a), these contractual provisions are negatively associated with returns for quantiles with moderate-to-large gains. These findings are more consistent with the effects of reporting manipulation on the distribution of reported returns than with a positive effect of discretion and incentives on performance. Further supporting the conclusion that contractual provisions are associated with reporting manipulation, results indicate that the kink in the distribution is strongest for funds with high water mark provisions. Additionally, I find that high water mark provisions and longer restriction periods on investor redemptions have become more prevalent for private equity funds in the last years the sample period. Accordingly, the kink in the return distribution is strongest in the last years of the sample. Taken together, these findings suggest that manipulation is significant because it distorts the relation between contractual provisions and reported performance.

Finally, I test whether funds with greater discretion report higher returns than do funds with less discretion during market downturns after controlling for other determinants of fund returns. On average, funds with the most discretion report monthly returns that are 0.8% higher than funds with the least discretion, increasing to 1.3% during market declines. However, there is notably no difference in mean reported returns for periods with the most extreme market losses. I conclude that managers use their discretion in valuing their portfolios to report relatively better performance, particularly during market downturns. However, during market crises managers are forced to liquidate their illiquid portfolios, thus providing an observable market price and reducing reporting discretion.

I contribute to the hedge fund literature by providing an upper-bound estimate of the economic magnitude of reporting manipulation by comparing the performance of funds with the most vs. the least discretion in valuing their assets. This study also contributes to the hedge fund literature by showing that the positive relation between reported hedge fund returns and contractual incentives documented in Agarwal, Daniel, and Naik (2009b) is distorted by the effects of manipulation such that the relation is non-linear in the distribution of reported returns. My findings also support the legitimacy of concerns raised in recent accounting studies that managers opportunistically mark assets to market in order to manage reported performance (Dechow, Myers, and Shakespeare, 2009). Finally, I contribute to the hedge fund and fair-value literatures as well as to research on the recent economic crisis by showing that manipulation is likely to be greatest during moderate market downturns, but not during the periods of market crisis. The evidence from the present study informs current efforts to regulate hedge funds as well as the standard-setting debate on fair-value accounting.

The next section provides background on hedge funds and develops the hypotheses tested in this paper. Section 3 briefly discusses recent related research; section 4 discusses the empirical tests. Section 5 presents the data and section 6 reports the results, robustness tests, and several caveats. In Section 7, I present some additional analyses, and in section 8 I conclude.

II. Background and hypothesis development

In this study, I examine two types of manipulation: performance smoothing and the achievement of salient performance targets (Graham, Harvey, and Rajgopal, 2005; Burgstahler and Dichev, 1997). Because these types of manipulation have been extensively studied in prior earnings management research, I only briefly describe them here to provide some background on hedge funds and on the application of these two types of manipulation to the hedge fund setting. As I argue below, the incentives for these two types of manipulation are very strong for hedge fund managers.

Underlying the discussion is the intuition that manipulation is only possible if managers have discretion in setting fair value estimates. Accordingly, I expect the effects of both types of manipulation to be greatest for the most illiquid funds.

2.1 Hedge funds and hypothesis development

Hedge funds are largely unregulated investment institutions open to institutional and wealthy individual investors. These funds typically avoid SEC filing requirements by making private placements to qualified investors, which are either individuals with a minimum of $1 million in net assets or $200,000 in net income for the prior two years or institutions with a minimum of $5 million in net assets.[5] Hedge funds with assets under

[5] http://www.sec.gov/answers/regd.htm, http://www.sec.gov/answers/rule504.htm, http://www.sec.gov/answers/rule505.htm, http://www.sec.gov/answers/rule506.htm, http://www.sec.gov/answers/accred.htm

management of at least $100 million and holdings of at least 10,000 or more shares or $200,000 must file 13-F forms with the SEC.[6]

Hedge funds have become an increasingly important part of public equity markets (Stulz, 2007). These funds pursue investment strategies in a wide range of traditional asset classes as well as alternative investments (President's Working Group on Financial Markets, 1999). In recent years, hedge funds have also increased their investment in markets traditionally dominated by other investors, such as private equity markets (Goldstein, 2007). The growth in hedge funds and their role during recent economic crises have led to an increase in the call for regulation.

2.2 Smoothing

The artificial smoothing of reported performance has long been a concern in corporate earnings (Hepworth, 1953; Graham, Harvey, and Rajgopal, 2005). Smoothing involves intertemporal shifting to reduce the time-series volatility of performance. In a cross-section, the effect of smoothing is to reduce the variance of the performance distribution. This concern about smoothing has also been expressed in the hedge fund setting (Getmansky, Lo, and Makarov, 2004). Hedge funds have strong incentives to smooth reported returns: Common performance measures used to evaluate hedge funds are directly tied to return volatility. For example, most hedge fund offering documents report Sharpe ratios and return sensitivity to market benchmarks.[7] Common claims by hedge fund managers include that their returns have low volatility, high Sharpe ratios, and a low correlation with the market. Funds can improve all of these measures by smoothing reported returns. Because acquiring and retaining investor funds is crucial for

[6] http://www.sec.gov/divisions/investment/13ffaq.htm

[7] Sharpe ratios are a measure of the reward for bearing risk. They are measured as the fund return minus the risk-free rate divided by the standard deviation of the excess fund return.

hedge funds, and investor flows are sensitive to reported performance, hedge funds have strong incentives to smooth returns to improve their Sharpe ratios and other performance measures.

Strong performance measures reported in public databases are one way for new funds to attract new investors. Therefore, although all managers have an incentive to smooth reported returns, the incentive for inflating Sharpe ratios is strongest in the early stages of a fund's life because the youngest funds typically have the greatest need for acquiring new investment.

2.3 Achieving key performance targets

Prior accounting research has examined managerial incentives to achieve reporting targets. Zero earnings (or changes in earnings) has been used in prior research as a key target (Burgstahler and Dichev, 1997). Hedge funds also have strong incentives to report positive returns. The incentive to report positive returns makes exceeding zero returns an important target in the hedge fund setting. Hedge funds are often marketed as absolute return strategies, and this focus on absolute returns creates an important cutoff for funds with pre-manipulation losses. Secondly, a significant portion of hedge fund revenue is generated by performance fees. These fees make positive reported fund performance crucial to management compensation and even to fund survival (Giannone, 2009). Also, many funds have high water mark provisions that allow managers to collect performance fees only after prior losses have been recovered in gains. These provisions align manager and investor incentives (Agarwal, Daniel, and Naik, 2009a); however, they also create strong incentives for managers to exceed a zero-return threshold.[8] Because

[8] The appendix shows descriptions of the performance fees and high water mark provisions of two institutions with underlying hedge fund operations.

funds with high water mark provisions must recover losses with future gains, losses essentially generate a liability with senior claims on future fund performance. This increases the incentive for managers to report positive returns and makes zero returns a strong performance target. The incentive to report gains is also particularly strong for funds seeking fund inflows. And, similar to the argument for smoothing, young funds have an added incentive to manipulate reported performance so that it exceeds the zero-return threshold.

An alternative explanation for the effects of high water marks on managerial decisions is that as funds fall below their high water mark, managers select riskier investments to increase subsequent return volatility (Ray, 2009). An increase in return volatility increases the option value of future performance fees. However, Panageas and Westerfield (2009) show that this need not always be the case. They demonstrate that because the high water mark has an effectively infinite horizon, the performance fee contract should be thought of as a series of options on future fees. While increasing investment risk increases the present value of the current option, increasing risk in the current period also increases the likelihood of falling below the high water mark in the future, thereby increasing the strike price of all subsequent options. As Panageas and Westerfield (2009) show, under certain conditions, managers do not respond to high water marks with greater risk-taking.

In addition, managers investing in illiquid assets are less likely to make risk-increasing decisions when their funds fall below high water marks. Illiquid assets, particularly investments in private equity, tend to require longer-term investment horizons, and thus the ultimate payoff of investing in illiquid assets may only be realized many periods after the initial investment. Following this argument (and for the setting in this paper), it is unlikely that private equity hedge fund managers increase risk in response to high water marks.

As an additional test of the effect of incentives on reporting manipulation, I examine relative performance between funds with and without discretion during market downturns. Managers face strong incentives to avoid the drain on liquidity caused by investor fund withdrawals during periods of market losses. Because fund flows are sensitive to relative performance among funds (Agarwal, Daniel, and Naik, 2009a), managers have the greatest incentive to manipulate performance to outperform other funds during periods with high risks of fund outflows. Therefore, the incentives for reporting relatively higher returns are particularly strong during market downturns.

If managers with reporting discretion manipulate returns during market downturns, while managers without reporting discretion are constrained from manipulating returns during these periods, then funds with reporting discretion will on average report higher performance than funds without discretion during periods of market losses.

2.4 Constraints

All managers have an incentive to manipulate reported performance; some managers have stronger incentives than others. However, several institutional frictions constrain manipulation. First, concerns about reputation constrain manipulation, leading to truthful reporting (Stocken, 2000). Second, litigation and other legal risks constrain manipulation (Healy and Palepu, 2001; Heninger, 2001). Third, the large concentration of institutional ownership in hedge funds may constrain manipulation (Beatty, Ke, and

Petroni, 2002; Burgstahler, Hail, and Leuz, 2004). Finally, because large institutions measure risk as volatility of returns, large upward or downward manipulations are unlikely in the hedge fund setting.

2.5 Empirical proxies

For this study, I require proxies for the following constructs: the amount of discretion available to managers in determining portfolio values, manager incentives to achieve key targets, and manager incentives to smooth performance. As described previously, I use measures of portfolio illiquidity as proxies for managers' discretion. I use private equity funds and funds with long restriction periods on investors' withdrawals[9] to proxy for funds with high levels of managerial discretion. Accordingly, I expect smoothing and the achievement of zero returns[10] to be strongest in these funds. In contrast, I expect public equity funds and funds with short restriction periods, which I use to proxy for funds with low levels of managerial discretion, to exhibit less smoothing and less achievement of zero-return targets.

Alternatively, the length of the restriction period may also act as a governance mechanism, as described in Agarwal, Daniel, and Naik (2009b). Longer restriction periods may provide a weaker incentive for managers to manipulate performance because there is less concern about investor withdrawals. As the present study involves an empirical proxy, I can only observe the net effect of these two opposing forces. I validate

[9]Two of these important restrictions are lockup provisions and withdrawal restriction periods. Lock up provisions set a minimum period from investment in the fund to the withdrawal of the principal invested. Restriction periods set the minimum time from the investors' request for withdrawal to the funds' obligation to return funds to the investor. For managers investing in less liquid, riskier, or longer-term investments, lockup provisions and restriction periods reduce the risks associated with the need to exit quickly from investments to meet investor demands for withdrawals.

[10] Throughout the paper, I refer to achieving or exceeding zero returns as the incentive to report positive returns.

my use of the restriction period in the descriptive analysis below and acknowledge that the hypotheses are necessarily two-sided because of these alternative explanations.

As proxies for the incentives to achieve key return targets I use a sample of funds with and without high water mark provisions[11] and measure relative performance between funds with and without discretion during market downturns. While I argue that all managers face incentives to inflate Sharpe ratios, I also use fund age as a proxy for managers' incentive to smooth returns and to achieve a zero-return target.

2.6 Hypotheses

In figure 1 I presents four hypothetical cases that illustrate expected differences in manipulation between samples of funds with different levels of discretion and incentives. The figure shows the histograms of observations across these cases, with the fitted curve representing the distribution absent any manipulation.

<u>Case 1: Little discretion, no target</u>

This is the base case. If managers have little discretion and lack a salient performance target, the distribution is unaffected by manipulation. In this case, the empirical distribution and the true distribution are approximately equivalent.

<u>Case 2: Little discretion, salient target</u>

If managers have little discretion, but they have incentives to meet or exceed a zero-return target, reporting manipulation is concentrated in the small loss and small gain

[11] Agarwal, Daniel, and Naik (2009a, b) construct a measure of the option value of the high water mark–performance fee contract. Although the stronger return target is the return that would allow managers to collect a performance fee, this target is measured with error and is likely to increase concerns about the endogeneity of the relationship between performance and this high water mark target. High water mark provisions are set at fund inception and therefore create less concern about an endogenous relationship. Additionally, if funds are on average profitable, then the zero-return target is a reasonable proxy for the true high water mark target. Ray (2009) measures whether funds are below their highwater mark by estimating how far the current period net asset value falls below the historical maximum net asset value. I repeat my tests with this alternative measure and find similar results.

fractions of the distribution. This is equivalent to the results reported in the earnings management research examining a kink in the earnings distribution.

Case 3: High level of discretion, no target

If managers have a high level of discretion, but they do not have an incentive to meet or exceed a zero-return threshold, managers will smooth performance to inflate the Sharpe ratios but will overstate returns to report gains. In this case 3, because managers smooth reported performance, there is a symmetric reduction in the number of extreme losses and gains, leading to a more peaked distribution centered on small to moderate gains.

Case 4: High level of discretion, salient target

If managers have a high level of discretion and the incentive to meet or exceed a zero-return target, they will smooth returns to inflate the Sharpe ratios as well as overstate returns to meet or exceed the zero-return threshold. This will lead to a reduction in the number of observations in the tails of the distribution as well as a kink around zero.

In accordance with these cases, I propose the following set of hypotheses.

H1*: Managers with low levels of discretion and a salient zero-return target report more than expected small gains and fewer than expected small losses.*

H2*: Managers with high levels of discretion and without a salient zero-return target report fewer than expected losses of all magnitudes; fewer than expected large gains; and more than expected small to moderate gains.*

H3*: Managers with high levels of discretion and a salient zero-return target report fewer than expected losses of all magnitudes; fewer than expected large* *gains; more than expected small to moderate gains; more than expected small gains; and fewer than expected small losses.*

H1 through H3 are hypotheses about the distribution of reported returns. The hedge fund setting also suggests certain situation-specific incentives for manipulation. As described previously, managers have an increased incentive to manipulate returns to report relatively higher returns during market downturns. This leads to the following hypothesis:

***H4**: Managers with reporting discretion report higher returns than managers without discretion during periods of market losses.*

Finally, although all funds have the incentive to inflate their reported Sharpe ratios, I hypothesize that, as has been found for venture capital funds (Gompers, 1996), in the early stage of their life-cycle hedge funds face stronger incentives to manipulate reported returns because of the marketing role that their reported returns play in attracting additional capital into the funds.

***H5**: The younger a hedge fund, the more likely it is that managers with reporting discretion will manipulate returns.*

III. Prior research

Many papers have examined earnings management explanations for the shapes of earnings distributions. Burgsthaler and Dichev (1997), for instance, find that there are fewer than expected small losses and more than expected small gains in the distribution of scaled earnings, thus providing evidence that managers manipulate earnings around a zero-earnings target.[12]

Several recent theoretical and empirical studies have examined characteristics of hedge fund contracts with a particular focus on high water mark provisions (e.g., Goetzmann, Ingersoll, and Ross, 2003; Agarwal, Daniel, and Naik, 2009a; Aragon and Qian, 2006; Ray, 2009). Their general conclusion is that high water marks give managers an incentive to work harder. Agarwal, Daniel, and Naik (2009a) find that funds with high water marks and long restriction periods on investor redemptions have higher performance. An alternative view, related to the tests in the present study, argues that because incentives lead to greater reporting manipulation, the relation between incentives and corporate performance may be overstated (Cornett, Marcus, and Tehranian, 2008).

The misreporting of hedge fund returns has only recently been studied. Bollen and Pool (2009) are the first to examine the distribution of hedge fund returns, documenting a kink around zero in the pooled distribution of reported returns for all hedge funds. They also observe that manipulation is greater for funds that invest in distressed securities and weaker for funds investing in public equity. Agarwal, Daniel, and Naik (2009b) test

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[12] I discuss critiques of this literature in the caveats section.

whether funds with greater incentives and opportunities to inflate returns have return spikes in December. They use an estimate of the value of managers' call options on future performance arising from performance fees and high water mark provisions, fund performance relative to similar funds, lockup and restriction periods, and flow-performance sensitivity as proxies for manager incentives for the manipulation of reported returns. They also use fund volatility and liquidity as proxies for managerial opportunity to manipulate returns.

Using the same pricing mechanisms employed by hedge funds to value their investment positions, Cassar and Gerakos (2009) find that funds that provide managers with greater discretion and that use less-verifiable pricing sources have return patterns consistent with intentional smoothing.

IV. Empirical design

In this section, I describe the three sets of tests: (1) distribution-based tests, (2) quantile regressions, and (3) reported performance conditional on market downturns and managerial reporting discretion.

4.1 Distribution-based tests

Testing the hypotheses about the effects of manipulation on reported return distributions requires a benchmark distribution with its associated probabilities. The challenge in these tests is selecting a distribution that approximates the distribution absent reporting manipulation. I use two approaches to do this.

In the first approach, I compare the sample distribution of monthly returns[13] to a distribution fitted to the sample after imposing a kernel density estimate.[14] This approach assumes that the true distribution is a smoothed version of the sample distribution and that deviations are unexpected departures from the true distribution.

In the second approach, I use the fitted kernel density of public equity–oriented hedge funds as the benchmark. In doing so, I assume that the fitted distribution for public

[13] I focus on monthly returns. However, hedge fund performance fees are typically based on quarterly or annual horizons. Therefore, conceptually, a tighter test of the effect of the contractually based incentives to manipulate returns would be performed on the returns measured for the same period over which performance fees are calculated. Unfortunately, the performance fee period is not available in the data, and any arbitrary aggregation of returns would inject noise into the analysis. I repeated the analysis based on calendar quarter and annual aggregated returns and reached similar conclusions. The concern about the aggregation of returns only applies to the performance fee–related incentives; it does not apply to the other incentives to manipulate returns. For the fee-based incentives, monthly returns should display the same effects if manipulation is done on a monthly basis rather than across the performance fee period.

[14] I limit the density estimation to returns between –10% and +10%. This improves the fit of the density estimate by not forcing the estimate to fit the extremes of the distribution, particularly when doing across subsample comparisons. Altering or removing this cutoff does not materially affect the results.

equity hedge funds is an accurate measure of the true return distribution for the subsamples used in the tests. This is consistent with Bollen and Pool is (2009) conclusion that funds with the most liquid investments exhibit the least evidence of reporting manipulation.

Using the probabilities from the estimated density function, I create standard normal test statistics to determine deviations from the “true” fitted distribution (see Bollen and Pool, 2009). The standard normal statistic is given by $(x\text{-}np)/np\ (1\text{–}p)$, where x is the number of observations in the bin, n is the total number of observations, and p is the probability from the kernel density estimate fit to the sample of reported returns.[15] As noted in Bollen and Pool (2009), bin width selection is the most important aspect of kernel density estimation. I use Silverman’s (1986) rule of thumb to determine the bin width. Because there is a large difference in the number of observations between the private equity and public equity hedge funds, I adjust the bin widths with a multiplier of 0.5 for the public equity funds and 2.5 for the private equity funds. This adjustment creates an additional correction for differences in the number of observations across these samples. The adjustment is also consistent with the finding in Bollen and Pool (2009) that the kink in the distribution is less pronounced for funds investing in liquid investments such as public equity funds: with the multipliers, the fitted distribution is tied more closely to the empirical distribution for the public equity–oriented funds. The adjustments also suit the additional tests that use the fitted distribution of public equity fund returns as the benchmark “true” distribution.[16]

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[15] Similar to Bollen and Pool (2009), I use a Gaussian kernel.

[16] Using other multipliers and removing the multipliers produces similar results.

For presentation purposes, I set bins to a range of 0.2%, where bin 0 is for positive returns at or below 0.2%. This keeps the bin widths constant across the different figures. For the same reason, I limit the results to returns +/– 6%.[17] In each case, the standard normal statistic is created as described above prior to imposing the limits on the distribution of the reported figures. Similar to Bollen and Pool (2009), I remove zero returns from the distribution analyses. This removes observations with no reported return as well as months in which managers do not revise net asset value estimates. I include these observations in the other tests.

For the distribution-type tests, I split funds into subsamples based on the liquidity of their investment portfolios (private versus public equity funds, and long versus short investor lockup and notice provisions) and on whether a fund has a high water mark provision as well as on a proxy for fund age. I use these subsamples to measure the effects of the level of managerial discretion and the incentives for reporting manipulation (H1–H3). I also split the funds into subsamples based on fund age as an additional incentive for managers to manipulate reported performance (H5).

4.2 Quantile regressions

In addition to distribution tests, I use quantile regressions to identify non-linearities in the effects of contractual provisions on fund returns. Quantile regression (Koenker and Basset, 1978) has been used extensively in other disciplines and more recently has been applied to estimates of hedge fund risk factor exposures (Meligkotsidou, Vrontos, and Vrontos, 2009). Quantile regression allows for non-linearities in estimated regression coefficients across the distribution of the dependent

[17] This restriction likewise applies to bins between –30 and 30. Alternative bin-width choices and bin-width windows lead to the very similar conclusions.

variable. This approach is conceptually similar to one in which funds are grouped based on returns and then OLS regressions are estimated with returns as the dependent variable. However, because quantile regression does not impose the distributional assumptions of OLS, it avoids the resulting bias in the estimated coefficients. The quantile regression approach also permits multivariate tests of the return distribution.

Hypotheses H1–H3 predict that the effects of high water mark provisions and contractual provisions on returns, lockup requirements, and restriction periods will be nonlinear in the distribution of returns. The manipulation explanations suggest that for the negative portion of returns, high water mark provisions, lockup provisions, and restriction periods are positively associated with returns. However, for the large positive portion of returns, these contractual provisions are negatively associated with returns. These are similar to my earlier predictions related to the smoothing of reported performance: the greater the incentives for meeting or exceeding the zero-return threshold and the lower the costs of reporting manipulation, the more that negative returns are shifted to the positive portion of the distribution and more extreme positive returns are shifted to the moderate gains portion of the distribution.

Two key pieces of evidence, if they obtain, would validate these hypotheses. The effect of the contractual provisions on fund returns should be positive for the lower parts of the return distribution, and secondly, it should become negative only above the point at which upward manipulation becomes less likely. That is, the point at which the estimated effect switches from negative to positive needs to be above the zero-return point and should turn negative in the moderately positive portion of the return distribution.

This test is similar in spirit to those in a recent paper by Agarwal, Daniel, and Naik (2009a), who find that lock up provisions, restriction periods, and high water mark provisions are positively associated with fund returns. The results in that study show the effects of the contractual provisions on the conditional mean fund return. The quantile regression approach tests whether the effects of the contractual provisions differ across quantiles of the return distribution.

4.3 Relative reported performance

To test H4, the hypothesis that managers with reporting discretion report higher fund performance during market downturns than do managers without discretion, I estimate a regression of excess returns on an indicator variable equal to one if a fund has a private equity focus as a proxy for whether a fund has reporting discretion, and an interaction with an indicator variable for periods with negative market excess returns. I also control for other variables and interactions. Although this test cannot rule out the possibility that funds with greater reporting discretion perform better than other funds during market downturns, the hypothesis predicts that in market downturns funds with greater discretion will have higher reported performance than other funds because of reporting manipulation.

V. Sample selection and descriptive statistics

The sample comprises observations selected from the union of three large hedge fund databases: Lipper/TASS, HedgeFundResearch, and Bloomberg. I restrict the sample to funds with either a public equity or a private equity investment focus. I match funds across databases on the fund name and fund returns. If the fund name matches either exactly or very closely match and the returns also match for at least 90% of the observations, then I classify the fund as being covered in multiple databases. For multiple-database funds, I use a single return observation for each month. I select monthly return observations in the following order: Lipper/TASS, HedgeFundResearch, then Bloomberg. I retain all funds covered in a single database. Fund returns must be reported in US$ to be included in this study.

To determine fund investment focus, I rely on the strategy classification provided by the hedge fund databases. I also classify any funds with "Private" in the fund name as hedge funds with a private equity focus. I restrict the sample to funds with reported returns between January 1, 1995, and September 30, 2009. The sample begins in 1995 because the hedge fund databases began coverage of inactive funds starting that year, and it ends in September 2009 because the most recently available month of data is from December 2009.

Tables 1–3 describe the overall union of the hedge fund databases and the sample of equity focused funds that I employ in my tests. There are over 23,000 unique funds in the full union of the three databases. Of these funds, the largest number of funds, 9,630

(41% of the sample) invest in public equity. Private equity funds (3% of the sample) number 630 funds. The smaller number of private equity funds is consistent with the predominance of public equity funds in the hedge fund universe, despite recent growth in the number of hedge funds focused on private equity investments. The other broad categories of investment styles make up approximately 56% of the funds in the sample (14% comprising funds of funds).

Table 1, panel B, reports fund statistics by year. The number of private equity–oriented funds increases from 154 in 1995 to a peak of 375 in 2005 and declines to 268 in 2009. The number of public equity–oriented funds increases from 1,162 in 1995 to a peak of 5,266 in 2008, declining to 3,388 in 2009. There is a large drop in the number of private and public equity fund observations during 2008 and 2009, reflecting the failure of a large number of hedge funds during that period due to the credit crisis. The percentage of funds with high water mark provisions (*PCT HW*) increases for all funds in the sample to approximately 80% by the end of the sample period. The median wait time for investor withdrawal (lockup and restriction periods, *MED WAIT*) increases from 30 days to approximately 90 days for private equity funds, while for public equity funds it increases to 45 days during the early 2000s and then declines to 31. The changes over time suggest that the optimal contractual provisions develop over time. The longer wait time for investor withdrawals from private equity funds is consistent with fund managers setting these provisions to allow for investments in less liquid markets. This descriptive evidence also provides validation for the use of wait time as a proxy for liquidity. The smaller percentage of private equity funds with high water mark provisions may also suggest that managers and/or investors recognize the differences in the incentives for and costs of manipulation across liquid and illiquid investments and they adjust contractual provisions accordingly. The changes in high water mark provisions over time also suggest that incentives for manipulation are greatest in the last years of the sample. I test this implication in section 7.

Approximately 35 percent of both private and public equity–focused hedge funds are active, while the remaining 70 percent come from funds no longer covered by the hedge fund databases (table 2). This is because they either have been liquidated or have chosen to stop reporting returns to these databases.

Seventy-eight percent of public equity funds have high water mark provisions, compared to 57 percent of private equity funds. This contrasts with the finding in Aragon and Qian (2009) that less liquid funds are more likely to have high water marks. This evidence highlights that at least for a subset of funds, current explanations for the role of high water marks are insufficient. It is possible that because investors anticipate the substantial discretion of hedge funds investing in private equity, they are less likely to require high water marks from these funds. I provide some initial evidence for this conjecture in some additional analysis.

Funds with less liquid investments (private equity funds) have contractual provisions that tend to benefit funds with less liquid investments. The mean (median) restriction period (*RESTRICT*) is 61 (60) days for private equity funds and 30 (30) days for public equity funds. Lockup provisions are rare in the sample, either because funds do not report them to these databases or because they are indeed rare, with quartile 1 through quartile 3 values of zero for the public equity–oriented funds and quartile 1 and median values of zero for the private equity–oriented funds. However, the mean value for private equity–oriented funds (4.3) is greater than the mean value for public equity funds (2.9).

Table 3 provides descriptive statistics of the monthly reported returns for the pooled return distribution. The mean and median returns of public equity funds are similar. This is inconsistent with the notion that, on average, private equity earns a premium over public equity because of the illiquidity of the investment. The standard deviation of public equity–oriented hedge fund returns is much higher (60.8%) than the standard deviation of private equity–oriented hedge fund returns (5.2%).[18] Therefore, in the pooled distribution, even after the most extreme outliers are excluded, public equity funds have more extreme reported returns. This is again inconsistent with the intuition that private equity investments are riskier than public equity investments, and it provides preliminary support for the hypotheses that funds with managerial discretion smooth returns. Drawdown and the percentage of zero-return observations are similar for private and public equity hedge funds. The similar frequency of zero-return observations for private and public equity funds reduces the concern that the results are driven by less frequent valuations by private equity funds. The percentage of negative return observations is 30.3% for private equity funds, lower than the 37.4% for public equity funds. This evidence is consistent with private equity funds using their discretion to avoid reporting losses. Table 3, panel B, reports descriptive statistics for the factors used in the regression analyses.

[18] Note that the standard deviations are for the pooled distribution and do not represent fund-specific return volatility.

VI. Results

6.1 Sharpe ratios and information ratios

Table 4 reports the monthly Sharpe ratios and information ratios separately for private and public equity funds. The Sharpe ratios (panel A) are the mean of yearly Sharpe ratios, which are calculated as the square root of 12 times the mean monthly fund return minus the one month Treasury bill rate divided by the standard deviation of monthly returns. Similarly, the information ratios in panel B are the mean annual information ratio, measured as the square root of 12 times the intercept divided by the standard deviation of the residuals from a firm level time series regression of monthly excess returns on the market premium (*MKTRF*). The information ratio in panel C is measured as 12 times the intercept divided by the standard deviation of monthly excess returns on the subset of three factors with the highest adjusted *R*-square selected from the following factors: *RET_LAG1*, *MKTRF*, *MKTRF_LAG1*, *SMB*, *HML*, and *CHSPREAD*. Sharpe ratios and information ratios with absolute values greater than 30 are deleted. RETRF*_LAG1* is the lagged fund excess return; *MKTRF* is the excess value weighted market return; *MKTRF_LAG1* is *MKTRF* lagged one month; *SMB* is a size factor; *HML* is a book-to-market factor; and *CHSPREAD* is the change in the yield spread between Moody's BAA- and AAA-rated corporate bonds.

The monthly Sharpe ratios of private equity hedge funds are greater than those of public equity funds at the minimum, 1st quartile, median, and 3rd quartile values (panel A). The mean (median) Sharpe ratio is 0.46 (0.5) for public equity funds and 1.09 (0.92) for private equity funds. The difference in Sharpe ratios provides an upper bound on the economic magnitude of the effects of reporting manipulation on hedge fund performance.

As benchmarks for the magnitude of the Sharpe ratios, the market premium, the size, and the book-to-market factors all have Sharpe ratios from 0.17 to 0.77 (panel A). The economic implications of manipulation are likely to be important because the potential manipulation pushes private equity fund ratios above those of benchmarks against which fund managers are evaluated.

Although the Sharpe ratio is a key hedge fund performance measure, it does not control for other factors that determine performance. The information ratio removes the effects of other determinants of returns from the Sharpe ratio performance measure. After controlling for other determinants of fund returns, private equity funds continue to have performance measures superior to those of public equity funds (panels B and C). In untabulated results, the mean and median differences in Sharpe ratios and information ratios between public and private equity funds are significant at the 1% level. In a hallmark practitioner-oriented text, Grinold and Kahn (1995) state that an information ratio of 0.50 is good, 0.75 is very good, and 1.0 is exceptional. Public equity funds thus have good information ratios, and private equity hedge funds have very good to exceptional information ratios. Public equity hedge funds have a mean (median) information ratio of 0.49 (0.49), compared to a private equity fund ratio of 0.88 (0.61).

Panel C reports an information ratio that controls for additional determinants of fund returns. This information ratio is generated from a model using the three factors that generate the highest adjusted *R*-square for each fund. Getmansky, Lo, and Makarov (2004) note that illiquidity and intentional smoothing generate smoothed returns. I include lagged fund excess returns in the set of possible fund determinants to control for the effect of illiquidity on the information ratio. However, any control for illiquidity may also remove some of the effect of return manipulation on the information ratio. Therefore, the information ratios in panel C represent a lower-bound estimate of the effect of manipulation on performance. Public equity hedge funds have a mean (median) information ratio of 0.40 (0.42), compared to a private equity fund ratio of 0.49 (0.55). The difference between the information ratios of private and public funds remains statistically significant. Even after controlling for other determinants of fund returns and potentially removing some of the effects of manipulation, private equity funds have substantially and significantly larger information ratios than public equity funds.

6.2 Public equity–focused versus private equity–focused hedge fund returns

Figure 2 shows the monthly return distributions of private equity– and public equity–focused hedge funds. A kink in the distribution immediately to the right of zero, bin 0, is apparent for both the private equity and public equity hedge fund return distributions. The bottom portion of the figure plots the standard normal statistic for deviations from the kernel density estimates, which are fitted separately for each distribution. The horizontal lines indicate significance at the 5% level such that statistics above (below) the top (bottom) line(s) have significantly more (fewer) observations than expected. The plot shows that the statistic in the small negative bin –1 is significantly negative and the statistic in the small positive bin 0 is significantly positive. For the public equity–oriented funds the statistic is generally insignificant outside of the small positive/small negative portion of the distribution. However, the significant test statistic extends beyond the small negative and small positive bins to the extremes of the return distribution for the private equity funds.

In figure 3, the fitted public equity density estimate is used as the benchmark for the private equity empirical distribution. For these results and the rest of the distribution results in the paper the standard normal test statistic is created, with the probabilities generated by the kernel density estimate for the public equity fund returns. There are a significantly larger number of observations than expected in the positive gains and center of the distribution, and fewer than expected observations in the tails of the distribution. There are also fewer than expected large losses, suggesting that hedge funds do not use "big bath" manipulation as in the corporate earnings setting.

This evidence could be viewed as surprising, given the reasonable intuition that private equity investments would be expected to be riskier than public equity investments, with small probabilities of larger payoffs and larger probabilities of small or negative payoffs. The results, however, are consistent with private equity funds intentionally smoothing their reported performance.

6.3 Public equity– and private equity–focused hedge fund results conditional on the presence or absence of high water mark provisions

Panels A and B of figure 4 plot the test statistics separately for private and public equity funds conditional on whether funds have a high water mark provision, which creates a strong incentive to exceed a zero-return threshold. For private equity funds, the statistic jumps to a significantly positive value at the positive return cutoff for bin 0 (panel A). However, the statistic for the small negative bin –1 is significant only for the funds with a high water mark provision. The statistic is also stronger in the small-to-moderate gains for funds with a high water mark provision. Both sets of funds have fewer than expected observations in the tails of the distribution.

Panel B reports the statistic for public equity–oriented hedge funds with and without a high water mark provision. The small positive and small negative bins have significantly positive and negative statistics, respectively, only for the funds with a high water mark provision. The results are less clear for other parts of the distribution. In general, the results are consistent with H1–H3 in that they show that funds with lower costs of manipulation and funds with high water mark provisions smooth returns and/or manipulate returns to exceed the zero-return threshold.

6.4 Full sample of equity-focused fund results conditional on high water mark provisions and waiting periods

Agarwal, Daniel, and Naik (2009b) find evidence that funds with high water mark provisions and waiting periods (i.e., lockup and restriction periods) have higher returns. I use these two selection criteria to create subsamples of funds likely to have differing incentives to meet the zero-return threshold and to differ in the costs of manipulating reported returns. As in the prior section, I identify funds with and without high water mark provisions. To separate funds into groups based on the length of the waiting period, I classify funds with waiting periods greater than 30 days as funds with greater discretion and funds with waiting periods of less than or equal to 30 days as funds with less discretion. Funds with discretion are expected to have shifts from the tails of the distribution toward the center-gains of the distribution. Funds with high water mark provisions are expected to have a smaller than expected number of small negative reported returns and a larger than expected number of small positive reported returns.

Figure 5 reports the results for the full sample of private and public equity funds.[19] The results are consistent with H1–H3. For funds with a high water mark provision and low costs of manipulation or greater discretion there is a jump in the statistic, moving from significantly negative to significantly positive for the small negative to small positive bins. This is consistent with the shifting of small losses to small gains when there is a strong incentive to meet the zero-return threshold. For funds with a high water mark provision but less discretion, the only significant statistic is for the small negative bin. These results are consistent with the high water mark provision providing incentives for managers to exceed the zero-return threshold and with higher costs of manipulation, which make more extreme manipulation less likely.

The kink result is absent from funds without the high water mark provision. Additionally, for funds with discretion, the distribution has a greater than expected number of observations in the small-to-moderate portion of the distribution and fewer than expected observations in the tails of the distribution. The shape is nearly the inverse for funds without discretion. The results are consistent with the predicted effects of the costs of and incentives for reporting manipulation. The next section reports multivariate tests that control for other determinants of returns.

6.5 Quantile regression

Agarwal, Daniel, and Naik (2009a) regress annual fund returns on high water mark provisions, wait periods, and other factors and find that high water mark provisions and wait periods are associated with higher fund returns. Table 5 reports the results of tests of the nonlinear effects of the contractual provisions predicted by return manipulation on fund excess returns. Simultaneous quantile regressions are estimated for

[19] I repeat the analysis with only public equity–focused funds and find very similar results.

the 10^{th}, 20^{th}, 30^{th},…90^{th} percentiles of the distribution for the entire sample of monthly equity hedge fund excess returns on *HW*, *WAITD*, *HW*WAITD*, *RETRF_LAG1*, *MKTRF*, *MKTRF_LAG1*, *SMB*, *HML*, and *CHSPREAD*. I include the interaction term *HW*WAITD* to control for any interactive effect between these contractual terms. Excess returns are defined as monthly hedge fund returns minus the one-month Treasury bill rate. *HW* is an indicator variable equal to one if a fund has a high water mark provision; *WAITD* is an indicator variable equal to one if the number of days an investor must wait before removing invested capital is greater than 30 days (the sample median), where the number of days is equal to the sum of the lockup and the restriction periods; *RETRF_LAG1* is the lagged fund excess returns; *MKTRF* is the excess value weighted market return; *MKTRF_LAG1* is *MKTRF* lagged one month; *SMB* is a size factor; *HML* is a book-to-market factor; and *CHSPREAD* is the change in the yield spread between Moody's BAA- and AAA-rated corporate bonds. The risk-free rate, *MKTRF*, *SMB*, and *HML* are collected from Kenneth French's website.

Consistent with Agarwal, Daniel, and Naik (2009a), at and around the median return the high water mark and wait period indicator variables are positive. The estimated value of these variables is positive for the lowest excess return quantiles and negative for the highest excess return quantiles. Importantly, both values only become negative for the parts of the return distribution with positive fund returns For example, *HW* turns negative for the 80^{th} percentile and *WAITD* turns negative for the 60^{th} percentile. Additionally, the difference between the estimates for the 90^{th} and the 10^{th} percentiles is significantly different, as estimated with an interquartile regression. This form of nonlinearity is consistent with contractual provisions creating incentives for managers to smooth reported returns, incremental to the other factors included in the regressions.

6.6 Reporting manipulation during market downturns

Table 6 reports the results from an OLS regression with fund-clustered standard errors of excess monthly returns on an indicator equal to one if a fund invests in private equity (*PVT*) and an interaction term with an indicator equal to one for periods with negative market excess returns (*NEG*).[20] H4 predicts that the interaction term (*NEG*PVT*) will be positive, consistent with greater upward manipulation of reported returns during market crises for funds with reporting discretion. The results are consistent with expectations. Private equity funds report 0.8% higher monthly excess returns than public equity funds on average. The estimated effect conditional on negative market returns (*NEG*PVT*) is 0.005. Thus, private equity funds report monthly excess returns that are 1.3% higher than public equity funds during periods with negative market returns. After controlling for other factors, private equity funds report higher returns on average than public equity funds, and the difference is statistically greater during periods of negative market premiums. Although not definitive, this finding suggests that the incentives and resulting reporting manipulation for funds with greater reporting discretion are greatest during periods of market losses.[21]

6.7 Public and private equity focused funds conditional on fund age

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[20] Using high water marks and restriction periods as proxies for incentives and fund discretion yield very similar results.

[21] These findings also help address concerns that the distribution-based returns are driven by managers allocating total expected returns across periods because market losses represent periods during which managers are likely to have additional information about expected returns and therefore should be reporting that information in returns.

Figure 6 reports the standard normal test statistic separately for private equity and public equity–oriented funds for the first 24 months of reported returns and for subsequent months of reported returns. H5 predicts that for funds with reporting discretion (in this case, private equity funds), the evidence of manipulation is greater for funds in the early periods of their life-cycle. The shapes of the return distributions of private equity funds for the first 24 and subsequent months of returns are similar, with fewer than expected large positive observations (panel A). The greater than expected small-to-moderate number of observations is more pronounced for the first 24 months of reported returns, and the small negative portion is only significant for subsequent years. The kink in the distribution is significant for all months of reported returns (panel B). Also, subsequent months of returns tend to have more than expected positive observations regardless of magnitude, and fewer than expected losses regardless of the magnitude.

6.8 Robustness

The results of my tests are robust to alternative empirical choices. They are not sensitive to the restriction of the data to any single hedge fund data source; to the use of hedge funds investing in both private and public equity rather than funds investing only in private equity; to alternative sample selection choices; to the removal of the first 1, 2, or 3 years of reported returns; to the division of the sample into the first half and last half of the sample in calendar time; to funds with monthly and quarterly management payment periods; or to benchmarks other than just public equity funds. Nor are the results sensitive to bootstrapped test statistics; to firm-clustered standard errors; or to other specifications of the kernel density estimation, including cutoffs for the inclusion of observations in the kernel density estimation, different bin widths, or different bin-width optimization methods. The results are similar for both active and inactive funds.

6.9 Caveats

Despite the alternative tests, sample selection, and robustness of the results there are a few concerns that may limit the inferences from the results in this paper. First, the results may not generalize from the equity-focused hedge fund setting to other hedge funds or to the corporate setting. Second, despite the various tests, the inferences may be driven by the sample selection problem as described in Durtschi and Easton (2009). Finally, the results may be caused by payoff differences between funds with different levels of investment liquidity.

VII. Additional analysis

The increase over time in the prevalence of high water mark provisions suggests that the incentive to manipulate returns in order to avoid reporting losses is greatest in the most recent years of the sample. Figure 7 provides some supporting evidence for this view. This figure reports the standard normal statistic for the private equity fund monthly returns from 2004–2009 benchmarked against the kernel density of private equity fund returns from 1995–1999. The figure shows that the small positive range is greater than expected during the last years of the sample. This is consistent with the hypothesis that reporting manipulation is greatest during the most recent period, when the incentive to manipulate returns to report small gains is greatest.

In table 6, I provide evidence that private equity funds report higher returns than public equity funds, especially during market downturns. However, during the worst market conditions, private equity funds may be forced to liquidate positions, thus reducing their discretion in setting fair market values. Table 7 confirms this conjecture. I split the sample of returns into 20 groups of months so that each group represents 5% of the months, based on the magnitude of the market premium. The difference between the public and private equity reported returns is insignificant during months with the 5% largest market losses. However, for the other periods with market losses, private equity funds report higher returns than do public equity funds. This evidence contrasts with the notion that misreporting is likely to be worst during crises periods. A recent paper examining discretion in determining bank book values describes this effect: “Accounting discretion entails the risk of generating highly inaccurate accounting information at a time of great turmoil, such as the present financial crisis” (Huizinga and Laeven, 2009).

VIII. Conclusion

I provide evidence that hedge fund reporting manipulation is economically important. I find that the discontinuity in the distribution of reported returns is greatest for funds investing in illiquid investments, funds with high water mark provisions, and funds in their first two years of reporting to a public hedge fund database. I also find evidence that the effect of manipulation on the distribution of returns extends beyond the small negative/small positive returns focus of prior research. I document that funds with the most reporting discretion (i.e., private equity funds) report Sharpe ratios that are twice as large as those of funds with the least discretion (i.e., public equity funds). The results of this study indicate that the positive relation between reported hedge fund returns and contractual incentives documented in Agarwal, Daniel, and Naik (2009b) is distorted by the effects of manipulation such that the relation is nonlinear in the distribution of reported returns. This manipulation is shown to be greatest during moderate, but not extreme, market downturns for the sample of funds in this study.

My findings support the concern that managers opportunistically mark assets to market in order to manage reported performance. The evidence is important for the standard-setting debate on fair value accounting as well as the effort to regulate hedge funds.

This paper provides no evidence on the optimality of these reporting outcomes. There may be benefits to allowing reporting manipulation, because doing so can reduce the incentives for managers to depart from their area of expertise by making risky investment decisions to achieve reporting objectives. I have documented changes over time in restriction periods on investors' withdrawals and high water mark provisions in private equity funds' contracts. This setting would also be an interesting one for an examination of the evolution of optimal contracting in a young, quickly developing industry.

It may also be helpful to make other refinements to the measures I use in the current version of the study. For example, it may be useful to exploit variation within private and public equity funds in the level of discretion in setting fair values, in the magnitude of performance fees, and in measures of the high water mark provision as well as other contractual provisions and incentives for reporting manipulation.

APPENDIX

Performance Fee Examples from SEC Filings (Italics Added)

OCH-ZIFF Capital Management Group LLC (2008 10-Q)

"Incentive income, which historically has comprised *a substantial portion of our annual revenues*, is contingent on our funds' generating positive annual investment performance. To the extent any of our funds generate negative annual investment performance, we would not earn incentive income for that fund for the year ended December 31. Additionally, that fund would be subject to a high water mark in the subsequent year which will reduce, and may eliminate, our ability to earn incentive income in that year for that fund. *The highwater marks* for our OZ Master Fund, Ltd., OZ Europe Master Fund, Ltd., and OZ Asia Master Fund, Ltd. *reset annually* on the first day of each calendar year. The *highwater mark* for our OZ Global Special Investments Mast Fund *is perpetual*."

The Blackstone Group (2000 10-K)

"The investment adviser of each of our carry funds generally receives an annual management fee that ranges from 1.0% to 2.0% of the investment fund's capital commitments during the investment period and at least 0.75% of invested capital after the investment period, except that the investment advisers to certain of our credit-oriented carry funds receive an annual management fee that ranges from 1.0% to 1.5% of invested capital throughout the term of the fund. The investment adviser of each of our credit-oriented funds that is structured like a hedge fund generally receives an annual management fee that ranges from 1.5% to 2.0% of the fund's net asset value and for general partners or similar entities a *performance-based allocation fee* (or similar incentive fee) *equal to 20% of the applicable fund's net capital appreciation per annum*, *subject to certain net loss carry-forward provisions* (known as a "highwater mark")…. Our ability to generate performance fees and allocations is an important element of our business and these items have historically accounted for a *very significant portion of our income*."

REFERENCES

Ackermann, C., R. McEnally, and D. Ravenscraft, 1999. The Performance of Hedge Funds: Risk, Return and Incentives, *Journal of Finance* 54, 833-874.

Agarwal, V., N.D. Daniel, and N.Y. Naik, 2009a. Role of Managerial Incentives and Discretion in Hedge Fund Performance. *Journal of Finance* 64:5, 2221-2256.

Agarwal, V., N.D. Daniel, and N.Y. Naik, 2009b. Do Hedge Funds Manage Their Reported Returns? Working paper.

Aiken, A.L., 2010. Hedge Funds, Return Smoothing, and the Pricing of Illiquid Assets: Evidence from Debt Holdings. Working paper.

Aragon, G.O. and J. Qian, 2007. The Role of High-water Marks in Hedge Fund Compensation. Working paper.

Beatty, A.L., B. Ke, and K.R. Petroni, 2002. Earnings Management to Avoid Earnings Declines across Publicly and Privately Held Banks. *The Accounting Review* 77:3, 547-570.

Bollen, N.P.B. and V. K. Pool, 2008. Conditional Return Smoothing in the Hedge Fund Industry. *Journal of Financial and Quantitative Analysis* 43: 2, 267-298.

Bollen, N.P.B. and V.K. Pool, 2009. Do Hedge Fund Managers Misreport Returns? Evidence from the Pooled Distribution. *Journal of Finance* 64: 5, 2257-2288.

Burgstahler, D., and I. Dichev, 1997. Earnings Management to Avoid Earnings Decreases and Losses. *Journal of Accounting & Economics* 24, 99-126.

Burgstahler, D., L. Hail, and C. Leuz, 2004. The Importance of Reporting Incentives: Earnings Management in European Private and Public Firms. Working paper.

Cassar, G. and J. Gerakos, 2009. Hedge Funds: Pricing Controls and the Smoothing of Self-Reported Returns. Working paper.

Cochrane, J.H., 2005. The Risk and Return of Venture Capital. *Journal of Financial Economics* 75: 3-52.

Copeland, R.M., 1968. Income Smoothing. *Journal of Accounting Research* 6: 101-116.

Cornett, M.M., A.J. Marcus, and H. Tehranian, 2008. Corporate Governance and Pay-for-Performance: The Impact of Earnings Management. *Journal of Financial Economics* 87: 357-373.

Dechow, P.M. and D.J. Skinner, 2000. Earnings Management: Reconciling the Views of Accounting Academics, Practitioners, and Regulators. *Accounting Horizons* 14:2, 235-250.

Defond, M.L. and C.W. Park, 1997. Smoothing Income in Anticipation of Future Earnings. *Journal of Accounting and Economics* 23: 115-139.

Dietrich, J.R., M.S. Harris, and K.A. Muller III, 2001. The Reliability of Investment Property Fair Value Estimates. *Journal of Accounting and Economics* 30, 125-158.

Durtschi, C. and P. Easton, 2009. Earnings Management? Erroneous Inferences Based on Earnings Frequency Distributions. Forthcoming *Journal of Accounting Research*.

Frankel, R.M., M.F. Johnson, and K.K. Nelson, 2002. The Relation between Auditors' Fees for Nonaudit Services and Earnings Management. *The Accounting Review* 77, 71-105.

Fung, W., and D.A. Hsieh, 2004. Hedge Fund Benchmarks: A Risk-Based Approach, *Financial Analysts Journal* 60, 60-80.

Fung, W. and D.A. Hsieh, 2009. Measurement Biases in Hedge Fund Performance Data: An Update. *Financial Analysts Journal* 65:3, 1-3.

Getmansky, M., A. W. Lo, and I. Makarov, 2004. An Econometric Model of Serial Correlation and Illiquidity in Hedge Fund Returns, *Journal of Financial Economics* 74, 529-609.

Giannone, J.A., Oct 12, 2009. "High water marks still haunt hedge funds." Thomson Reuters.

Goel, A.M. and A.V. Thakor, 2003. Why Do Firms Smooth Earnings? *Journal of Business* 76:1, 151-192.

Goetzmann, W.N., J. Ingersoll, and S.A. Ross, 2003. High-Water Marks and Hedge Fund Management Contracts, *Journal of Finance* 58, 1685-1718.

Goldstein, M., 2007. Hedge Funds Jump into Private Equity. *BusinessWeek* February, 26, 2007.

Gompers, P., 1996. Grandstanding in the Venture Capital Industry. *Journal of Financial Economics* 42, 133-156.

Goodwin, T.H., 1998. The Information Ratio. *Financial Analysts Journal* 54:4, 34-43.

Graham, J.R., C.R. Harvey, and S. Rajgopal, 2005. The Economic Implications of Corporate Financial Reporting. *Journal of Accounting and Economics* 40, 3-73.

Grinold, R.C. and R.N. Kahn, 1995. *Active Portfolio Management*, Chicago, IL; Richard D. Irwin.

Healy, P.M., 1985. The Effect of Bonus Schemes on Accounting Decisions. *Journal of Accounting and Economics* 7: 85-107.

Healy,P.M. and K.G. Palepu, 2001. Information Asymmetry, Corporate Disclosure, and the Capital Markets: A Review of the Empirical Disclosure Literature. *Journal of Accounting and Economics* 31, 405-440.

Hepworth, S.R., 1953. Smoothing Periodic Income. *The Accounting Review* 28:1, 32-39.

Heninger, W.G., 2001. The Association between Auditor Litigation and Abnormal Accruals. *The Accounting Review* 76:1, 111-126.

Holthausen, R.W., D.F. Larcker, and R.G. Sloan, 1995. Annual Bonus Schemes and the Manipulation of Earnings. *Journal of Accounting and Economics* 19, 29-74.

Huang, J., J. Liechty, and M. Rossi, 2009. Return Smoothing and its Implications for Performance Analysis of Hedge Funds. Working paper.

Huizinga, H. and L. Laeven, 2009. Accounting Discretion of Banks During a Financial Crisis. Working paper.

Indjejikian, R., M. Matejka, M., K.A. Merchant, and W.A. Van der Stede, 2009. Performance Targets in Annual Bonus Plans During a Recession: Survey Evidence on the Discontinuity in Earnings Distributions. Working paper.

Koenker, R. and G. Basset Jr., 1978. Regression Quantiles. *Econometrica* 46:1, 33-50.

Lambert, R.A., 1984. Income Smoothing as Rational Equilibrium Behavior. *The Accounting Review* 59:4, 604-618.

Laux, C. and C. Leuz. 2009a. The Crisis of Fair Value Accounting: Making Sense of the Recent Debate. Working paper.

Laux, C. and C. Leuz. 2009b. Did Fair-Value Accounting Contribute to the Financial Crisis? Working paper.

Meligkotsidou, L. I. D. Vrontos, and S.D. Vrontos, 2009. Quantile Regression Analysis of Hedge Fund Strategies. Working paper.

Panageas, S., and M. Westerfield, 2009. High water marks: High Risk Appetites? Convex Compensation, Long Horizons, and Portfolio Choice, *Journal of Finance* 64, 1-36.

President's Working Group on Financial Markets. 1999. Hedge Funds, Leverage, and the Lessons of Long-Term Capital Management, Report of the President's Working Group on Financial Markets. (Department of the Treasury, Board of Governors of the Federal Reserve System, Securities and Exhange Commission, and Commodity Futures Trading Commission.)

Ray, S., 2009. The Downside of High Water Marks: An Empirical Study. Working paper.

Schipper, K., 1989. Commentary on Earnings Management. *Accounting Horizons* 3:4, 91-102.

Silverman, B.W., 1986. *Density Estimation for Statistics and Data Analysis* (Chapman and Hall, New York, NY).

Stocken, P.C., 2000. Credibility of Voluntary Disclosure. *The RAND Journal of Economics* 31:2, 359-374.

Stulz, R.M., 2007. Hedge Funds: Past, Present, and Future. *Journal of Economic Perspectives* 21:2, 175-194.

Trueman, B. and S. Titman, 1988. An Explanation for Accounting Income Smoothing. *Journal of Accounting Research* 26, 127-139.

Tucker, J.W. and P.A. Zarowin, 2006. Does Income Smoothing Improve Earnings Informativeness? *The Accounting Review* 81:1, 251-270.

TABLE 1: Sample Description

Descriptive statistics of equity focused hedge fund characteristics from the union of three hedge fund databases: Lipper-TASS, Hedge Fund Research, and Bloomberg from January 1995 to September 2009. Public equity focused hedge fund are defined as funds investing in public equity markets pursuing various strategies such as long-short equity, equity market neutral, long biased, or short biased. Private equity focused hedge fund are funds investing in private equity markets with various approaches such as start-up companies, leveraged buyouts, and private investments in public equity. N Obs in Panel A is the number of funds covered in the complete data set. N Obs in Panel B is the number of unique funds covered each calendar year. High Water is the percent of funds with high water mark provisions. Wait is the total time an investor must wait in days before withdrawing funds from initial investment and is the sum of the lock up period, the advanced notice period, and the redemption period.

Panel A: Union of Databases

Strategy	# Obs	Percent
Public Equity	9,630	41%
Private Equity	630	3%
Convertible Arbitrage	393	2%
Emerging Markets	826	4%
Event Driven	1,287	6%
Fixed Income	1,339	6%
Macro	2,180	9%
Managed Futures	1,127	5%
Multi-Strategy	1,721	7%
Funds of Funds	3,169	14%
Other	913	4%
Total	23,215	100%

Panel B: Private and Public Equity Focused Hedge Funds by Year

	Public Equity Focused Hedge Funds			Private Equity Focused Hedge Funds		
Year	# Obs	High Water	Wait	# Obs	High Water	Wait
1995	1,162	43%	30	154	20%	30
1996	1,461	45%	30	208	21%	30
1997	1,729	48%	30	227	26%	30
1998	1,983	50%	30	260	27%	30
1999	2,218	56%	30	270	34%	45
2000	2,505	63%	30	286	42%	48
2001	2,746	70%	35	305	49%	60
2002	3,053	75%	40	307	53%	65
2003	3,335	78%	45	331	58%	75
2004	3,764	81%	45	354	63%	90
2005	4,291	84%	45	375	67%	90
2006	4,585	85%	45	372	68%	90
2007	4,919	86%	45	369	70%	90
2008	5,266	86%	30	349	72%	90
2009	3,888	86%	31	268	74%	90

TABLE 2: Descriptive Statistics for Private and Public Equity Focused Hedge Fund Characteristics

Descriptive statistics of hedge fund characteristics for the union of three hedge fund databases: Lipper-TASS, Hedge Fund Research, and Bloomberg. The final sample is the set of funds with a strategic focus on public equity or private equity having reported returns from January 1995 to September 2009. Active is an indicator variable equal to one if the fund is classified as active by the hedge fund databases. High Water is an indicator equal to one if the fund has a high water mark provision. Lock Up is the number of months from initial investment an investor must wait before withdrawing funds. Restrict is the number of days from the initial request to redeem shares by investor to the redemption of those shares by the hedge fund. Sharpe ratio is the mean monthly fund return minus 0.3% divided by the standard deviation of monthly returns.

Fund Type	NAME	MEAN	STDEV	P1	P25	P50	P75	P99
Public Equity Focused Funds	Active	36.9%						
	High Water	77.7%						
	Lock Up	2.9	6.5	0	0	0	0	24
	Restrict	30.2	33.9	0	0	30	50	120
Private Equity Focused Funds	Active	34.5%						
	High Water	56.9%						
	Lock Up	4.3	8.3	0	0	0	12	36
	Restrict	60.5	47.1	0	30	60	90	180

TABLE 3: Hedge Fund Net of Fees and Factor Monthly Return Descriptive Statistics

Descriptive statistics for monthly net of fees return for hedge funds from the union of three hedge fund databases: Lipper-TASS, Hedge Fund Research, and Bloomberg. The final sample is the sample of funds with a strategic focus on public equity or private equity having reported returns from January 1995 to September 2009. Panel A reports statistics of monthly fund returns. RET is the monthly net of fees reported fund return. Drawdown is the cumulative return minus the historical cumulative maximum return. Zero return is an indicator variable equal to one for observations with returns equal to zero and Neg Ret is an indicator variable equal to one if the observation has a return that is less than zero. Panel B reports statistics for monthly factor returns over the same period. Rf is the one-month Treasury bill rate, MKTRF is the excess value weighted market return, SMB is a size factor, HML is a book-to-market factor, and CHSPREAD is the change in the yield spread between Moody's BAA and AAA rated corporate bonds. The risk free rate, MKTRF, SMB, and HML are taken from Kenneth French's website.

Panel A: Monthly Fund Return Statistics for Pooled Return Distribution

Fund Type	NAME	N	MEAN	STDEV	P1	P25	P50	P75	P99
Public Equity Focused Funds	RET	476,591	0.9%	60.8%	-16.3%	-1.0%	0.7%	2.5%	17.8%
	Drawdown		-0.23	0.91	-3.01	-0.16	-0.02	0	0
	Zero Ret		0.5%						
	Neg Ret		37.4%						
Private Equity Focused Funds	RET	48,150	0.8%	5.2%	-13.6%	-0.4%	0.8%	2.1%	16.3%
	Drawdown		-0.22	0.92	-3.37	-0.12	0.00	0	0
	Zero Ret		0.5%						
	Neg Ret		30.3%						

Panel B: Monthly Factor Return Statistics

Variable	MEAN	STDEV	P1	P25	P50	P75	P99
Rf	0.3%	0.2%	0.0%	0.2%	0.4%	0.4%	0.5%
MKTRF	0.4%	4.7%	-16.2%	-2.3%	1.3%	3.6%	8.8%
SMB	0.2%	3.8%	-7.5%	-2.2%	-0.1%	2.6%	13.8%
HML	0.3%	3.6%	-9.9%	-1.5%	0.3%	2.0%	12.5%
CHSPREAD	0.01%	0.13%	-0.48%	-0.03%	0.00%	0.04%	0.49%

TABLE 4: Performance Measures—Sharpe Ratios and Information Ratios

Sharpe ratios and information ratios for funds from the union of three hedge fund databases: Lipper-TASS, Hedge Fund Research, and Bloomberg. The final sample is the set of funds with a strategic focus on public equity or private equity having reported returns from January 1995 to September 2009. Sharpe ratio is the mean yearly Sharpe ratio where the yearly Sharpe ratio is calculated as the mean monthly fund return minus the one month treasury bill divided by the standard deviation of monthly returns for each fund. Two versions of an information ratio are reported. The first information ratio is measured as the intercept divided by the standard deviation of the residuals from a firm level time series regression of monthly excess returns on the market premium (MKTRF). The second information ratio is measured as the intercept divided by the standard deviation of monthly excess returns on the subset of three factors with the highest adjusted r-square selected from the following factors: RETRF_LAG1, MKTRF, MKTRF_LAG1, SMB, HML, CHSPREAD. The Sharpe ratios and the information ratios are annualized by multiplying by the square root of 12. Sharpe ratios and information ratios with absolute values greater than 30 are deleted. RETRF_LAG1 is the lagged fund return, MKTRF is the excess value weighted market return, MKTRF_LAG1 is MKTRF lagged one month, SMB is a size factor, HML is a book-to-market factor, and CHSPREAD is the change in the yield spread between Moody's BAA and AAA rated corporate bonds. The risk free rate, MKTRF, SMB, and HML are collected from Kenneth French's website.

Panel A: Annualized Sharpe ratio

	Mean	Std.Dev.	Min	P5	Q1	P50	Q3	P95	Max
PUBEQ	0.46	2.00	-27.64	-1.97	-0.24	0.50	1.14	2.77	24.92
PVTEQ	1.09	2.26	-14.30	-0.94	0.36	0.92	1.78	3.77	24.89
MKTRF	0.77								
SMB	0.17								
HML	0.43								

Panel B: Information ratio with 1 factor (MKTRF)

	Mean	Std.Dev.	Min	P5	Q1	P50	Q3	P95	Max
PUBEQ	0.49	1.65	-28.31	-1.51	-0.15	0.49	1.09	2.47	28.38
PVTEQ	0.88	2.02	-8.15	-1.39	-0.04	0.61	1.28	4.20	20.42

Panel C: Information ratio with the 3 factors with the highest adjusted r-square

	Mean	Std.Dev.	Min	P5	Q1	P50	Q3	P95	Max
PUBEQ	0.40	1.89	-21.20	-1.96	-0.26	0.42	1.06	2.55	28.77
PVTEQ	0.49	1.56	-11.29	-1.75	-0.17	0.55	1.10	2.75	9.75

TABLE 5: Simultaneous Quantile Regressions of Excess Returns on Contractual Provisions and Factor Returns for Each Excess Return Decile

Simultaneous quantile regressions of excess fund returns on explanatory variables. The sample is the union of three hedge fund databases: Lipper-TASS, Hedge Fund Research, and Bloomberg for funds with a strategic focus on public equity or private equity having reported returns from January 1995 to September 2009. Excess returns are defined as monthly hedge fund returns minus the one-month Treasury bill rate. Reported results are from quantile regression coefficient estimates and bootstrapped standard errors. Results for an interquartile regression that tests for differences between the quantiles 0.9 and 0.1 are also presented. Quantiles are between 0 and 1 where 0.1 is the 10% quantile and similarly for the other quantiles. Bold type indicates significance at the 5% or better. HW is an indicator variable equal to one if a fund has a high water mark provision, WAITD is an indicator variable equal to one if the number of days an investor must wait before removing invested capital is greater than 30 days (the sample median) where the number of day is equal to the sum of the lockup and the restriction periods, RETRF_LAG1 is the lagged fund excess returns, MKTRF is the excess value weighted market return, MKTRF_LAG1 is MKTRF lagged one month, SMB is a size factor, HML is a book-to-market factor, and CHSPREAD is the change in the yield spread between Moody's BAA and AAA rated corporate bonds. The risk free rate, MKTRF, SMB, and HML are collected from Kenneth French's website.

Quantile	Intercept	HW	WAITD	HW * WAITD	RETRF LAG1	MKTRF	MKTRF LAG1	SMB	HML	CHSPREAD	Pseudo R2	Low Cost , High Incentive
0.1	**-0.0516**	**0.0087**	**0.0173**	**-0.0114**	**0.0882**	**0.4476**	**0.0439**	**0.1253**	0.0098	**-3.3525**	11.8%	0.0145
0.2	**-0.0265**	**0.0046**	**0.0100**	**-0.0063**	**0.0949**	**0.3407**	**0.0406**	**0.0980**	**0.0183**	**-2.0919**	9.5%	0.0083
0.3	**-0.0135**	**0.0025**	**0.0058**	**-0.0033**	**0.1053**	**0.2790**	**0.0300**	**0.0855**	**0.0208**	**-1.5835**	7.8%	0.0050
0.4	**-0.0051**	**0.0017**	**0.0032**	**-0.0017**	**0.1176**	**0.2383**	**0.0200**	**0.0810**	**0.0170**	**-1.3283**	6.6%	0.0032
0.5	**0.0016**	**0.0011**	**0.0009**	-0.0003	**0.1290**	**0.2177**	**0.0105**	**0.0831**	**0.0087**	**-1.0715**	6.2%	0.0018
0.6	**0.0084**	**0.0007**	**-0.0015**	**0.0013**	**0.1387**	**0.2133**	0.0024	**0.0890**	**-0.0072**	**-0.7441**	6.1%	0.0005
0.7	**0.0167**	0.0002	**-0.0043**	**0.0031**	**0.1491**	**0.2259**	**-0.0061**	**0.1004**	**-0.0271**	**-0.1983**	6.3%	-0.0010
0.8	**0.0297**	**-0.0013**	**-0.0092**	**0.0067**	**0.1599**	**0.2535**	**-0.0122**	**0.1198**	**-0.0494**	**0.4018**	6.8%	-0.0038
0.9	**0.0545**	**-0.0033**	**-0.0153**	**0.0108**	**0.1665**	**0.3155**	**-0.0228**	**0.1592**	**-0.0794**	**1.3122**	7.2%	-0.0079

Interquartile Regression (0.9-0.1)

	Intercept	HW	WAITD	HW * WAITD	RETRF LAG1	MKTRF	MKTRF LAG1	SMB	HML	CHSPREAD
0.9-0.1	**0.1061**	**-0.0119**	**-0.0326**	**0.0221**	**0.0783**	**-0.1322**	**-0.0667**	**0.0339**	**-0.0892**	**4.6646**

TABLE 6: Panel Regression of Excess Returns on Factor Returns Conditional on the Sign of the Market Premium

Panel regression of excess fund returns on explanatory variables. The sample is the union of three hedge fund databases: Lipper-TASS, Hedge Fund Research, and Bloomberg for funds with a strategic focus on public equity or private equity having reported returns from January 1995 to September 2009. Excess returns are defined as monthly hedge fund returns minus the one-month Treasury bill rate (RETRF). Reported results are from OLS coefficient estimates and t-values based on standard errors clustered by fund. MKTRF is the excess value weighted market return, MKTRF_LAG1 is MKTRF lagged one month, SMB is a size factor, HML is a book-to-market factor, and CHSPREAD is the change in the yield spread between Moody's BAA and AAA rated corporate bonds. The risk free rate, MKTRF, SMB, and HML are collected from Kenneth French's website. NEG is an indicator variable equal to one if MKTRF is less than one, _LAG1 indicates one month lagged values. RETVOL is the lagged 6 month standard deviation of monthly returns.

Independent Variables	Predicted Sign	Coeff. Est.	T Value
Intercept		-0.039	-1.8
MKTRF	+	0.073	0.6
NEG	-	-0.007	-4.1
MKTRF*NEG	+	0.470	1.9
PVT	+	0.008	2.0
MKTRF*PVT	-	-0.041	-0.9
NEG * PVT	+	0.005	3.7
MKTRF*NEG *PVT	?	-0.015	-0.2
MKTRF_LAG1	0	-0.092	-1.2
NEG_LAG1	-	-0.012	-2.8
MKTRF_LAG1*NEG_LAG1	+	0.147	1.3
MKTRF_LAG1*PVT	+	0.044	1.3
NEG_LAG1* PVT	+	0.004	2.5
MKTRF_LAG1*NEG_LAG1*PVT	?	0.029	0.7
CHSPREAD	-	-0.915	-1.5
SMB	+	0.055	1.5
HML	+	-0.142	-3.4
RETRF_LAG1	+	0.019	1.2
RETVOL	+	1.674	2.1
Adj. Rsquare			44.7%
N Obs			488,062
Fund Clustered Standard Errors N Clusters			7761

TABLE 7: T-Tests for Differences in Means between Public Equity and Private Equity Funds by Levels of Market Premium

T-tests for differences in mean monthly net of fees returns between public equity and private equity focused funds between January 1995 and September 2009. RMKTRF is the ranked excess value weighted market return such that a value of 1 indicates the months with the lowest 5% of monthly market premiums.

	Mean Values		Difference	
RMKTRF	Public Equity Funds	Private Equity Funds	Public-Private Equity Funds	tValue
1	-4.0%	-3.6%	-0.4%	-1.8
2	-1.6%	-1.1%	-0.6%	-4.7
3	-0.9%	-0.2%	-0.7%	-5.0
4	-1.0%	-0.7%	-0.4%	-2.9
5	-0.5%	-0.1%	-0.3%	-4.2
6	0.1%	0.3%	-0.2%	-2.4
7	-0.5%	0.2%	-0.6%	-6.5
8	0.1%	0.6%	-0.4%	-4.4
9	0.9%	0.8%	0.1%	0.5
10	1.0%	1.2%	-0.2%	-2.7
11	-0.3%	0.2%	-0.5%	-3.3
12	1.3%	1.2%	0.1%	1.4
13	1.9%	1.7%	0.2%	2.3
14	2.4%	1.7%	0.7%	3.0
15	2.4%	2.1%	0.3%	2.8
16	3.1%	2.4%	0.6%	0.4
17	2.9%	2.6%	0.3%	2.6
18	2.8%	1.6%	1.2%	6.4
19	3.4%	2.5%	0.9%	6.5
20	6.0%	2.8%	3.1%	0.4

FIGURE 1: The Effects of Costs of and Incentives for Reporting Manipulation on the Distribution of Reported Performance

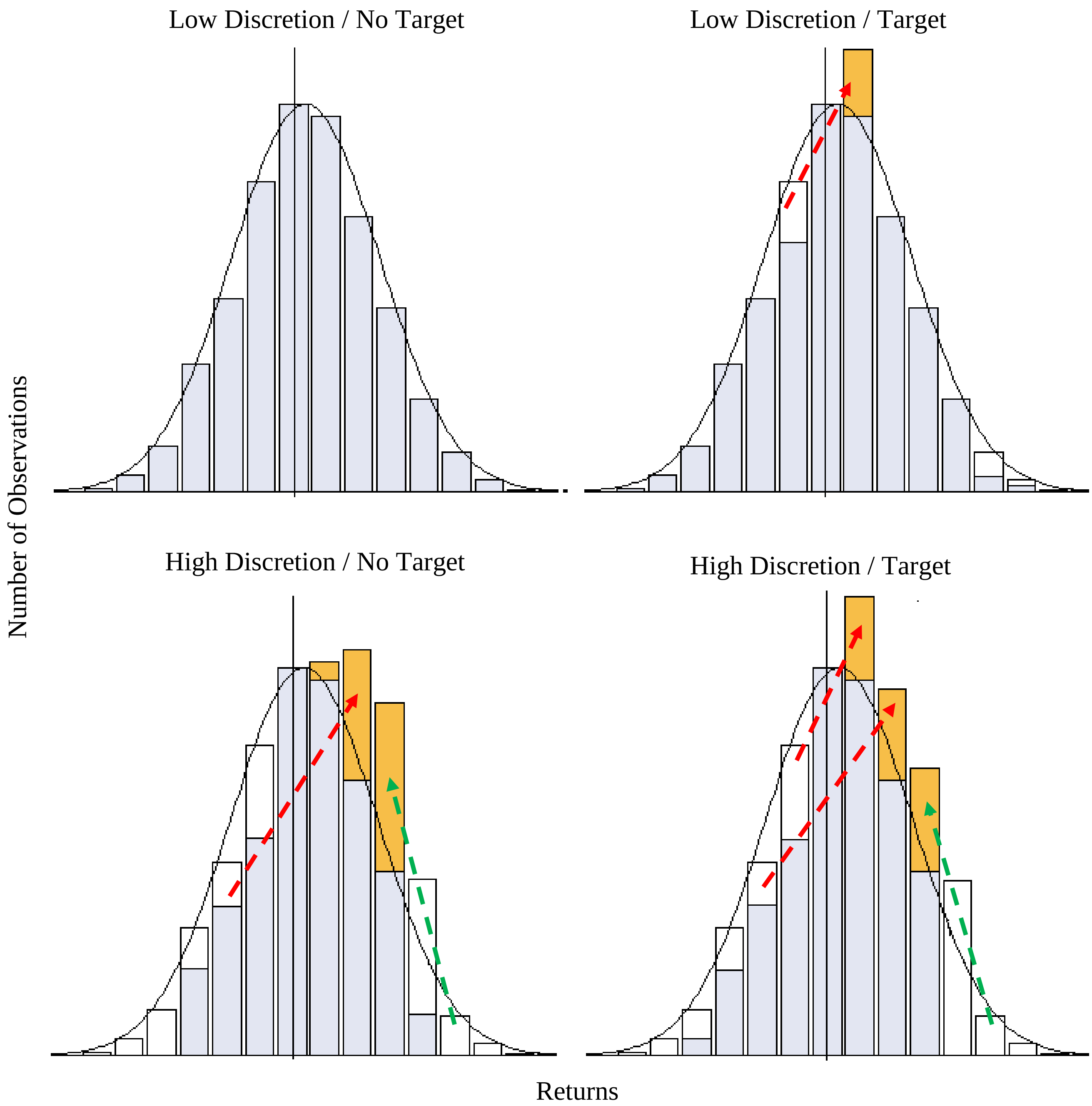
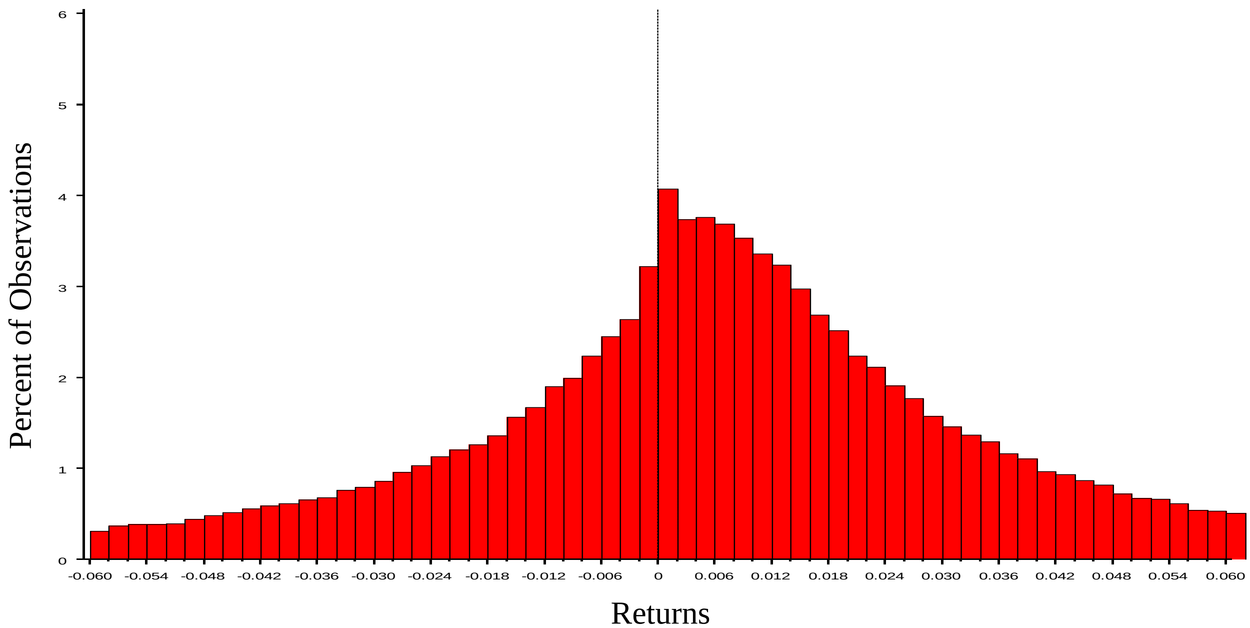


FIGURE 2: Distributions of Monthly Returns for Public vs. Private Equity Focused Hedge Funds

The distributions of monthly hedge fund returns and the statistical significance of the unexpected number of observations in each histogram bin for funds with a public equity vs. private equity investment focus. Bins are set to a range of 0.2% and bin 0 is for 0 < returns < = 0.2%. A vertical line is drawn at the zero return point. Zero returns omitted from the analysis.

Panel A: Public Equity Hedge Fund Returns



Panel B: Private Equity Hedge Fund Returns

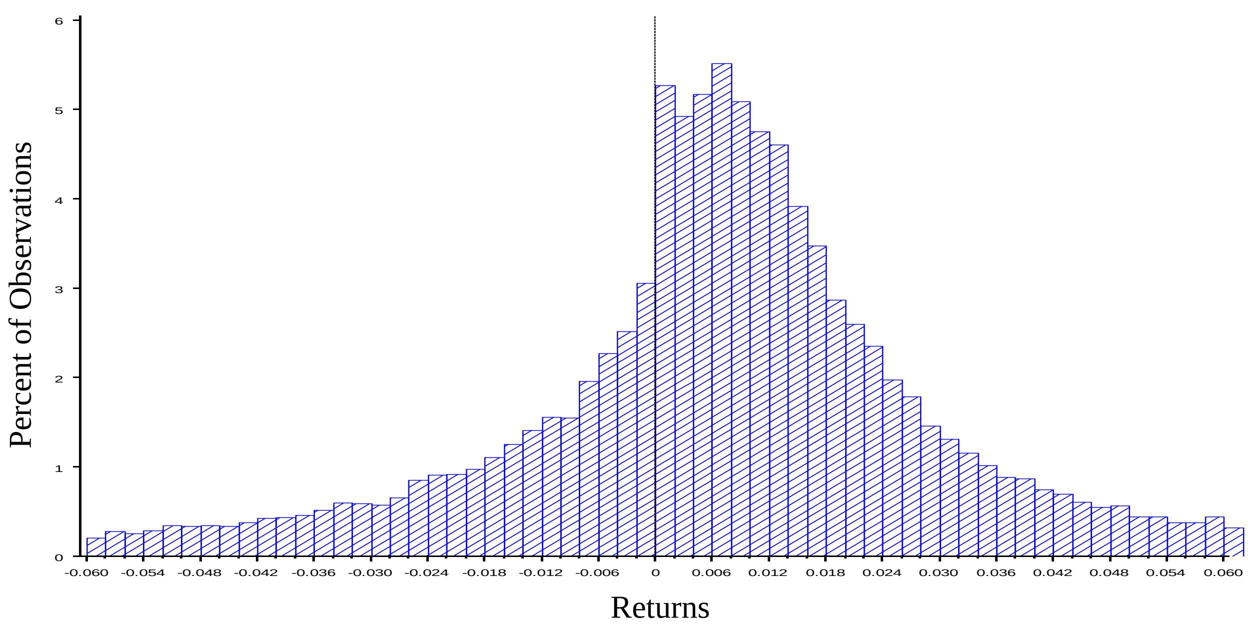


FIGURE 2 Panel C

Statistical significance is determined by the standard normal statistic *(x-np) / np (1-p)* where *x* is the number of observations in the bin, *n* is the total number of observations and *p* is the probability of the kernel density estimate fit to the sample of reported returns. Vertical lines mark the cutoff for significance at the 5% level. The kernel density estimate is estimated with a Gaussian density as the kernel with the Silverman (1986) bin width selection and adjustments to the bin width using band width multipliers of 2.5 for private equity funds and 0.5 for public equity funds.

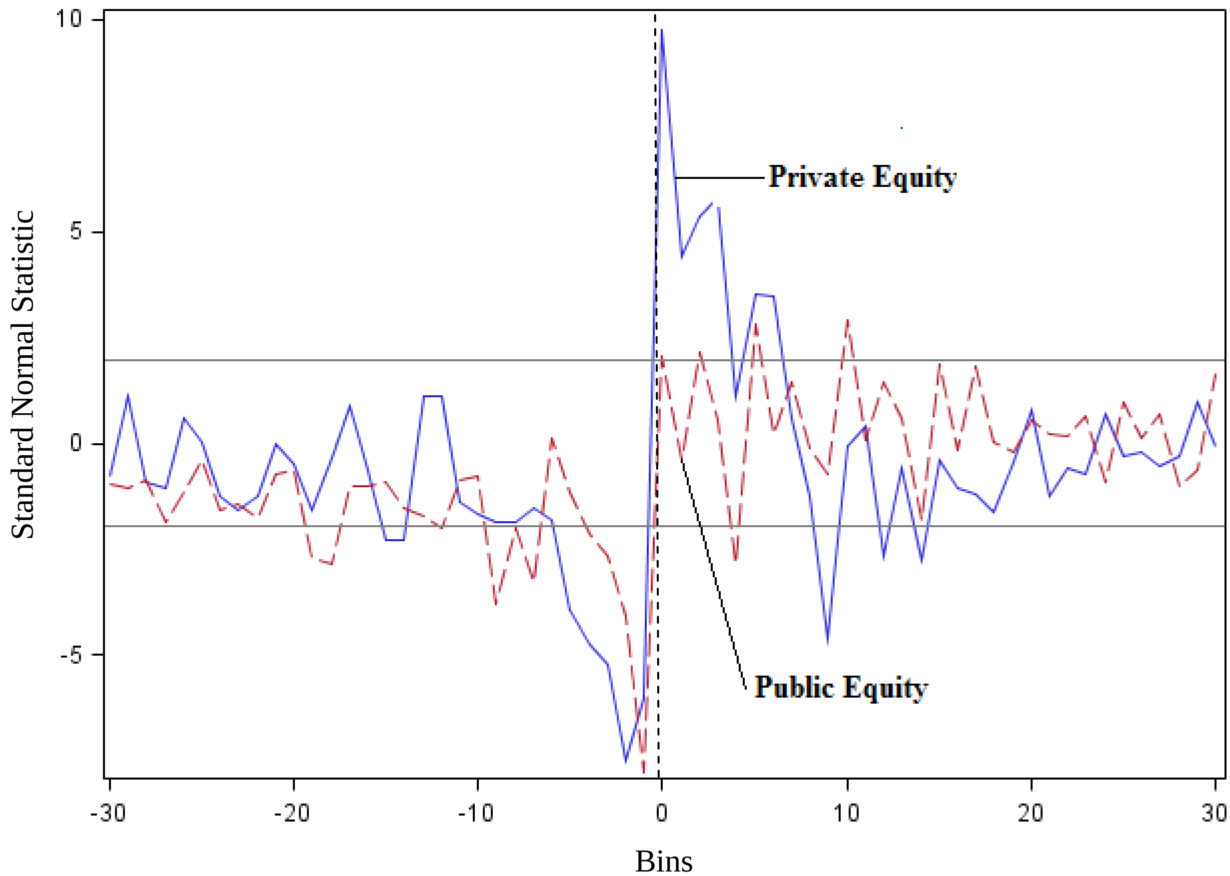


FIGURE 3: Standard Normal Statistic for Private Equity Focused Hedge Fund Distribution Benchmarked Against the Kernel Density Estimate of Public Equity Focused Hedge Funds

Private equity focused hedge fund reported returns minus the expected number of returns from a kernel density estimate of the return distribution of public equity oriented hedge funds. Bins are set to a range of 0.2% and bin 0 is for 0 < returns < = 0.2%. Statistical significance is determined by the standard normal statistic *(x-np) / np (1-p)* where *x* is the difference between the private equity and public equity number of observations in the bin, *n* is the total number of observations and *p* is the probability of the kernel density estimate fit to the sample of public equity hedge fund reported returns. Vertical lines mark the cutoff for significance at the 5% level. The kernel density estimate is estimated with a Gaussian density as the kernel with the Silverman (1986) bin width selection and adjustments to the bin width using a band width multiplier of 0.5.

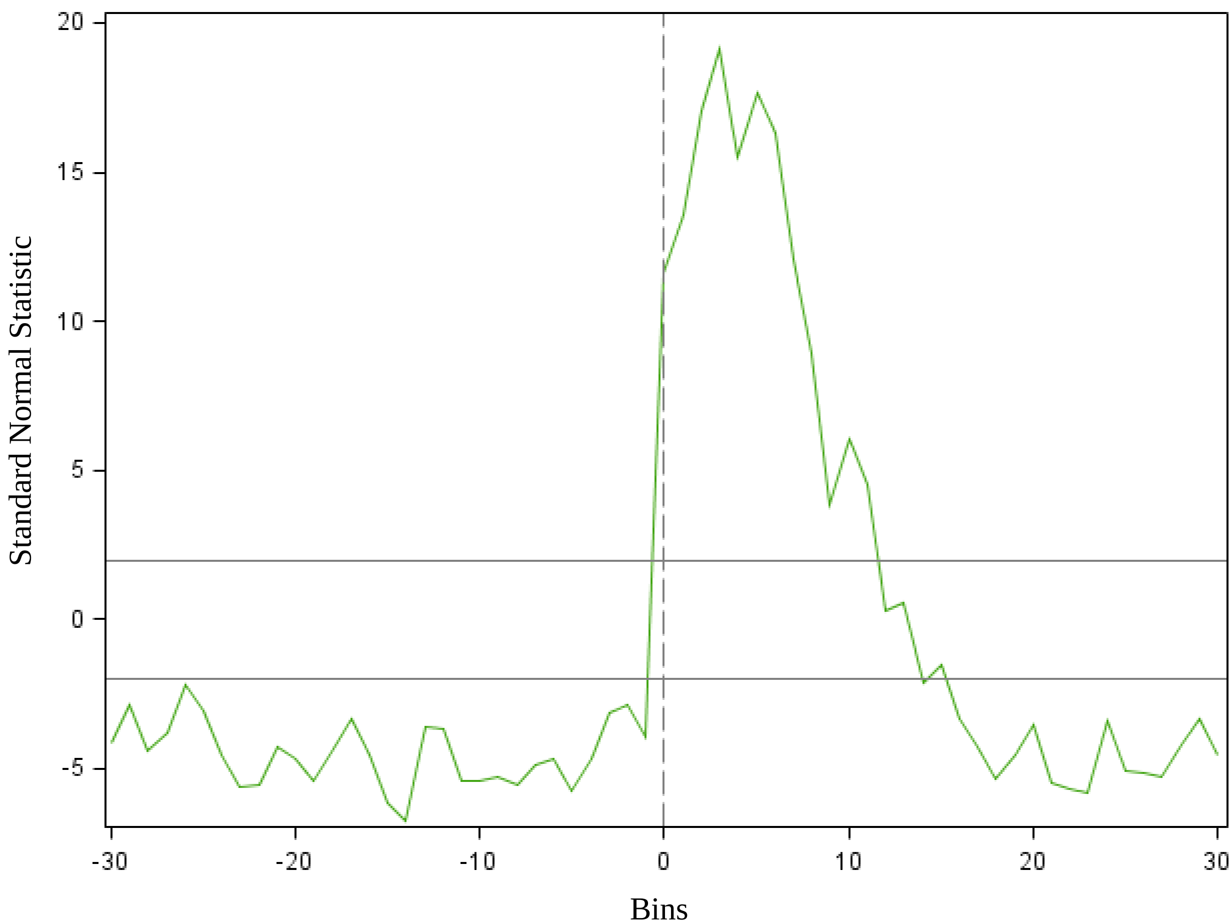
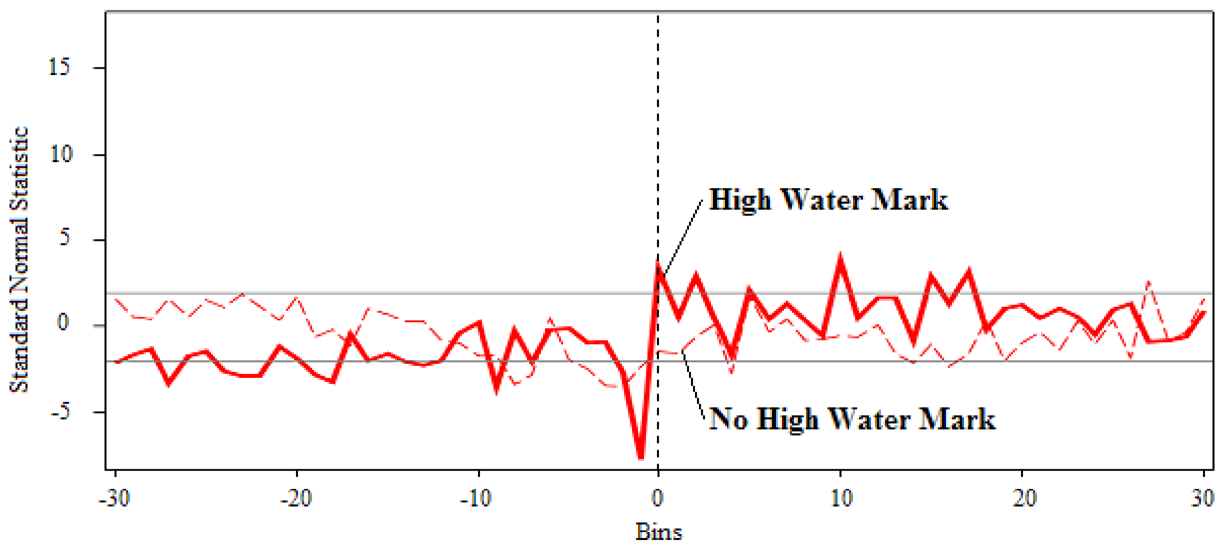


FIGURE 4: Standard Normal Statistic for Private and Public Equity Focused Hedge Fund Distributions Benchmarked Against the Kernel Density Estimate of Public Equity Focused Hedge Funds for Funds with and without High Water Mark Provisions

Private equity (Panel A) and public equity (Panel B) hedge fund reported returns, separately for funds with and without high water mark provisions, minus the expected number of returns from a kernel density estimate of the return distribution of public equity hedge funds. Bins are set to a range of 0.2% and bin 0 is for 0 < returns < = 0.2%. Statistical significance is determined by the standard normal statistic *(x-np) / np (1-p)* where *x* is the difference between the private equity and public equity number of observations in the bin, *n* is the total number of observations and *p* is the probability of the kernel density estimate fit to the sample of public equity hedge fund reported returns. Vertical lines mark the cutoff for significance at the 5% level. The kernel density estimate is estimated with a Gaussian density as the kernel with the Silverman (1986) bin width selection and adjustments to the bin width using a band width multiplier of 0.5.

PANEL A: Public Equity Focused Hedge Funds



PANEL B: Private Equity Focused Hedge Funds

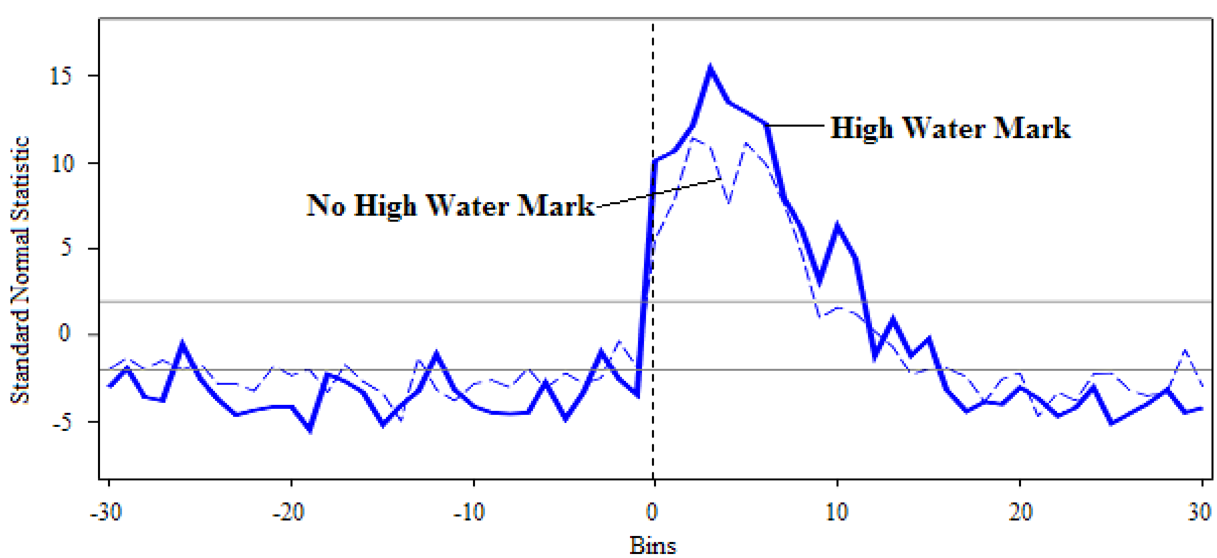


FIGURE 5: Standard Normal Statistic of 2X2 for the Full Private and Public Equity Focused Sample with and without High Water Mark Provision and High / Low Costs of Reporting Manipulation

Hedge fund reported returns, separately for the following groups: funds with high water mark provisions and with total redemption wait time (lockup + restriction periods) greater than 45 days, high water mark and total wait time less than or equal to 45 days, and similarly for no high water mark provisions and greater / less than or equal to 30 days, minus the expected number of returns from a kernel density estimate of the return distribution of public equity oriented hedge funds. Bins are set to a range of 0.2% and bin 0 is for 0 < returns < = 0.2%. Statistical significance is determined by the standard normal statistic *(x-np) / np (1-p)* where *x* is the difference between the private equity and public equity number of observations in the bin, *n* is the total number of observations and *p* is the probability of the kernel density estimate fit to the sample of public equity hedge fund reported returns. Vertical lines mark the cutoff for significance at the 5% level. The kernel density estimate is estimated with a Gaussian density as the kernel with the Silverman (1986) bin width selection and adjustments to the bin width using a band width multiplier of 0.5.

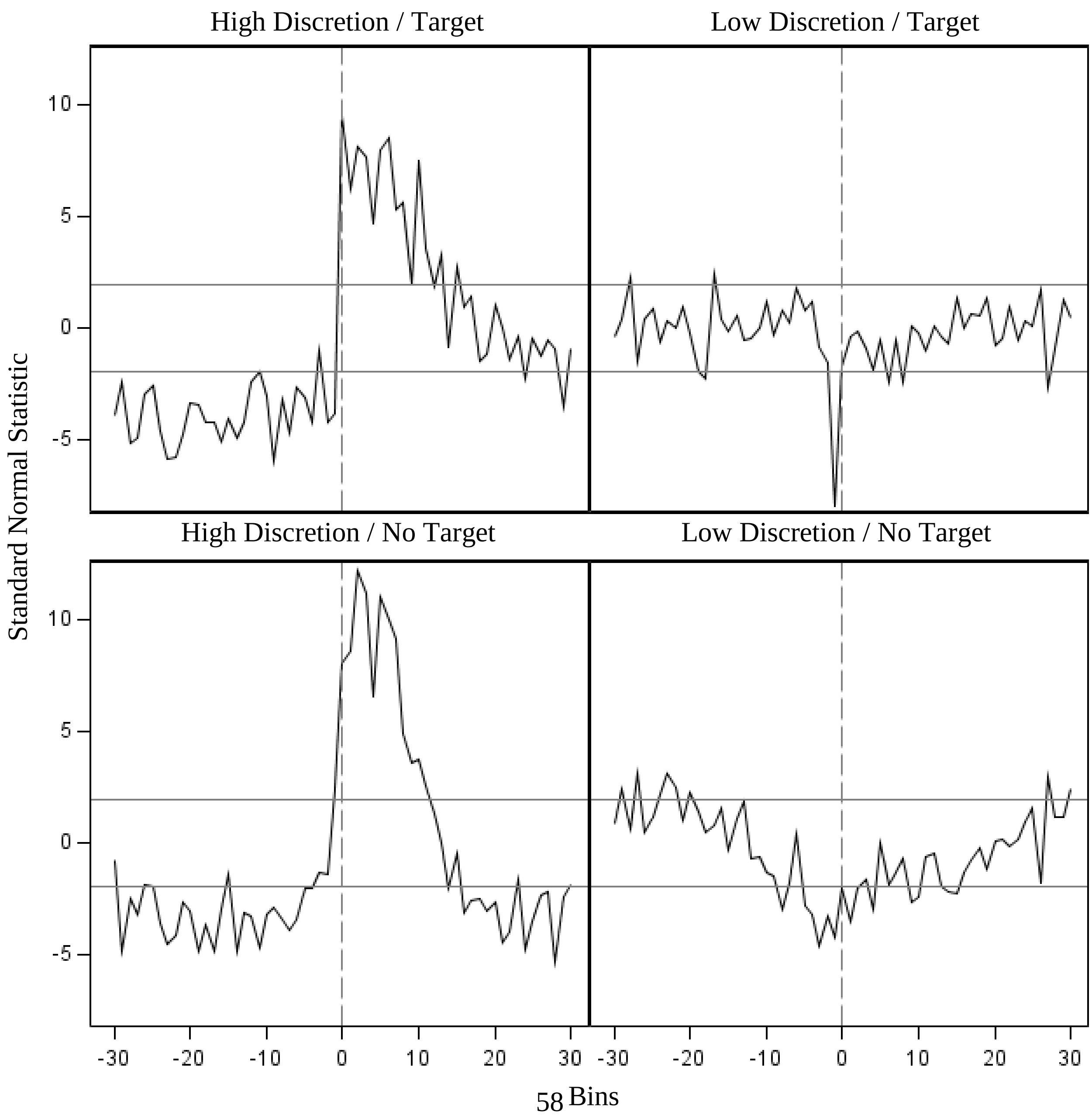
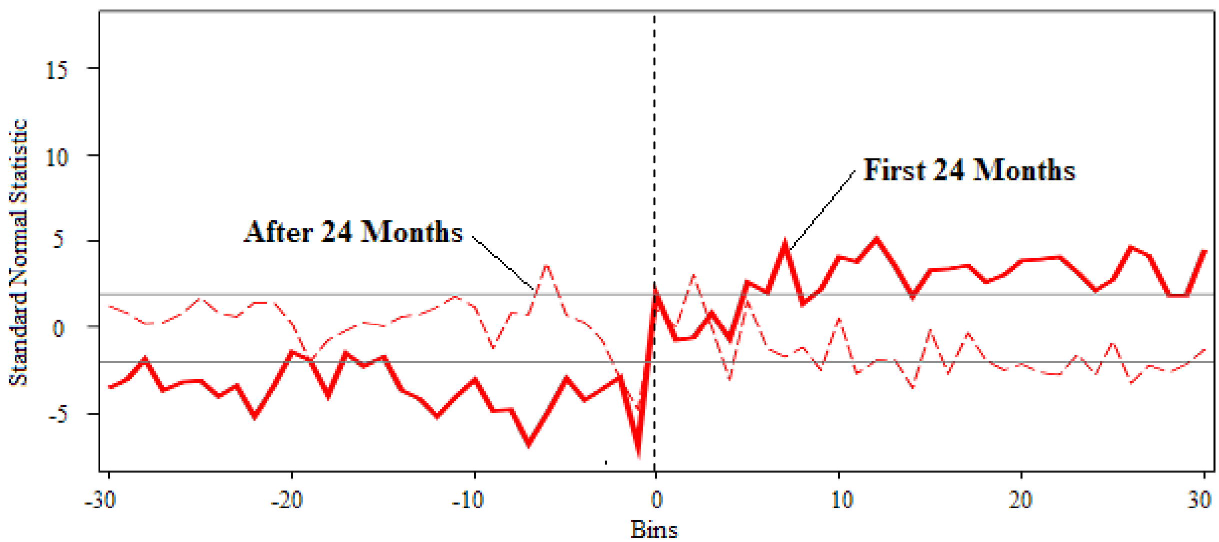


FIGURE 6: Standard Normal Statistic for Private and Public Equity Focused Hedge Fund Distributions Benchmarked Against the Kernel Density Estimate of Public Equity Focused Hedge Funds for Funds in First 2 Years of Reporting and for 3+ years of Reporting

Private equity (Panel A) and public equity (Panel B) hedge fund reported returns, separately for the first 24 months of reported fund returns and for subsequent months, minus the expected number of returns from a kernel density estimate of the return distribution of public equity oriented hedge funds. Bins are set to a range of 0.2% and bin 0 is for 0 < returns < = 0.2%. Statistical significance is determined by the standard normal statistic *(x*-np) / np (1-p) where *x* is the difference between the private equity and public equity number of observations in the bin, *n* is the total number of observations and *p* is the probability of the kernel density estimate fit to the sample of public equity hedge fund reported returns. Vertical lines mark the cutoff for significance at the 5% level. The kernel density estimate is estimated with a Gaussian density as the kernel with the Silverman (1986) bin width selection and adjustments to the bin width using a band width multiplier of 0.5.

PANEL A: Public Equity Focused Hedge Funds



PANEL B: Private Equity Focused Hedge Funds

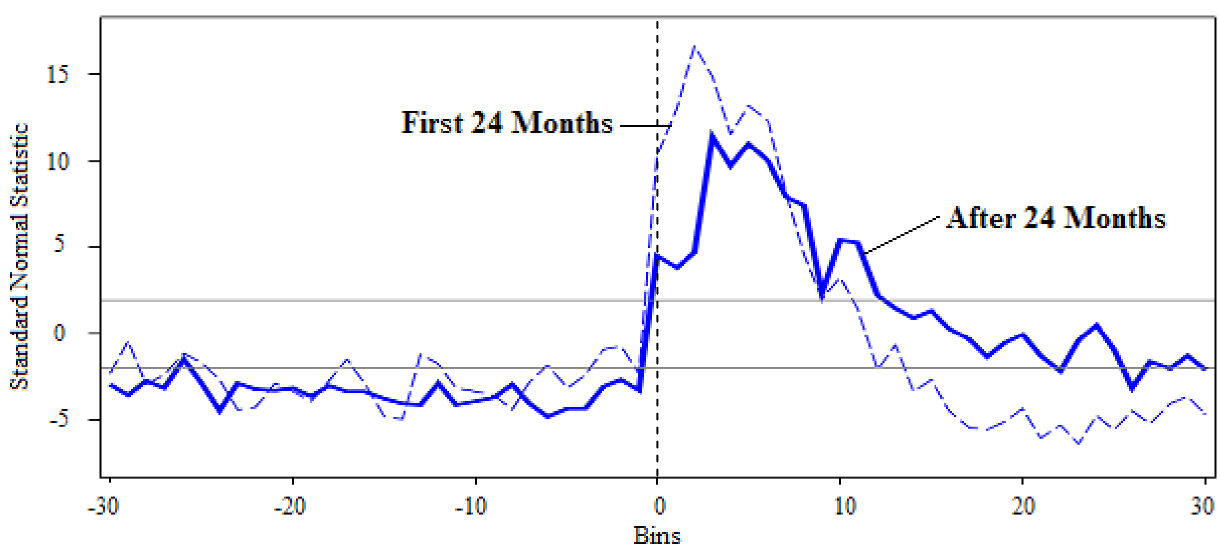


FIGURE 7: Standard Normal Statistic for Private Equity Focused Hedge Fund Distribution from 2004 to 2009 Benchmarked Against the Kernel Density Estimate of Private Equity Focused Hedge Funds from 1995 to 1999

Private equity focused hedge fund reported returns from 2004 to 2009 minus the expected number of returns from a kernel density estimate of the return distribution of private equity focused hedge funds from 1995 to 1999. Bins are set to a range of 0.2% and bin 0 is for 0 < returns < = 0.2%. Statistical significance is determined by the standard normal statistic $(x\text{-}np) / np\ (1\text{-}p)$ where x is the difference between the private equity number of observations in the bin, n is the total number of observations and p is the probability of the kernel density estimate fit to the sample of returns from 1995 to 1999. Vertical lines mark the cutoff for significance at the 5% level. The kernel density estimate is estimated with a Gaussian density as the kernel with the Silverman (1986) bin width selection and adjustments to the bin width using a band width multiplier of 2.5.