Doubling Down

Jonathan Rhinesmith*

June 7, 2014

Abstract

I demonstrate that when investment fund managers "double down" on positions that have run against them, they outperform. Specifically, I find that a portfolio formed of the U.S. equity positions that hedge fund managers add to after recent stock-level underperformance generates significant annualized risk-adjusted outperformance of between 5% and 15%. This finding is not the result of a simple reversal effect, of a fund's best ideas (large positions), or of the general informativeness of fund trades. My results are consistent with a career risks mechanism for this phenomenon. By adding to a losing position — the opposite of window dressing — managers are making their losses particularly salient. I demonstrate in a panel regression that investment managers avoid adding to losing positions. Furthermore, managers outperform by more when they double down after greater past losses in a position. These findings suggest a position-level limits to arbitrage effect. Even when an asset decreases in price for non-fundamental reasons, some of the investment managers with the most relevant knowledge of that asset may be particularly hesitant to add to their positions because they have already suffered losses in that asset.

*Harvard University. rhinesmith@fas.harvard.edu. I thank Malcolm Baker, John Campbell, Lauren Cohen, Robin Greenwood, Chris Malloy, Andrei Shleifer, and seminar participants at Harvard for helpful discussions and suggestions.

Introduction

> "If the security you are considering is truly a good investment, not a speculation, you would certainly want to own more at lower prices." Seth Klarman, Margin of Safety

Suppose an investment fund manager buys a stock for $10 that she thinks is worth $15. The stock proceeds to decline in value to $7, while the market remains flat. As an econometrician, one cannot easily tell if the stock's fundamental value has dropped, or if the stock price movement was just noise, making the stock a better buy at $7 than it was at $10. If one believes the investment manager has skill, perhaps the investment manager can tell the difference. Yet even if the stock is a more attractive buy now, the fund manager may be hesitant to add to, or to "double down" on, her existing position. Her investors already know she has suffered substantial losses in the stock, and adding to the position will make those losses even more salient. The manager would effectively be employing reverse window dressing; instead of substituting out losing positions for winning stocks, she is making her losing positions even bigger. If such an effect were indeed at work, one would expect that fund managers would only "double down" in the most promising of situations, and that the corresponding positions would outperform.

In line with this reasoning, I find that in a sample of the long U.S. equity positions of hedge fund managers from January 1, 1990 through December 31, 2013, a portfolio formed of the positions that hedge fund managers add to following recent stock-level underperformance generates significant annualized risk-adjusted outperformance of between 5% and 15%. In turn, positions that managers double down on after greater position-level losses outperform by more than those that managers double down on after smaller losses. I demonstrate in panel regressions that managers avoid doubling the portfolio weights of losing positions. I also find tenuous evidence that managers facing more fund-level career risk, proxied by poor trailing manager-level returns, are particularly hesitant to substantially add to a losing position, relative to managers facing less career risk. While I cannot definitively prove that career risk is driving managers' hesitancy to double down, my results are generally consistent with this mechanism.

I construct a variety of control portfolios to demonstrate that "doubling down" is not explained by mechanical return effects or by previously identified asset pricing phenomena. In particular, my finding is not the result of a simple reversal effect, of a fund's best ideas (large positions), or of the general informativeness of fund trades. Funds exit, rather than double down on, most of the positions in which they suffer losses. The positions that they exit do not outperform. In my sample, funds' largest positions do not substantially outperform. Positions that managers double after strong trailing stock-level performance do not

outperform to nearly the same extent as the double down positions. I also find that these "double up" positions fail to outperform the positions that a manager chooses to exit after strong trailing stock-level performance. In other words, large hedge fund manager trades are statistically informative only after poor trailing position-level performance. This finding is consistent with my proposed mechanism. For positions with strong trailing performance, managers are choosing between riding or harvesting winners, which has no clear implications for career risk.

Many studies that form portfolios that generate large outperformance figures construct hypothetical portfolios that face short sale constraints and high transaction costs. The double down portfolio instead represents actual positions of significant size held by hedge fund managers. These are long positions in stocks that are liquid enough for managers to make large trades in. The double down portfolio I construct at each quarter end is based, on average, upon nearly $2 billion of actual manager positions.

Doubling down represents a clear demonstration of the information content of a manager's portfolio management decisions, when she knows that her investors will be watching closely. These findings thus contribute to the literatures on career risk and selective manager skill. On the other hand, doubling down as I define it is rare in the context of the universe of all hedge fund equity positions. My results therefore have little to say about aggregate measures of skill.

My findings also suggest that during asset price dislocations, some of the specialists in those assets — fund managers that already own a stake in a given stock, for example — are hesitant to devote additional capital to those positions as a result of the losses they have already suffered. This reasoning extends the basic limits to arbitrage intuition (Shleifer and Vishny (1997)), which links fund-level performance to a manager's reluctance to take on additional risk. My findings are primarily the result of position-level, rather than fund-level, underperformance. I study position portfolio weights, rather than dollar position sizes, which should substantially reduce the impact of flows and past manager performance on my findings. These results add a new facet to the interaction between career risk and asset price dislocations.

1 Literature

While studies of aggregate skill in mutual funds and hedge funds have found mixed results, a persuasive literature has emerged that managers generate positive abnormal risk-adjusted returns on certain positions, which are identifiable ex-ante. For instance, hedge

funds outperform on their confidential holdings (Agarwal, Jiang, Tang, and Yang (2013)), and mutual fund buys during large outflows (or sells during large inflows) are informative (Alexander, Cici, and Gibson (2006)). Relevant to my approach, several papers utilize mutual fund portoflio weights to predict outperformance, such as the best ideas of mutual funds (Cohen, Polk, and Silli (2010)), mutual fund active share (Cremers and Petajisto (2009)), and mutual fund industry concentration (Kacperczyk, Sialm, and Zheng (2005)). As a whole, this literature finds that manager conviction is at times related to performance, if one can properly identify a manager's strongest beliefs or expertise.

Lakonishok, Shleifer, Thaler, and Vishny (1991) detail the practice of window dressing by fund managers. They find that a sample of pension fund managers do tend to sell their losing positions, likely as an attempt to avoid investors making negative inferences of the managers' skill. When a manager doubles down, in contrast, the fund manager is adding to a losing position, thus calling even *more* attention to that position.

Working against my findings are two separate effects the literature has identified. First, mutual fund flows are known to chase past performance, and have furthermore been shown to predict future returns (Coval and Stafford (2007)). This effect should work against my findings, as managers double down on positions that have run against them. One would expect the poor past performance of double down positions to be associated with worse manager-level performance, *ceteris paribus*, and thus outflows. These outflows would in turn tend to drive negative future returns on those positions, as managers sell them to meet redemptions.

Second, the disposition effect in mutual funds appears to predict underreaction in asset prices (Frazzini (2006)). Doubling down is a bit different, as when a manager doubles down, they are not merely holding on to a loser, as the disposition effect would predict. Instead, managers are actually adding to losing positions. In the case of doubling down in hedge funds, I tend to find reversals in stock-level performance, rather than the drift that the disposition effect has been shown to predict. Managers only double down infrequently, however, so drift could still dominate in the full sample of losing positions. Furthermore, my focus on hedge funds, rather than mutual funds, may explain some of the differences in my findings.

On the theory side of things, Shleifer and Vishny (1997) formalize the seminal concept of limits to arbitrage. This argument provides an explanation for why rational arbitrageurs may limit the positions they take to correct mispricings. In their model, uninformed investors cause fund managers to face outflows following poor fund-level performance, making managers averse to taking on large amounts of risk. Scharfstein and Stein (1990) analyze why fund managers may be hesitant to deviate from popular positions as a result of relative performance evaluation metrics. While hedge fund manager contracts are not typically ex-

plicitly tied to the performance of other managers, anecdotally hedge fund investors evaluate funds relative to the available universe of hedge funds. When a manager doubles down on a position, she is likely to stand out from other hedge funds unless many other funds are doubling down in the same position (which I do not find empirically).

Savor and Gamboa-Cavazos (2011) illustrate that in the aggregate, short sellers cover their positions after losses (price increases, in their case). However, the effect they identify is at the aggregate short interest level, due to data limitations, and is thus fundamentally different from my own. Savor and Camboa-Cavazos are cleverly and effectively illustrating limits to arbitrage in the aggregate — that new arbitrageur capital is not fully replacing the losses and outflows of existing short sellers — rather than showing that existing short sellers are necessarily choosing to retreat. It is quite possible that fund managers are adding to their short positions as a percentage of their assets under management while aggregate short interest is declining as a result of the portfolio implications of shorting.[1] Furthermore, given that outflows tend to follow poor past trailing performance, flow effects would also push towards a reduction in aggregate short interest after losses on short positions. I identify doubling down by examining managers' portfolio weights, and thereby limit the influence of changes in managers' total assets under management. I am thus able to more effectively infer individual manager beliefs regarding future returns.

I contribute to the selective skill literature by demonstrating that the path by which a fund manager reaches her portfolio weights can provide additional predictive power and larger magnitudes of inferred skill relative to most previously identified effects. On the other hand, doubling down is by its nature quite rare, and does not have broader implications for the total amount of skill in the institutional investing universe. My findings are consistent with a position-level career risks mechanism. I add to the traditional limits to arbitrage literature by focusing on this position-level, rather than fund-level, underperformance as another potential limitation faced by skilled investment managers trading against mispricings.

2 Data

I construct my sample by linking the Thompson Reuters database of publicly available Form 13Fs, which contain the quarterly holdings of asset management institutions, to a

[1] For example, imagine stock X is worth \$100 per share. Suppose a single manager with \$100 in assets is short 1 share (100% of assets) of stock X. Suppose stock X increases to \$150. The manager will now have \$50 in assets, assuming no flows. Suppose the manager covers a third of a share of X. The manager will now be short \$100, or 2/3 of one share of stock X. The manager now has a 200% short position in X. The manager has increased her portfolio weight on her short position, but short interest in stock X has declined from 1 share to 2/3 of a share.

sample of hedge funds identified by Agarwal, Fos, and Jiang (2013).[2] I impose simple backward looking filters to attempt to eliminate funds that file 13Fs that are clearly not representative of a manager's overall portfolio.

In more detail, I begin with the Thompson Reuters 13F database. Any investment management institution that "exercises investment discretion over $100 million or more in Section 13F securities" (generally long U.S. equity positions, as well as some derivatives) is required to file a 13F within 45 days of the end of every calendar quarter.[3] The Form 13F reports the list of 13F securities that the investment manager holds as of the end of the corresponding calendar quarter.[4] In panel regressions in Section 3, I employ the full sample, from 12/31/1980 through 12/31/2013. In later sections, I construct portfolios that represent positions held by funds from 12/31/1989 through 12/31/2013. I omit the beginning of the sample because the resulting portfolios are too thin during that period, when there are fewer observations.

I then filter for the 13Fs of hedge funds using the comprehensive list of funds from Agarwal, Fos, and Jiang (2013). As explained in more detail in their paper, the authors merge five large commercial hedge fund databases with industry publications to form their hedge fund dataset.

I obtain stock returns from CRSP, and stock accounting data from COMPUSTAT. I focus on common stocks (CRSP share codes 10 and 11). I use the procedure of Shumway (1997) to account for delisting returns. I obtain data on DGTW returns from Russ Wermers' website.[5] Risk factor returns (SMB, HML, UMD) are from Ken French's website.

I assume that the set of securities filed on a fund's 13F constitutes a representative portfolio. I am trying to identify the potential expertise of active, "stockpicking" managers. Yet 13F filings do not provide information on short positions, cash holdings, or non-U.S. equity positions. I therefore remove filings that are clearly unrepresentative of a firm's investment strategy, or filings that identify firms pursuing strategies that are not likely to be based on active stockpicking. For example, a fund that reports only a single stock on a Form 13F is probably investing primarily outside of publicly listed U.S. equity holdings, while a fund that holds a controlling interest in a stock's common equity is likely pursuing a private

[2] I thank the authors for kindly providing me with their hedge fund sample.

[3] More detailed requirements are provided at https://www.sec.gov/answers/form13f.htm. The full list of 13F securities is available at http://www.sec.gov/divisions/investment/13flists.htm.

[4] As is common in the literature, in constructing my tests of performance, I ignore the 45 day filing delay. Instead, I analyze portfolios as of the date the manager holds the associated underlying positions. This approach focuses on the behavior of the managers themselves instead of attempting to construct a trading strategy that a third-party market participant could implement using only publicly available information.

[5] The DGTW benchmarks are available via http://www.smith.umd.edu/faculty/rwermers/ftp-site/Dgtw/coverpage.htm

equity strategy. Other funds, such as quant funds, hold a disproportionately large number of positions, and are less likely to rely on thorough stock-level analysis to make investment decisions. These funds are thus unlikely to have differential information on whether a change in the price of a stock is the result of a fundamental change in a firm's business prospects or whether the price change is simply noise, since they base their decisions primarily on aggregate patterns in accounting data and returns.

I therefore remove (1) any filing in which a single holding represents over 60% of the 13F portfolio, (2) any filing with fewer than 10 positions, (3) any filing in which a fund holds over 50% of the total outstanding market cap of a stock whose market cap exceeds $250 million, (4) any filing in which the value of the 13F portfolio is under $50 million, and (5) any filing which contains more than 150 positions. None of my results are sensitive to these particular threshold values. These filters reduce my sample of fund-quarters from 48,260 to 28,578.[6]

After imposing the filters above, the hedge fund 13F portfolios that remain should generally be representative of managers' beliefs within those portfolios. All discussion of manager returns and flows refer to these portfolios. If a manager holds a portfolio of 20 different stocks, in addition to cash, several short positions, and a number of credit positions, there is no reason that the manager's long stock position weights should not represent, on average, a manager's relative evaluation of different opportunities. For instance, if a manager overweights a given stock within her long portfolio, it seems reasonable to infer that the manager most likely believes that stock has a greater expected return or lower risk as compared to some of her other stock holdings.

Table 1 summarizes the hedge fund universe across 13F filings from 12/31/1989 through 9/30/2013. Averages are taken in the time series, with the datapoint in any given quarter representing an average that is equal-weighted across managers, but value weighted within any given manager's portfolio.[7]

Quintiles are from characteristic-based assignments (i.e., DGTW portfolio assignment). The sample of hedge funds tends to hold stocks in larger size quintiles, with above average momentum, and with slightly below average book-to-market. The sample grows steadily over time, and peaks at almost 600 managers in late 2007.

[6]The mutual fund literature employs comparable filtering techniques. See, for instance, Kacperczyk, Sialm, and Zheng (2007). The main differences between my approach and the standard mutual fund sample selection procedure are driven by the fact that mutual fund holdings data includes cash and non-stock holdings, and mutual funds are labeled with explicit investment objectives. Furthermore, mutual funds rarely take a private equity approach to investing.

[7]For example, these averages weight a 10% position of a manager with $1 billion in assets under management twice as heavily as a 5% position of a manager with $5 billion in assets under management.

3 When do managers double the weight of a position?

I first examine what factors explain how managers alter their portfolio weights over time. If a position-level career risk mechanism is truly at work, then managers should be hesitant to add to positions that have generated large past losses, relative to positions that have generated large gains. Furthermore, if position-level and fund-level career risks interact, it is possible that managers facing greater fund-level career risk may be hesitant to double down on losing positions, relative to managers facing less fund-level career risk.

Attempting to explain the complete panel of manager-stock-quarter portfolio weight changes would be a substantial task, given the vast universe of potential investments and the numerous sources of noise involved. Instead, I focus my attention on large increases in the portfolio weights of previously sizable positions. I do not attempt to explain small portfolio weight changes, or the portfolio weight changes of small positions. I also do not attempt to explain a manager's decision to initiate a new position in a particular security.

In other words, what factors lead a hedge fund manager to increase her bet on a position that she already holds? When do managers fulfill the "doubling" requirement of the phenomenon of "doubling down"? The dependent variable that I employ is an indicator variable that captures when a manager doubles a portfolio weight over the past 3, 6, 9, or 12 months. Doubling down, the details of which I explain in Section 4, occurs when a manager doubles the portfolio weight of a position specifically after poor trailing stock-level performance, a subset of the events captured by my indicator variable.

I first remove all positions that were not sizable as of time t-q from the sample (I set q=1, 2, 3, or 4). I define a sizable position as one with a portfolio weight greater than the maximum of (1) 2.5% and (2) a manager's average position size in all 13Fs she has filed to date (defined at the manager-quarter level).[8] I use this definition of a sizable position throughout the paper, although I later vary the exact cutoffs for robustness and to demonstrate comparative statics.

For the left hand side, I construct an indicator variable, $double_{s,m,t,q}$, that is set to 1 if the position weight at time t of stock s for manager m at least doubled over the past q quarters, and 0 otherwise. As an example, suppose q=2. If Microsoft was a 5% position for manager m on June 30, 2004, and a 10% or greater position for manager m on December 31, 2004, then $double_{Microsoft,m,12/31/2004,2} = 1$. If, on the other hand, Microsoft was only a 6% position for manager m at December 31, 2004, then $double_{Microsoft,m,12/31/2004,2} = 0$.

I employ a linear regression approach with standard errors clustered in two dimensions,

[8] I define average position size as the reciprocal of the average number of equity positions on all of a manager's 13Fs filed up to and including the date of analysis. For example, if a manager has filed 13Fs with 20, 30, and 40 positions to date, then her average position size will be $1/(\frac{1}{3} * (20 + 30 + 40)) = 3.33\%$.

at the manager and quarter levels. While the dependent variable is an indicator variable, it is merely a simplification of the continuous trading behavior of managers that allows me to cleanly separate events. I am not overly concerned with small negative predicted values for the left hand side variable, which could loosely be interpreted as an increase in the likelihood of decreasing a position, rather than doubling its weight. My regressions never produce fitted values above 1. Since a manager's portfolio weights by definition add up to 1, a decision to double one position clearly impacts the decision to double other positions. Clustering errors at the manager level is therefore necessary. I additionally cluster by time, for robustness and in case portfolio weight decisions are correlated across managers during a given time period.

I employ three different regression frameworks. In all regressions, I include controls at the stock level for instititutional ownership as a percentage of total market capitalization (*IOR*), the number of institutional owners (*numInst*), the stock's book-to-market ratio (*BM*), and the log market capitalization (*logMktCap*). At the manager level, I include a control for a manager's 13F assets (*13Fassets*).

In my first regression, I include a variable that represents a stock's recent gain relative to the market (*recentGain*), expressed as a percentage contribution to the manager's portfolio. In other words, if stock s was a 5% position but outperformed the market by 20% over the past q quarters, then its *recentGain* would be positive 1% for that period. I winsorize returns relative to the market at the 1% level in this calculation. Losses are recorded as negative numbers.

$$double_{s,m,t,q} = \alpha_0 + \alpha_1 recentGain_{s,m,t,q} + \gamma' controls_{s,m,t,q} \tag{1}$$

My proposed position-level career risks mechanism would suggest that managers are averse to adding substantially to losing positions ($\alpha_1 > 0$). I strongly confirm this hypothesis in the data. In Panel A of Table 2, the coefficient on *recentGain* is positive and highly statistically significant (t-statistic of over 12 across all values of *q)*. A positive coefficient means that as *recentGain* becomes more negative (as losses increase in magnitude), a manager is less likely to double a position.

Of course, one interpretation of this coefficient is simply that managers are averse to trading positions, and instead choose primarily to let position weights drift based on performance. However, hedge funds are known to have relatively high turnover. Agarwal, Fos, and Jiang (2013) find that hedge funds turn over their 13F portfolios about 0.92 times a year on average. Furthermore, I am not analyzing high frequency trades. Over horizons of 9 or 12 months, it seems unlikely that a manager is especially averse to altering her portfolio weights, since she will typically turn over almost her entire portfolio over such a horizon. The strong significance of the coefficient on *recentGain* over these longer horizons — with higher

magnitudes and t-statistics than over 3 and 6 month horizons — provides some reassurance that portfolio weight drift is not the dominant cause of managers doubling positions.

In Panel B, I break down this effect into a stock's previous position size as a percent of a manager's 13F portfolio as of quarter *t-q* (*previousPosSize*), and the performance of the stock relative to the market over the past q quarters, winsorized at the 1% level (*stkMinMkt*).

$$double_{s,m,t,q} = \alpha_0 + \alpha_1 stkMinMkt_{s,m,t,q} + \alpha_2 previousPosSize_{s,m,t,q} + \gamma' controls_{s,m,t,q} \quad (2)$$

Managers appear less likely to add to stocks that have poor market-adjusted performance, based on the positive and significant coefficient on *stkMinMkt* (α_1). They are also less likely to double large positions ($\alpha_2 < 0$); this makes sense from a portfolio management perspective, if one values diversification and does not want to allow a single position to dominate the portfolio.

Finally, in Panel C I undertake a more ambitious approach that uses a proxy for fund-level career risk, the quintile of a manager's trailing 2 year return (*trailingRetQuintile*).[9] A manager with returns in the top quintile over the past 2 years is likely more secure from a career perspective than a manager in the bottom return quintile. My hypothesis is that fund-level career risk has a particular impact on a manager's willingness to double a position after losses, relative to after gains. I therefore also include an indicator (*gainLess0*) set to 1 when *recentGain* is less than 0. I include the three-way interaction and all two-way interactions between *recentGain, gainLess0,* and *trailingRetQuintile.* The coefficient of interest, β, is the coefficient on the three-way interaction between these variables. I retain all other variables used so far as RHS variables.

$$\begin{aligned} double_{s,m,t,q} = \alpha_0 + \beta recentGain_{s,m,t,q} * gainLess0_{s,m,t,q} * trailingRetQuintile_{s,m,t,q} \\ + \delta' twoWayInteractions_{s,m,t,q} + \alpha_1 recentGain + \alpha_2 stkMinMkt_{s,m,t,q} \\ + \alpha_3 previousPosSize_{s,m,t,q} + \gamma' controls_{s,m,t,q} \end{aligned} \quad (3)$$

In other words, β is the coefficient on the interaction term between specifically a stock's past losses (rather than gains) and a proxy for career risk (a manager's trailing 2 year return quintile). I have separately included the other interactions, so tests of β examine whether or

[9]Returns are measured as the buy and hold returns of a manager's 13F portfolio, rebalanced at each quarter end to the manager's latest 13F filing. Quintiles at each date are based on the trailing returns of all fund managers in my sample at that date with sufficient return history. A higher quintile represents higher trailing returns.

not career risks have a differential impact on a manager's willingness to double down after *losses* in a position, *relative* to after gains.

The consistently negative estimate of β across all specifications suggests that a manager facing less career risk (*trailingRetQuintile* is more positive) who is holding a position that has generated more losses (*recentGain* is more negative) may be more willing to double the weight of that position than is a manager facing more career risk.[10] This effect is relative to the unconditional relationship between career risk and gains/losses. However, statistical significance is weak. One regression just misses the 10% significance threshold (t-statistic 1.64 for q=2) for β, while the others are not as close. There is thus only marginal evidence that the impact of fund-level career risk may be different for gains than for losses in the direction I have hypothesized.

Overall, these results suggest that managers are reluctant to double the portfolio weight of a position on which they have lost considerable money. There is also tenuous evidence that managers facing elevated career risk at the fund level are particularly reluctant to double a losing position.

4 Double down portfolio construction

In this section, I define doubling down in the data. I then provide summary statistics of the double down portfolio.

4.1 Definition

In order to test my hypothesis, I translate the anecdotal story that I described in the introduction into a quantifiable procedure. I define doubling down as a stock s held by a manager m at the end of quarter t that meets the following criteria over the past q quarters (I refer to q as the portfolio formation period). First, the position s must have been sizable for manager m in period t-q.[11] Second, over the last q quarters, stock s's return must have fallen short of the CRSP value weighed index return by more than Z%. Third, the manager must have increased the weight of s in her portfolio at time t to at least G * (the position weight of s at time t-q).

I hold a stock in the double down portfolio until the stock is no longer a sizable position for manager m. In other words, I hold the position until the "investment thesis plays out," from the manager's perspective, or until the manager exits the sample (whichever comes

[10] More losses*less career risk*coefficient = negative*position*negative = positive.

[11] As explained in Section 3, I define a sizable position as one with a portfolio weight greater than the maximum of (1) 2.5% and (2) a manager's average position size in all 13Fs she has filed to date (defined at the manager-quarter level). Later, I will vary these cutoffs for robustness, i.e., I use 3% instead of 2.5%, or I use 1.5 times a manager's average position size.

first). I weight each position using its portfolio weight for manager m, divided by the sum of the portfolio weights of all positions in the portfolio (so that position weights sum to 1). I utilize this approach because it allows relative position sizes within manager portfolios to matter, but ignores the size of managers' total U.S. equity portfolios.[12] My results carry through on an equal weighted-basis.

Finally, I exclude instances in which a manager doubles down on a stock over the past q quarters when the proportional change in the manager's assets over those q quarters was in the bottom decile of all the managers in my sample. In other words, I ignore observations when a manager doubles down over a period during which her 13F assets dropped precipitously. I remove these observations because they are much less likely to reflect a manager's beliefs regarding future excess returns. Managers that have experienced a rapid drop in their 13F assets are typically facing large outflows, have suddenly shifted their assets towards other (non-U.S. equity) strategies, or have suffered extreme negative returns and will soon face large outflows in the future. In the first two instances, if a manager has rapidly reallocated her funds to cash or to other asset classes, it is likely that liquidity considerations played a large role in determining portfolio weight changes. Similarly, in the third case, the flows-performance literature documents that if a manager has suffered extreme negative returns, the manager will likely face large outflows in the future. Such a manager will need to raise cash in anticipation of future outflows, once again meaning that liquidity considerations will have an outsized impact on portfolio weights. Furthermore, my portfolio construction approach relies on a manager's decision to reduce a position's weight to determine when to remove that position from the double down portfolio. Knowing that a manager may soon be forced to liquidate means that there is a significant chance that I will be forced to remove any associated positions when the manager liquidates, rather than waiting for an information based sell signal for that position. In other words, I will likely be unable to follow such a stock until the manager thinks it is no longer undervalued. Finally, I also remove these observations of doubling down to differentiate my effect from Alexander, Cici, and Gibson (2006), who find that manager purchases during extreme outflows generate future outperformance.[13]

In my baseline portfolio construction, I employ the following parameter values. I test q=2 quarters, Z=10%, and G=2. I later proceed to vary all of these parameters (q=1-4, Z=0%-15%, G=1.5-2.25) for robustness, and to demonstrate that outperformance increases when doubling down is conditioned on greater past losses.

[12] There is some empirical (see, for example, Cremers and Petajisto (2009)) evidence that skill declines among the largest managers.

[13] Appendix Table A1 provides baseline performance results for the double down portfolio without imposing this filter. The point estimates are slightly lower, but are still quite statistically significant.

4.2 Summary statistics

Table 3 summarizes the double down portfolio formed using the baseline parameter values listed above. Since I examine managers' sizable positions, the average size quintile of the double down portfolio increases relative to the full sample, as one would expect. The average book-to-market quintile of these stocks is below that of the median stock (the third quintile). The average momentum quintile is similarly below that of the median stock, as one would expect given the portfolio formation procedure.

Figure 1 displays the number of double down positions in my portfolio over time (left hand scale) against the number of hedge funds in my sample (right hand scale). The number of double down positions grows in line with the number of hedge funds. The average total value of these underlying positions in their respective managers' portfolios, across the 96 quarters in the sample, is $1.84 billion.[14] Even the lowest 10th percentile of the value of the portfolio is over $180 million. In other words, the double down portfolio represents actual substantial bets made in the market by the underlying hedge fund managers in my sample. Taking another perspective, managers separately double down on 410 positions, and hold these positions for between 4 and 5 quarters (13 months), on average.

4.3 Exiting instead of doubling down

The double down portfolio constructed above suggests that doubling down is a rare occurence, as one would expect if managers take on substantial career risk by doing so. To provide some context for the frequency of doubling down, beyond the panel regressions in Section 3, I compare the number of double down positions to the number of positions that managers *exit*, rather than double down on. I use this portfolio again in Section 6 as a control portfolio for performance tests.

I construct an exit portfolio of positions that are double down eligible, but which managers halve the position weight of, as opposed to double, over the relevant time frame. In other words, these positions meet all other requirements to enter the double down portfolio, except the requisite increase in position weight, which instead declines substantially. I then hold each such position for 4 quarters after the manager has exited it, since this is approximately the average holding time of positions in the double down portfolio. Figure 2 displays the number of stocks in the double down portfolio (left hand scale) compared to the number of stocks in a portfolio of positions that managers have chosen to exit, rather than double down on (right hand scale). As the difference in scales makes evident, managers exit roughly

[14] At each quarter end, I add up the dollar values, in their respective managers' 13F filings, of all of the double down positions. For instance, if the portfolio has two positions, and hedge fund X holds $600 million of one position while hedge fund Y holds $300 million of the second, I would record a value of $900 million.

30 positions for each position that they double down on. As another comparison, on average across the sample period, the set of all hedge funds in aggregate holds roughly 200 sizable non-double down positions for each double down position.

5 Double down portfolio performance

I have demonstrated that managers are more willing to double the portfolio weight of a position that has done well recently than they are willing to double the portfolio weight of a position that has done poorly. This finding suggests that managers are hesitant to add to losing positions. However, arguably a better test of whether managers are more selective when adding to losing positions is to examine the performance of the losing positions to which managers add. If managers have a higher threshold for adding to losing positions, as a result of the ensuing career risk, then one would expect to see that when managers actually do make such a decision, those positions outperform.

In this section, I test the risk-adjusted performance of the double down portfolio. I demonstrate that managers do indeed outperform on those holdings. I then extend these performance tests to focus on comparative statics, and find results consistent with a career risks mechanism. That is, I demonstrate that doubling down after greater position-level losses predicts greater future outperformance.

5.1 Performance - baseline

Table 4 displays risk-adjusted performance measures of the double down portfolio. The 4-factor alpha is significant at the 5% level when doubling down occurs over a 3, 6, or 9 month interval. DGTW-adjusted performance and CAPM-alphas are significant for doubling down over 6 and 9 months. These figures are strongly positive and close to significant for the 3 month portfolio. At 6 or 9 months, outperformance figures range from 48 to 83 bps per month. Annualized, those figures correspond to outperformance of 5.8% (12*.0039) to 10.0% (12*.0083). At 3 months, monthly outperformance figures range from 39 bps to 78 bps.

At 12 months, all point estimates remain positive, but the doubling down effect begins to break down, as none of the outperformance estimates are statistically significant. It should not be too surprising that the effect of doubling down dissipates when using a sufficiently long portfolio formation horizon. The premise of the doubling down mechanism I propose is that a manager increases her portfolio weight in a stock in response to its underperformance. Hedge funds are highly active investors. It is not surprising that a manager takes less than 12 months to respond to a potential buying opportunity after a stock drops in price.

On the other hand, the effect is statistically a bit weaker at 3 months than at 6 or 9

months. This finding is driven by the fact that there are fewer observations of doubling down at the 3 month horizon. There are fewer stocks that managers double in position size and that have fallen a full 10% short of the market in such a short time frame. Given the size of these positions, for instance, holding all else equal (such as assets under management), it may take many weeks for a manager to fully double her portfolio weight in a stock. If the manager is trading in reaction to a drop in the price of a stock, to have both the price drop and the subsequent portfolio weight change occur within a single calendar quarter, which contains roughly 60 trading days, is apparently less common than to have both these events occur over the course of 2 or 3 quarters.

Naturally, with more frequent data on hedge fund holdings and trades, I would be able to more precisely observe both the time horizons at which doubling down operates and how managers time their trades. The outperformance of the double down portfolio using quarterly observations, which is still based on large changes in manager portfolio weights, suggests that managers are able to time their trades at least reasonably well when doubling down. If managers do in fact have some timing ability in this particular circumstance — when adding to large positions that they have lost money on — then one might expect that this timing ability would show up more cleanly in weekly or monthly holdings data, generating even larger outperformance figures.

The portfolio by construction weights negatively on momentum, or the UMD coefficient. The positive weight on value, or HML, of the double down portfolio is only slightly larger than the HML loading on the full hedge fund sample. The portfolio weights slightly above unity on the market, and generally a small positive amount on size.

Figure 3 displays the trailing 3-year CAPM and 4-factor alphas of the double down portfolio using a 6 month (Panel A) and 9 month (Panel B) formation period. As is apparent, outperformance is not generated solely during a small subsample, nor is it generated only early in the sample when the portfolio is based on fewer underlying positions. 3-year trailing alphas are very rarely substantially negative.

Going forward, I focus on the double down portfolios formed at the 3, 6, and 9 month horizons, with particular emphasis on results at the 6 and 9 month horizons, where I have more observations of doubling down.

5.2 Performance - comparative statics

If the career risk mechanism detailed so far is truly driving my results, one would expect that the outperformance of the double down portfolio would increase as its portfolio formation cutoffs are tightened. In other words, if a manager has suffered greater past losses on a position, then the act of doubling down on that position would be expected to generate more

career risk for the manager. In turn, one would expect the double down positions formed conditioning on greater past position-level losses to have higher expected returns in order to offset this career risk. Varying the portfolio formation parameters in this manner also provides a robustness check against data snooping.

I confirm this hypothesis in the data. I obtain risk-adjusted performance estimates as high as 123 bps per month, which leads to annualized outperformance of roughly 15%. For brevity, I only display 4-factor alphas for the double down portfolio formed using a 6 month window in Table 5. The Appendix displays the full tables (A.2-A.5) of DGTW-adjusted performance figures, 4-factor alphas, and CAPM alphas of portfolios formed using 3, 6, and 9 month windows with varying cutoffs. The full results are similar.

Tightening the double down cutoffs by definition reduces the number of double down observations. The resulting portfolios are therefore thinner than my baseline portfolios. On the other hand, though point estimates decrease, the statistical significance of my result remains even when I loosen the cutoffs relative to my baseline parameters. These portfolios of course are comprised of a greater number of underlying positions than the portfolios in my baseline construction.

Increasing the sizable position cutoff by varying either the absolute (2.5%) or the relative (the multiple of a manager's average position size) floor means that a manager will be required to have lost more in a given position, for the same stock-level performance, prior to doubling down in that position. As expected, as I increase the minimum sizable portfolio weight from 1.5% to 3.5%, the four-factor alpha increases from 41 bps per month to 106 bps per month. Varying the relative position cutoff, outperformance increases from 62 bps per month when a cutoff of 0.5 times a manager's average position size is used to 129 bps per month when a position must have started at 2 times a manager's average position size to be considered sizable.

Conditioning on different past performance cutoffs (the parameter Z) also varies a manager's past losses in a given position. Greater past losses generate greater outperformance after doubling down. A portfolio formed of the stocks that fell short of the market by 5% over the last 6 months, which a manager doubles down on, generates a 4-factor alpha of 46 bps per month. On the other hand, a portfolio of double down positions that fell short of the market by 15% generates a 4-factor alpha of 101 bps per month.

Finally, I consider different requisite increases in a manager's portfolio weight in a position (the parameter G) to define doubling down. One would expect that the larger you make a position after its past drop, the more salient it will be to investors. Once again, risk-adjusted performance increases from 29 bps to 120 bps per month as G goes from 1.5 to 2.25.

Double down positions generate greater outperformance, on average, when they are ini-

tiated following larger position-level losses.

5.3 Performance - event study

The calendar time portfolio is the preferred statistical test of the outperformance of a portfolio. However, examining all double down positions pooled together is a method of checking the robustness of the portfolio approach. In particular, one might be concerned that because the portfolio approach equally weights some quarters with few double down positions and other quarters with a large number of double down positions, it could be producing misleading results. The fact that the trailing 3-year alpha of the portfolio is not systematically different across most subsamples suggests that this issue should not be a major concern. I take an event study style approach here to further demonstrate robustness.

I construct an event study approach by treating a manager's decision to double down in a position as a single event. I then equal weight across all events. In my first approach, I throw away all information about how managers trade these positions after they double down. I define doubling down using my baseline parameters. Date 0 is the portfolio formation date, the date at which each double down event occured. I DGTW-adjust the performance of each stock in the portfolio.

Figure 4 displays the results. Performance is displayed over time as the average of monthly DGTW-adjusted portfolio performance figures from date 0 until the corresponding date in event time. The t-statistic is generated based on this series of monthly DGTW-adjusted returns. Remarkably, I find consistent outperformance at long horizons here. A manager doubling down in a stock reliably predicts positive outperformance of that stock over the next four years, on the order of 30-40 bps a month, on a DGTW-adjusted basis. The weakest time frame of outperformance is over the 3-5 quarter horizon.

Of course, if a mispricing corrects soon after a manager doubles down on a position, then observing a manager's decision to exit that position is important. I thus also consider an approach that equal weights all positions in the double down portfolio, but exits a position when a manager does. For example, the portfolio generating performance from 18 to 21 months in this approach is the equal-weighted average DGTW-adjusted performance of all double down positions that managers continued to hold (as sizable positions) as of the 6th quarter end following the quarter end at which they originally doubled down on those positions.

Figure 5 displays these results. Outperformance is now much stronger, though it does still dip briefly in the medium run. At longer horizons, the portfolio generates DGTW-adjusted outperformance estimates of between 40 and 80 bps, roughly in line with my portfolio results. Furthermore, it is worth noting that the performance of both of these portfolios is very strong

in the first 2 quarters following the double down event. Since managers exit many positions after 1 or 2 quarters, this performance is weighted more heavily in the performance generated by the calendar time double down portfolio in Section 5.1.[15]

To illustrate this point, Figure 6 displays how managers exit and size their double down positions over time. The average holding time of a double down position is 13 months. As can be seen, managers exit about one third of these positions within the first two quarters after doubling down. By the fifth quarter, they have exited another third. Managers slowly exit the remaining positions over time. Managers size the positions that are in the double down portfolio to be between 8% and 10% of their 13F assets, on average.

6 Control portfolios

In this section, I illustrate that the outperformance of the double down portfolio is robust to controlling for a number of alternative explanations. Double down positions outperform other large hedge fund positions and positions that are double down eligible but which managers instead exit. Other positions that managers buy on a dip do not outperform. Positions with large portfolio weight increases following strong position-level returns do generate some outperformance, though much less than their double down counterparts. Furthermore, these positions are statistically indistinguishable from positions with strong trailing returns that managers choose to exit rather than double. There seems to be less information content in a manager's portfolio weight changes after strong position-level performance, relative to following poor position-level performance. One would expect this differential if a manager devotes more attention to her portfolio management decisions regarding positions with poor performance, because of their potential career implications.

6.1 Full hedge fund sample

Table 6 displays the performance of the full sample of hedge fund equity positions, using the same weighting scheme as the double down portfolio. It also displays the performance of managers' largest positions (what one might expect to be their "best ideas," Cohen, Polk, and Silli (2010)).

[15]To illustrate this point, suppose that a fund holds two positions at all times across 40 quarters. One is a position in the same stock X for the entire sample. The other position is a different stock every quarter. Suppose the portfolio always weights both positions equally. Each quarter, the portfolio's performance will be generated as one half of the performance of stock X, and one half of the performance of the other stock in the portfolio. However, in constructing a pooled event approach such as I do in this section, using the purchase of a position as the date-0 event, the performance of the event portfolio would be based upon 40 positions in the first quarter, but thereafter only a single position for the remaining time in the event-study. This construction would downplay the performance contribution of the rotating positions in the portfolio, relative to their contribution to the performance of the actual fund over time.

Interestingly, I find that the managers in my filtered sample do generate economically small but statistically significant outperformance. Risk-adjusted performance ranges from roughly 10 to 20 bps monthly for the full set of hedge fund positions. These figures could potentially cover a management fee of between 1% and 2%, though they would have more trouble covering both a management fee and an incentive fee. Of course, managers could also potentially add (or subtract) value on the short side of their portfolios, which I am unable to observe, and could add (or subtract) value in non-U.S. equity positions or from intra-quarter trading.

The evidence for best ideas is much weaker in my hedge fund sample than in the mutual fund sample of Cohen, Polk, and Silli (2010). Sizable positions in my sample, defined in Section 3, generate performance in line with the full sample of fund positions. The performance of funds' single largest or top 3 positions is similar. The outperformance of double down positions, a subset of large positions, cannot be attributed to this effect.

To further illustrate this point, I go long the double down portfolio and short the complete set of sizable hedge fund positions. I display the results in Table 7, using double down portfolios formed after a stock dips relative to the market by 10% or 15%. The estimated long-short portfolio alphas are all strongly positive, and many are statistically significant.

6.2 Other positions with poor recent stock-level performance

I have demonstrated that if a manager doubles down on a stock after it has underperformed, the stock tends to do well going forward. But what if this is merely some sort of mechanical reversal effect? What happens to the stocks that underperform, but which managers do not double down on?

Table 8 displays the performance of relevant control portfolios that are formed conditional on poor recent trailing stock-level returns. The dominant effect that concerns the continuation of short term returns, of course, is momentum. A position's performance over the past year tends to be positively correlated with its performance over the following year. As I will show, none of the control portfolios I form here generate excess performance unless they are given credit for a (predictably) large negative weight on UMD. Relative to a DGTW-adjusted or market benchmark, these portfolios generate insignificant performance. Claiming to beat only a strongly short-momentum portfolio is rarely an objective of hedge fund managers. The double down portfolio, on the other hand, does well on both a DGTW-adjused and CAPM basis. Regardless, none of these comparable portfolios come close to matching the magnitude of the outperformance of the double down portfolio.

The first portfolio is constructed of positions that are double down eligible, but which managers exit (i.e., cut the position weight in half over the relevant time frame) rather than

double down on, as in Section 4.3. In other words, these positions meet all other requirements to enter the double down portfolio, except the requisite increase in position weight (which declines, rather than increases).[16] I then hold each such position for 12 months after the manager has exited it. I equal weight positions both within and across managers.[17] Results are similar for portfolios that are value weighted by a stock's market capitalization. DGTW and CAPM alphas are near zero or somewhat negative.

The second portfolio is formed of all positions that managers buy into on a dip (i.e., stocks with returns over the portfolio formation period that fall short of the market by 10%, and which managers did not hold at the start of the formation period). As with the double down portfolio, I hold all such positions as long as the fund manager does. Once again, these stocks do not generate enviable performance.

The third portfolio specifically looks at when managers initiate a sizable position after poor trailing performance. In other words, a position may or may not have been a small position before, but the manager increased its weight across the sizable threshold following stock-level underperformance. I hold all such positions as long as the manager continues to hold the stock as a sizable position. These positions display similarly meager performance.

In summary, it does not appear that fund positions generally outperform following stock-level dips.

6.3 Large portfolio weight changes following strong stock-level performance

What if a manager doubles her position weight in a stock after strong, rather than weak, trailing stock-level performance? Conditional on a manager doubling her portfolio weight in a stock, how does the stock's recent trailing performance matter?

If one thinks that large changes in a manager's portfolio weights are informative in gen-

[16] I specifically examine effective exits, rather than all positions that are double down eligible but which managers do not double down on, to make the control portfolio comparable to the double down portfolio. Requisite to doubling down, a manager must make a large change in the portfolio weight of a position. One likely reason for such a change is if a manager changes her beliefs regarding a position's degree of underpricing. Inversely, to exit a position, a manager must also make a large change in the portfolio weight of a position, potentially expressing the manager's belief that the position is no longer as attractive an investment. On the other hand, when a manager makes only a small change to the portfolio weight of a position that has underperformed recently, it is difficult to infer if the manager has changed her beliefs, or if other sources of noise such as transaction costs are driving the small portfolio weight change. Nevertheless, in unreported tests, available upon request, I construct portfolios of the positions that are double down eligible but which managers neither exit nor double down on. They generate performance results in line with the full set of sizable positions.

[17] I need to make some assumptions here because the manager has already effectively exited the position. I therefore cannot infer how long to hold the position, or how to weight it, from the manager's trading behavior, as I do in the construction of the double down portfolio. Managers hold double down positions for roughly 4 quarters on average, so I hold these stocks for a similar time period.

eral, one would expect that positions which managers increase in weight following stock-level outperformance would also do well. Notably, however, the fund flows literature would already lead us to expect this to be the case. If a fund holds a sizable position in a stock that does well, then the fund will tend to be doing better than average, and will attract inflows because flows chase performance. Flows will drive the price of the stock upwards, as that fund and other managers who held that stock receive inflows and buy more of their existing positions. This effect is of course correlated with momentum, though they are not the same. Coval and Stafford (2007), for instance, find that a portfolio formed of stocks held by funds with expected future inflows generates a positive monthly 4-factor alpha of about 30 bps. Controlling for momentum therefore only partially removes the effect of fund flows.

Table 9 displays the performance of positions that managers adjust after strong trailing performance (a return greater than the market plus 10% over the relevant time frame).[18] "Double up" positions that managers double after strong performance do well, though not nearly as well as their double down counterparts. On a 4-factor alpha or CAPM-alpha basis they generate outperformance of between 12 and 40 bps (in the vicinity of the Coval and Stafford estimates for inflow-based outperformance), compared to a range of 48-72 bps for the double down portfolios formed over the same formation horizons.

I demonstrated in Section 6.2 that double down eligible positions which managers exit instead of doubling down on do not outperform. In other words, managers have some skill at selecting which positions to double down on; changes in a manager's portfolio weight in a position after poor stock-level performance are informative. Analogously, what about positions that managers exit (cut the position weight of in half) instead of double up on after strong stock-level outperformance? The second portfolio in Table 9 shows that these positions generate 4-factor alphas or CAPM-alphas of between 13 and 30 bps, just under the outperformance generated by the double up portfolio.[19] In other words, the large positions that a manager holds and that have done well in the past tend to do well in the future, even after adjusting for momentum, regardless of whether the manager increases or decreases her portfolio weights in those positions.

To formally test this claim, in Table 10 I form several long-short portfolios. First, I go long the double down portfolio, and short the positions that a manager exits instead of doubling down on. I then go long the double up portfolio, and short the positions that a manager exits instead of doubling up on. Finally, I go long positions that a manager doubles

[18] I construct this portfolio just as I do the double down portfolio, in that positions are weighted by their manager-level portfolio weight, and are held as long as the manager continues to hold the stock as a sizable position.

[19] I construct this portfolio just as I do the portfolio of positions that managers exit instead of douling down on. Positions are equal-weighted and are held for 12 months.

following middling performance (stock-level performance within 10% above or below the market over the relevant time frame), and short those that a manager exits after similar recent performance.

The double down long-short portfolio generates strong outperformance. In contrast, the double up long-short portfolio generates point estimates of alphas below 20 bps that are statistically indistinguishable from zero at all portfolio formation horizons. The final portfolio formed of stocks with middling recent returns generates performance figures between those of the other two portfolios.

Fund manager portfolio weight changes after strong trailing position-level performance are not informative. As expected, positions that have done well in the past continue to outperform, regardless of a manager's actions.

6.4 Adjusting for industry performance

What if managers are merely rotating into down-and-out industries at the right time, such as buying financial stocks in early 2009? To test this concern, I industry adjust the performance of my double down portfolio using the performance of each position's respective industry under the Fama-French 48 industry classification system. Table 11 displays the results. The double down portfolio generates significant outperformance in excess of an industry matched portfolio. Point estimates diminish marginally relative to a DGTW adjustment. Going long the double down portfolio and short each stock's respective industry portfolio generates positive and significant 4-factor alphas using 3, 6, or 9 month portfolio formation periods. Doubling down does not simply represent timely industry bets.

6.5 Active portfolio weight changes

In a frictionless setting, managers set their portfolio weights at every date based upon their beliefs regarding future asset returns. Of course, frictions such as transaction costs and taxes mean that managers do not trade as frequently as the frictionless benchmark would imply, a consideration I discussed briefly in Section 3. Yet hedge funds have relatively high turnover and I am not analyzing high frequency trades. Furthermore, I am only looking at large portfolio weight changes. Departing from the frictionless benchmark does not seem to be warranted in my case.

Nonetheless, to illustrate the robustness of the doubling down effect, I construct a control portfolio that utilizes specifically a fund's *active* portfolio weight changes. An active portfolio weight change over the past q quarters is the change in the position's portfolio weight minus the change that would have occured in the position's portfolio weight if the manager had made absolutely no trades over the quarter. In other words, $activeweightchange =$

$currentpositionweight - (1+returnofstock)/(1+returnofmanagerm) * previouspositionweight$, with all returns measured over the portfolio formation period.

In this case, I define doubling down as before, except that I now require a manager to actively increase the portfolio weight of a position over the past q quarters by the position's original portfolio weight at t-q. For example, suppose stock s starts as a 5% position at time t-q. The stock declines by 50% over the next two quarters, but the overall fund has a return of 0%. If the manager did not trade any positions over those q quarters, then stock s would now be a 2.5% position. In order for the manager to actively increase her position in stock s by its original portfolio weight, stock s will have to be a 7.5% or larger position at time t.

Table 12 displays the performance of double down portfolios that are formed using active weight changes over 3, 6, and 9 month portfolio formation periods. The double down portfolio continues to generate strong outperformance. For instance, point estimates decline only slightly at 9 months. This result makes sense, as empirically, trading frictions are not sufficient to prevent managers from trading extensively over this time horizon (as is made clear by the fact that managers on average turn over almost their entire portfolio every 12 months).

7 Conclusion

Hedge fund managers outperform substantially and significantly on the positions that they double down on. Portfolios formed of these positions generate risk-adjusted outperformance of 5-15% on an annualized basis. The outperformance of doubling down is not explained by mechanical or previously identified asset pricing effects. Rather, doubling down behavior and returns are consistent with a career risks mechanism for this effect. Doubling down on a stock reverses the phenomenon of window dressing. By adding to a loser, fund managers call more attention to their mistakes.

If managers are hesitant to add to losing positions, then this effect may limit the amount of arbitrage capital that trades against mispricings. Existing holders likely represent a significant portion of the group of specialists who understand an individual asset well enough to separate mispricings from fundamental underperformance over short time horizons. If existing holders are constrained, and available specialist capital is limited, then past position losses will have implications for the dynamics of asset price dislocations beyond the well-known impact of fund-level losses. This possibility warrants further investigation.

References

[1] Agarwal, Vikas, Vyacheslav Fos, and Wei Jiang, 2013, Inferring reporting-related biases in hedge fund databases from hedge fund equity holdings, Management Science 59, 1271-1289.

[2] Agarwal, Vikas, Wei Jiang, Yuehua Tang, and Baozhong Yang, 2013, Uncovering hedge fund skill from the portfolio holdings they hide, Journal of Finance 68, 739-783.

[3] Alexander, Gordon, Gjergji Cici, and Scott Gibson, 2007, Does motivation matter when assessing trade performance? An analysis of mutual funds, Review of Financial Studies 20, 125-150.

[4] Cohen, Randolph, Christopher Polk, and Bernhard Silli, 2010, Best ideas, Working paper.

[5] Coval, Joshua and Erik Stafford, 2007, Asset fire sales (and purchases) in equity market, Journal of Financial Economics 86, 479-512.

[6] Cremers, Martijn, and Antti Petajisto, 2009, How active is your fund manager? A new measure that predict performance, Review of Financial Studies 22, 3329-3365.

[7] Daniel, Kent, Mark Grinblatt, Sheridan Titman, and Russ Wermers, 1997, Measuring mutual fund performance with characteristic-based benchmarks, Journal of Finance 52, 1035–1058.

[8] Frazzini, Andrea, 2006, The disposition effect and underreaction to news, Journal of Finance 61, 2017-2046.

[9] Kacperczyk, Marcin, Clemens Sialm, and Lu Zheng, 2005, On the industry concentration of actively managed equity mutual funds, Journal of Finance 60, 1983–2011.

[10] Kacperczyk, Marcin, Clemens Sialm, and Lu Zheng, 2007, Unobserved actions of mutual funds, Review of Financial Studies 2379-2416.

[11] Lakonishok, Josef, Andrei Shleifer, Richard Thaler, and Robert Vishny, 1991, Window dressing by pension fund managers, American Economic Review Papers and Proceedings 81, 227-231.

[12] Savor, Pavel and Mario Gamboa-Cavazos, 2011, Holding on to your shorts: When do short sellers retreat?, Working paper.

[13] Scharsftein, David and Jeremy Stein, 1990, Herd behavior and investment, American Economic Review 80, 465-479.

[14] Shleifer, Andrei and Robert Vishny, 1997, The limits of arbitrage, Journal of Finance 52, 35-55.

[15] Wermers, Russ, 2004, Is money really "smart"? New evidence on the relation between mutual fund flows, manager behavior, and performance persistence, Working paper.

Tables and Figures

Table 1: Hedge fund universe summary statistics

This table displays the characteristics of my hedge fund sample, after applying the filters described in the text. The sample covers 12/31/1989 - 9/30/2013. Statistics are taken across the full set of 96 13F filings covered in the sample, except for characteristic data which is across 90 13F filings (12/31/1989 - 3/31/2012). Quintile averages are weighted by portfolio weights. A value of 5 represents a higher measure of the underlying statistic, ie the largest market cap quintile, the highest book to market quintile, or the highest trailing 12-month performance (excluding the most recent month) quintile.

	Mean	Median	10th pctl	90th pctl	Standard Deviation
Hedge funds per quarter	293	259	77	530	174.7
Positions per quarter	17,011	17,131	5,409	28,004	8,566
Total long U.S. equity assets per quarter ($ BB)	219.9	151.9	31.4	493.1	180.1
Median position value ($ MM)	2.5	2.3	1.8	3.3	0.6
Average position size quintile**	3.9	3.9	3.7	4.1	0.2
Average position book quintile**	2.7	2.7	2.6	2.9	0.1
Average position momentum quintile**	3.2	3.2	2.9	3.4	0.2

Table 2: Predicting manager doubles

This table displays the results of panel regressions to predict hedge fund manager position weight doubles. The dependent variable $double_{s,m,t,q}$ is an indicator variable set to 1 when a manager m doubles the portfolio weight of a position s at time t over the trailing q quarters (1, 2, 3, or 4, as denoted). *stockMinMkt* is the performance of a stock over the past q quarters relative to the CRSP value weighted market index. *previousPosSize* is the percentage weight of that position for manager m as of q quarters ago. *recentGain* is *stockMinMkt * previousPosSize*, or the gains/losses on that position over the past q quarters, relative to holding an equal-sized position in the market index. *trailingRetQuintile* is the quintile of the manager's 13F portfolio returns over the past q quarters, relative to the full sample of managers. *gainLess0* is an indicator set to 1 if *recentGain* is less than 0. Interactions are as denoted. Additional controls include a stock's institutional ownership percentage, its number of institutional holders, book-to-market, and log market capitalization, and the 13F assets of the fund manager. T-statistics are displayed in brackets, based on standard errors clustered by both manager and by time period. ** and * denote significance at the 5% and 10% levels, respectively.

Panel A: Impact of *recentGain*

Double position size over past	3 months	6 months	9 months	12 months
Dependent variable:	$double_{s,m,t,1}$	$double_{s,m,t,2}$	$double_{s,m,t,3}$	$double_{s,m,t,4}$
recentGain	0.3665	0.4814	0.6069	0.6322
	[12.62] **	[14.09] **	[14.19] **	[15.05] **
IOR	0.0031	0.0046	0.0023	0.0042
	[1.71] *	[1.72] *	[0.64]	[1.05]
numInst	0.0000	0.0000	0.0000	0.0000
	[-5.03] **	[-3.46] **	[-1.61]	[-0.47]
BM	0.0025	0.0025	0.0012	0.0007
	[2.43] **	[2.27] **	[1.24]	[0.57]
logMktCap	0.0013	0.0002	-0.0014	-0.0027
	[3.58] **	[0.42]	[-2.05] **	[-3.39] **
13Fassets	0.0000	0.0000	0.0000	0.0000
	[-3.39] **	[-2.52] **	[-1.07]	[-1.43]
constant	-0.0183	0.0094	0.0500	0.0785
	[-2.56] **	[0.88]	[3.37] **	[4.61] **
Observations	247,407	202,539	168,488	141,473
R-squared	0.0021	0.0042	0.0075	0.0097

Panel B: Impact of *stockMinMkt* and *previousPosSize*

Double position size over past	3 months	6 months	9 months	12 months
Dependent variable:	$double_{s,m,t,1}$	$double_{s,m,t,2}$	$double_{s,m,t,3}$	$double_{s,m,t,4}$
stockMinMkt	0.0323	0.0419	0.0511	0.0540
	[14.19] **	[15.44] **	[16.13] **	[16.89] **
previousPosSize	-0.0753	-0.1166	-0.1330	-0.1563
	[-10.16] **	[-10.27] **	[-9.81] **	[-9.33] **
IOR	0.0032	0.0042	0.0010	0.0021
	[1.68] *	[1.49]	[0.28]	[0.49]
numInst	0.0000	0.0000	0.0000	0.0000
	[-4.26] **	[-2.27] **	[-0.04]	[1.38]
BM	0.0026	0.0030	0.0023	0.0026
	[2.63] **	[2.72] **	[2.37] **	[2.33] **
logMktCap	0.0010	-0.0005	-0.0026	-0.0041
	[2.66] **	[-0.94]	[-3.56] **	[-4.95] **
13Fassets	0.0000	0.0000	0.0000	0.0000
	[-3.05] **	[-2.22] **	[-0.76]	[-1.05]
constant	-0.0083	0.0301	0.0802	0.1165
	[-1.15]	[2.72] **	[5.21] **	[6.44] **
Observations	247,407	202,539	168,488	141,473
R-squared	0.0041	0.0082	0.0139	0.0183

Panel C: Interactions

Double position size over past	3 months	6 months	9 months	12 months
Dependent variable:	$double_{s,m,t,1}$	$double_{s,m,t,2}$	$double_{s,m,t,3}$	$double_{s,m,t,4}$
*recentGain*gainLess0*	-0.0364	-0.0469	-0.0208	-0.0344
**trailingRetQuintile*	[-1.20]	[-1.64]	[-0.80]	[-1.38]
recentGain	0.0211	-0.0473	0.0341	-0.1355
	[0.29]	[-0.71]	[0.43]	[-1.62]
stockMinMkt	0.0533	0.0681	0.0794	0.0850
	[13.55] **	[14.27] **	[15.34] **	[15.58] **
previousPosSize	-0.1135	-0.1752	-0.2140	-0.2284
	[-12.15] **	[-13.79] **	[-13.93] **	[-12.94] **
*trailingRetQuintile*recentGain*	0.0103	0.0191	-0.0219	-0.0049
	[0.42]	[0.73]	[-1.05]	[-0.24]
*trailingRetQuintile*gainLess0*	0.0004	-0.0005	-0.0011	-0.0007
	[1.49]	[-1.06]	[-1.95] *	[-1.53]
*recentGain*gainLess0*	-0.5351	-0.5769	-0.7220	-0.5271
	[-5.20] **	[-7.42] **	[-7.88] **	[-5.16] **
gainLess0	0.0033	0.0082	0.0121	0.0128
	[4.33] **	[5.18] **	[6.62] **	[8.02] **
trailingRetQuintile	-0.0009	-0.0003	-0.0002	-0.0003
	[-3.13] **	[-0.67]	[-0.42]	[-0.56]
IOR	0.0039	0.0050	0.0024	0.0033
	[2.19] **	[1.81] *	[0.67]	[0.80]
numInst	0.0000	0.0000	0.0000	0.0000
	[-4.48] **	[-2.39] **	[-0.29]	[1.12]
BM	0.0027	0.0031	0.0023	0.0025
	[2.78] **	[2.90] **	[2.46] **	[2.31] **
logMktCap	0.0012	-0.0001	-0.0019	-0.0035
	[3.35] **	[-0.15]	[-2.64] **	[-4.10] **
13Fassets	0.0000	0.0000	0.0000	0.0000
	[-2.56] **	[-1.96] *	[-0.42]	[-0.88]
constant	-0.0151	0.0170	0.0599	0.0959
	[-2.08] **	[1.56]	[3.91] **	[5.20] **
Observations	247,407	202,539	168,488	141,473
R-squared	0.0050	0.0097	0.0163	0.0208

Table 3: Double down portfolio summary statistics, 6 month portfolio formation

This table displays the characteristics of the double down portfolio, formed as described in the text. The sample covers 12/31/1989 - 9/30/2013. Statistics are taken across the full set of 96 13F filings covered in the sample, except for characteristic data which is across 90 13F filings (12/31/1989 - 3/31/2012). Quintile averages are weighted by portfolio weights. A value of 5 represents a higher measure of the underlying statistic, ie the largest market cap quintile, the highest book to market quintile, or the highest trailing 12-month performance (excluding the most recent month) quintile.

	Mean	Median	10th pctl	90th pctl	Standard Deviation
Hedge funds per quarter	17	10	4	38	13.8
Positions per quarter	18	10	5	44	15.3
Total long U.S. equity assets per quarter ($ BB)	1.84	0.82	0.18	5.36	2.0
Median position value ($ MM)	39.7	35.9	22.1	54.1	25.5
Average position size quintile**	4.2	4.2	3.5	5.0	0.5
Average position book quintile**	2.5	2.6	1.5	3.2	0.6
Average position momentum quintile**	2.8	2.7	2.1	3.6	0.7

Table 4: Double down portfolio

This table displays the monthly performance of the double down portfolio, formed as described in the text. The baseline parameter values are used here. That is, over the relevant portfolio formation period, a stock's return must fall short of the CRSP value weighted market index by at least 10%, and the manager must have increased the position portfolio weight to 2 * its weight at the begining of the formation period. Furthermore, the position must be sizable at both the beginning and end of the formation period, with sizable defined at the manager quarter level as the maximum of (1) 2.5% and (2) the manager's average position size across all 13Fs filed by the manager to date. Portfolio performance is calculated from 12/31/1989-12/31/2013 for alpha calculations, and from 12/31/1989-6/30/2012 for DGTW calculations. Positions are weighted equally across managers but value-weighted within a given manager's portfolio, as described in the text. T-statstics are displayed in brackets. ** and * denote significance at the 5% and 10% levels, respectively.

Trailing ret interval	Raw return	DGTW adjusted	4 factor alpha	market	size	book	mom	CAPM alpha	market	Avg # positions in alpha portfolios[1]
3 months	1.33%	0.39%	0.78%	1.09	-0.04	0.27	-0.31	0.55%	1.24	9.6
		[1.15]	[2.13]**	[11.5]	-[0.3]	[1.8]	-[2.7]	[1.54]	[15.8]	
6 months	1.69%	0.83%	0.72%	1.14	0.07	0.35	-0.18	0.64%	1.24	18.3
		[3.70]**	[3.35]**	[17.9]	[0.7]	[3.4]	-[3.8]	[2.84]**	[20.7]	
9 months	1.41%	0.63%	0.49%	1.13	0.18	0.35	-0.15	0.48%	1.21	20.0
		[2.66]**	[2.03]**	[17.8]	[1.7]	[3.2]	-[2.0]	[1.99]**	[19.4]	
12 months	1.22%	0.35%	0.24%	1.11	0.26	0.36	-0.12	0.28%	1.16	26.6
		[1.63]	[1.12]	[19.0]	[2.6]	[5.4]	-[2.0]	[1.26]	[20.0]	

[1]The 3-month trailing return portfolio has no positions for 2 of the 96 quarters in my sample. The 6-, 9-, and 12- month portfolios are populated for all 96 quarters.

Table 5: Comparative Statics

This table displays the monthly performance of the double down portfolio, formed as described in the text, but varying the parameter values used to form the portfolio. In each column, a single parameter value (X) is varied, as displayed, relative to the baseline case. The resulting 4-factor alpha of the 6-month formation period portfolio is displayed. In the first column, the definition of sizable is the maximum of (1) X% and (2) the manager's average position size across all 13Fs filed by the manager to date. In the second column, the definition of sizable is the maximum of (1) 2.5% and (2) X * the manager's average position size across all 13Fs filed by the manager to date. In the third column, over the past 6 months, a stock's return must fall short of the CRSP value weighted market index by at least X%. In the fourth column, over the past 6 months, the manager must have increased the position portfolio weight to X * its weight at the begining of the formation period. Portfolio performance is calculated from 12/31/1989-12/31/2013. Positions are weighted equally across managers but value-weighted within a given manager's portfolio, as described in the text. T-statstics are displayed in brackets. ** and * denote significance at the 5% and 10% levels, respectively.

Varying position cutoff		Varying average position factor		Varying fall relative to market		Varying increase in portfolio wtd	
New Value	9 mo DGTW	New Value	9 mo DGTW	New Value	9 mo DGTW	New Value	9 mo DGTW
1.50%	0.41%	0.50	0.62%	0%	0.38%	1.50	0.29%
	[2.57]**		[2.96]**		[2.06]**		[1.87]*
2.00%	0.57%	0.75	0.59%	5%	0.46%	1.75	0.47%
	[2.99]**		[2.87]**		[2.28]**		[2.51]**
3.00%	0.81%	1.50	0.94%	15%	1.01%	2.25	1.20%
	[2.95]**		[3.16]**		[3.30]**		[3.55]**
3.50%	1.06%	2.00	1.29%				
	[2.88]**		[3.64]**				

Table 6: Hedge fund sample, all and large positions

This table displays the monthly performance of the full sample of hedge fund positions and the subset of large hedge fund positions. Sizable is defined at the manager quarter level as the maximum of (1) 2.5% and (2) the manager's average position size across all 13Fs filed by the manager to date. Top position and top 3 positions are the portfolios formed of the single largest or largest three positions, by portfolio weight, in each manager's 13F portfolio at each quarter end. Portfolio performance is calculated from 12/31/1989-12/31/2013 for alpha calculations, and from 12/31/1989-6/30/2012 for DGTW calculations. Positions are weighted equally across managers but value-weighted within a given manager's portfolio, as described in the text. T-statstics are displayed in brackets. ** and * denote significance at the 5% and 10% levels, respectively.

	Raw return	DGTW adjusted	4 factor alpha	market	size	book	mom	CAPM alpha	market
all	1.01%	0.11%	0.15%	1.05	0.04	0.27	-0.02	0.18%	1.10
positions		[3.50]**	[3.13]**	[68.3]	[1.6]	[16.6]	-[1.6]	[2.66]**	[63.0]
sizable	1.01%	0.10%	0.15%	1.05	0.02	0.23	0.03	0.20%	1.08
positions		[2.77]**	[2.90]**	[64.4]	[0.9]	[12.9]	[2.2]	[3.08]**	[58.9]
top	1.08%	0.09%	0.25%	1.07	-0.08	0.25	0.10	0.16%	1.10
position		[1.22]	[3.16]**	[50.3]	-[2.4]	[7.5]	[4.6]	[2.41]**	[62.3]
top 3	1.05%	0.10%	0.17%	1.06	-0.01	0.24	0.08	0.16%	1.11
positions		[1.87]*	[2.61]**	[55.2]	-[0.3]	[10.3]	[4.8]	[2.29]**	[62.0]

Table 7: Long double, short all other hedge fund large positions

This table displays the monthly performance of long-short portfolios that go long the double down portfolio and short the set of all sizable hedge fund positions. The double down portfolio is constructed as described in the text, using baseline parameter values but requiring that over the relevant portfolio formation period a stock's return must fall short of the CRSP value weighted market index by either 10% or 15%, as noted. Sizable is defined at the manager-quarter level as the maximum of (1) 2.5% and (2) the manager's average position size across all 13Fs filed by the manager to date. Portfolio performance is calculated from 12/31/1989-12/31/2013 for alpha calculations, and from 12/31/1989-6/30/2012 for DGTW calculations. Positions are weighted equally across managers but value-weighted within a given manager's portfolio, as described in the text. T-statstics are displayed in brackets. ** and * denote significance at the 5% and 10% levels, respectively.

	4-factor alpha			CAPM alpha		
	3 mo	6 mo	9 mo	3 mo	6 mo	9 mo
Long double down (<mkt-10%),	0.63%	0.57%	0.35%	0.35%	0.44%	0.28%
short other large positions	[1.74]*	[2.74]**	[1.49]	[0.98]	[2.02]**	[1.21]
Long double down (<mkt-15%),	1.25%	0.86%	0.33%	1.01%	0.79%	0.30%
short other large positions	[2.48]**	[2.87]**	[1.22]	[2.04]**	[2.55]**	[1.10]

Table 8: Other trades after poor performance

This table displays the monthly performance of control portfolios formed of stocks that have recently underperformed the market. That is, over the relevant portfolio formation period, these stocks have performance that falls short of the CRSP value weighted market index by 10% or more. In the first control portfolio, an exit is a position that is double down eligible but which a manager cuts the portfolio weight of by half rather than doubling it. In the second portfolio, dip positions are those that managers initiate for the first time after poor trailing performance. In the third portfolio, large dip positions are positions that managers make sizable after poor trailing performance. Portfolio performance is calculated from 12/31/1989-12/31/2013 for alpha calculations, and from 12/31/1989-6/30/2012 for DGTW calculations. Positions are weighted as described in the text. T-statstics are displayed in brackets. ** and * denote significance at the 5% and 10% levels, respectively.

	Dgtw-adjusted			4-factor alpha			CAPM alpha		
	3 mo	6 mo	9 mo	3 mo	6 mo	9 mo	3 mo	6 mo	9 mo
Exit instead	-0.05%	0.03%	0.03%	0.04%	0.17%	0.19%	-0.27%	-0.17%	-0.13%
of double down	-[0.33]	[0.19]	[0.23]	[0.43]	[1.68]*	[1.98]**	-[1.62]	-[0.95]	-[0.72]
Establish *ANY*	0.05%	0.08%	0.10%	0.10%	0.23%	0.20%	-0.09%	0.01%	-0.03%
position on a dip	[0.47]	[0.90]	[1.05]	[1.02]	[2.54]**	[2.32]**	-[0.72]	[0.10]	-[0.21]
Establish a *LARGE*	0.19%	0.15%	0.05%	0.25%	0.37%	0.22%	-0.07%	-0.06%	-0.20%
position on a dip	[1.13]	[0.93]	[0.34]	[1.61]	[2.66]**	[1.97]**	-[0.38]	-[0.30]	-[0.99]

Table 9: Trades after good performance

This table displays the monthly performance of control portfolios formed of stocks that have recently outperformed the market. That is, over the relevant portfolio formation period, these stocks have performance that exceeds the CRSP value weighted market index by 10% or more. In the first control portfolio, the manager doubles the portfolio weight of the selected positions. In the second portfolio, the manager exits, or cuts the portfolio weight of in half, the selected positions. Portfolio performance is calculated from 12/31/1989-12/31/2013 for alpha calculations, and from 12/31/1989-6/30/2012 for DGTW calculations. Positions are weighted as described in the text. T-statstics are displayed in brackets. ** and * denote significance at the 5% and 10% levels, respectively.

	Dgtw-adjusted			4-factor alpha			CAPM alpha		
	3 mo	6 mo	9 mo	3 mo	6 mo	9 mo	3 mo	6 mo	9 mo
Double pos size	0.25%	0.48%	0.30%	0.12%	0.41%	0.30%	0.22%	0.40%	0.33%
after strong perf	[0.83]	[2.93]**	[1.72]*	[0.36]	[2.40]**	[1.70]*	[0.66]	[2.11]**	[1.71]*
Exit position	0.24%	0.21%	0.11%	0.14%	0.22%	0.13%	0.20%	0.30%	0.21%
after strong perf	[2.40]**	[2.88]**	[1.56]	[1.34]	[2.59]**	[1.45]	[1.58]	[2.78]**	[2.03]**

Table 10: Long double, short exit by trailing performance

This table displays the monthly performance of long-short portfolios that examine the informativeness of manager trades after differing levels of trailing position-level performance. In particular, these portfolios go long positions that managers double the portfolio weight of, and short positions that managers cut the portfolio weight of by half. The trailing stock-return requirement for each portfolio, relative to the market, is denoted in the table. The first portfolio looks at positions that, over the relevant portfolio formation period, have performance that falls short of the CRSP value weighted market index by 10% or more. The second portfolio looks at positions that beat the index by 10% or more. The third portfolio looks at positions that fall in between. Portfolio performance is calculated from 12/31/1989-12/31/2013. Positions are weighted as described in the text. T-statstics are displayed in brackets. ** and * denote significance at the 5% and 10% levels, respectively.

	4-factor alpha			CAPM alpha		
	3 mo	6 mo	9 mo	3 mo	6 mo	9 mo
After weak perf	0.79%	0.60%	0.32%	0.94%	0.91%	0.66%
(double down; <mkt-10%)	[2.19]**	[2.79]**	[1.29]	[2.73]**	[3.89]**	[2.66]**
After strong perf	-0.02%	0.19%	0.17%	0.02%	0.11%	0.12%
(>mkt+10%)	-[0.07]	[1.08]	[0.97]	[0.07]	[0.63]	[0.72]
After medium perf	0.08%	0.28%	0.14%	0.09%	0.35%	0.21%
(mkt-10%<r<mkt+10%)	[0.51]	[1.86]*	[0.54]	[0.53]	[2.37]**	[0.79]

Table 11: Double down portfolio, industry adjusted

This table displays the monthly industry-adjusted performance of the double down portfolio, and the monthly performance of long-short portfolios that go long the double down portfolio and short an industry-matched portfolio. The double down portfolio uses baseline parameters. Industry returns are generated by matching each position in the double down portfolio to its corresponding Fama-French 48 industry. Portfolio performance is calculated from 12/31/1989-12/31/2013. Positions are weighted equally across managers but value-weighted within a given manager's portfolio, as described in the text. T-statstics are displayed in brackets. ** and * denote significance at the 5% and 10% levels, respectively.

Industry-adjusted			4-factor alpha of long double down, short industry			CAPM alpha of long double down, short industry		
3 mo	6 mo	9 mo	3 mo	6 mo	9 mo	3 mo	6 mo	9 mo
0.20%	0.75%	0.49%	0.78%	0.72%	0.49%	0.55%	0.64%	0.48%
[0.59]	[3.39]**	[2.06]**	[2.13]**	[3.35]**	[2.03]**	[1.54]	[2.84]**	[1.99]**

Table 12: Double down portfolio, active portfolio weight changes

This table displays the monthly performance of the double down portfolio, formed as described in the text, but requiring that over the relevant portfolio formation period, the manager must have *actively* increased the position portfolio weight by at least the position's size at the beginning of the formation period. Otherwise, the baseline parameter values are used. Portfolio performance is calculated from 12/31/1989-12/31/2013 for alpha calculations, and from 12/31/1989-6/30/2012 for DGTW calculations. Positions are weighted equally across managers but value-weighted within a given manager's portfolio, as described in the text. T-statstics are displayed in brackets. ** and * denote significance at the 5% and 10% levels, respectively.

Trailing ret interval	Raw return	DGTW adjusted	4 factor alpha	market	size	book	mom	CAPM alpha	market
3 months	1.35%	0.44%	0.82%	1.18	0.01	0.16	-0.27	0.64%	1.29
		[1.54]	[2.80]**	[12.5]	[0.1]	[1.3]	-[2.8]	[2.15]**	[17.3]
6 months	1.48%	0.65%	0.54%	1.17	0.23	0.30	-0.21	0.50%	1.24
		[3.00]**	[2.65]**	[19.5]	[2.4]	[3.3]	-[4.8]	[2.26]**	[22.1]
9 months	1.26%	0.46%	0.43%	1.09	0.25	0.30	-0.23	0.38%	1.17
		[2.22]**	[1.94]*	[18.7]	[2.7]	[3.1]	-[3.7]	[1.64]	[19.0]

Figure 1: Double Down Portfolio Composition over Time

This figure displays the number of positions in the double down portfolio (left hand scale, solid line), constructed as described in the text, against the number of hedge funds in the sample (right hand scale, dashed line).

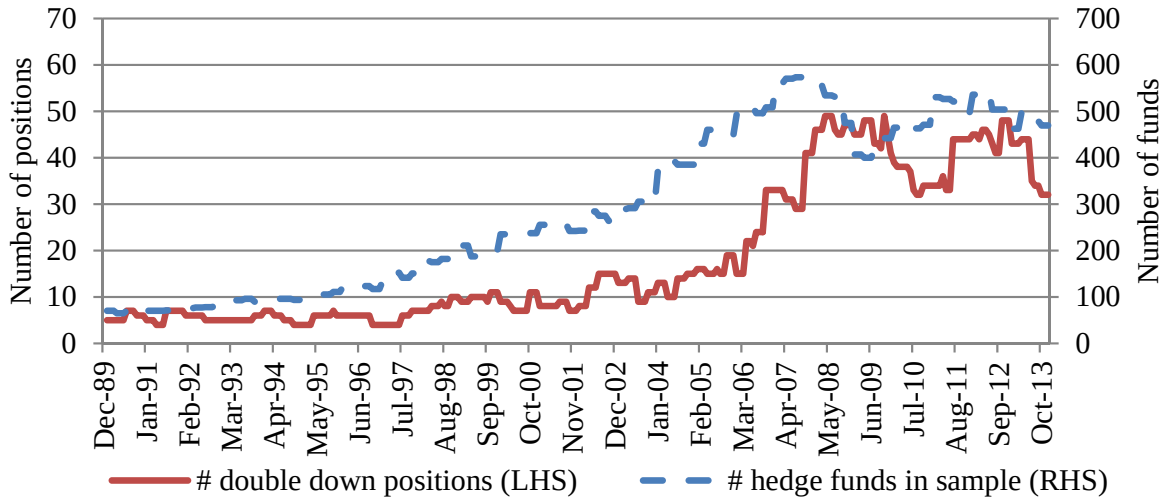


Figure 2: Double Down or Exit?

This figure displays the number of positions in the double down portfolio (left hand scale, solid line), constructed as described in the text, against the number of positions that managers exit instead of double down on (right hand scale, dashed line).

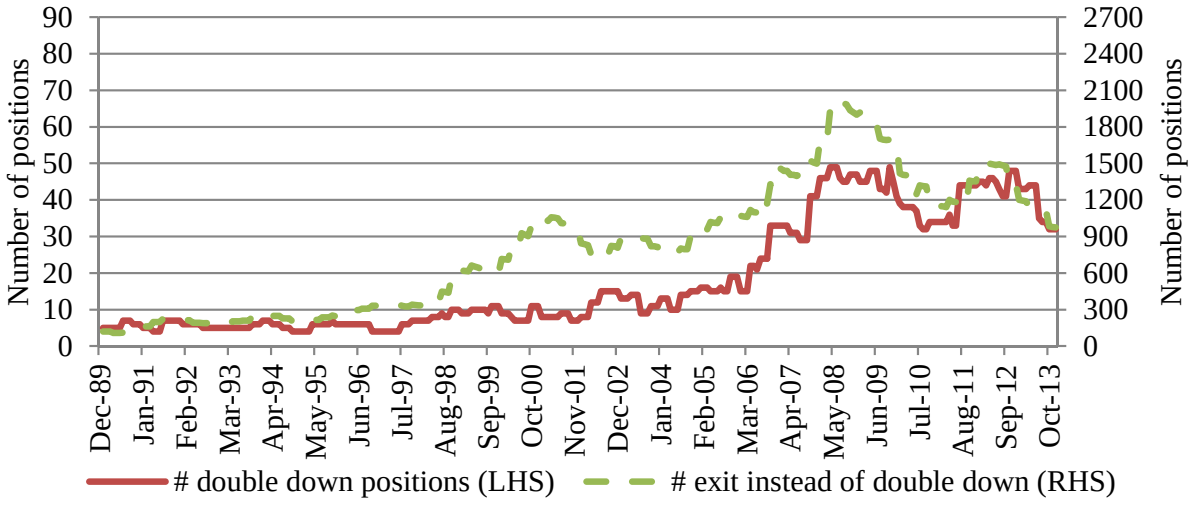
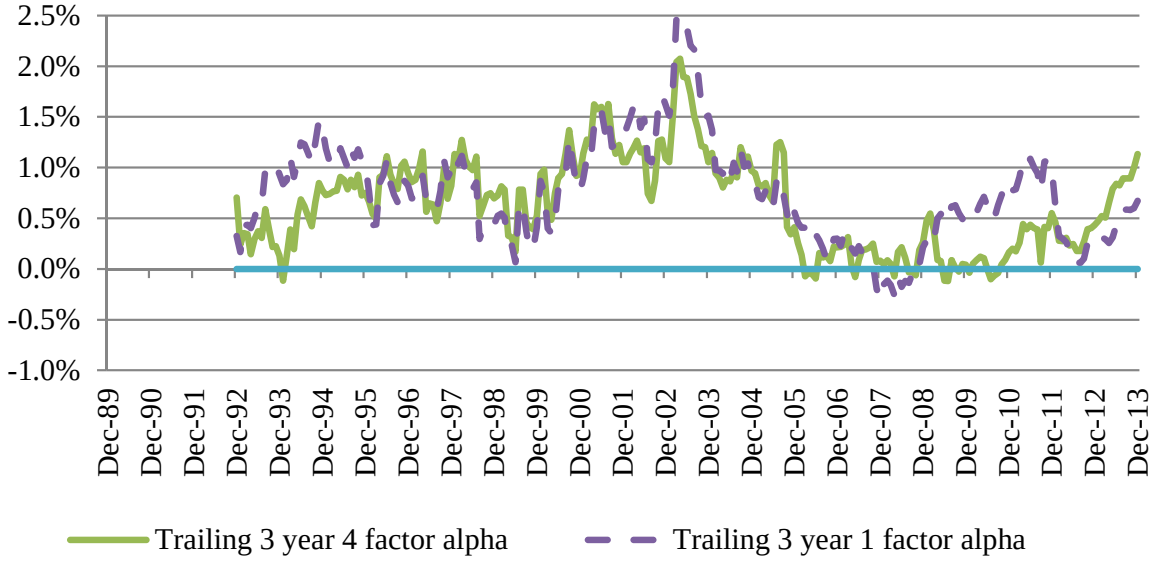


Figure 3: Double Down Portfolio Performance Over Time

This figure displays the monthly trailing 3-year 4-factor (solid line) and CAPM alpha (dashed line) of the double down portfolio, constructed as described in the text.

Panel A: 6 month portfolio formation period



Panel B: 9 month portfolio formation period

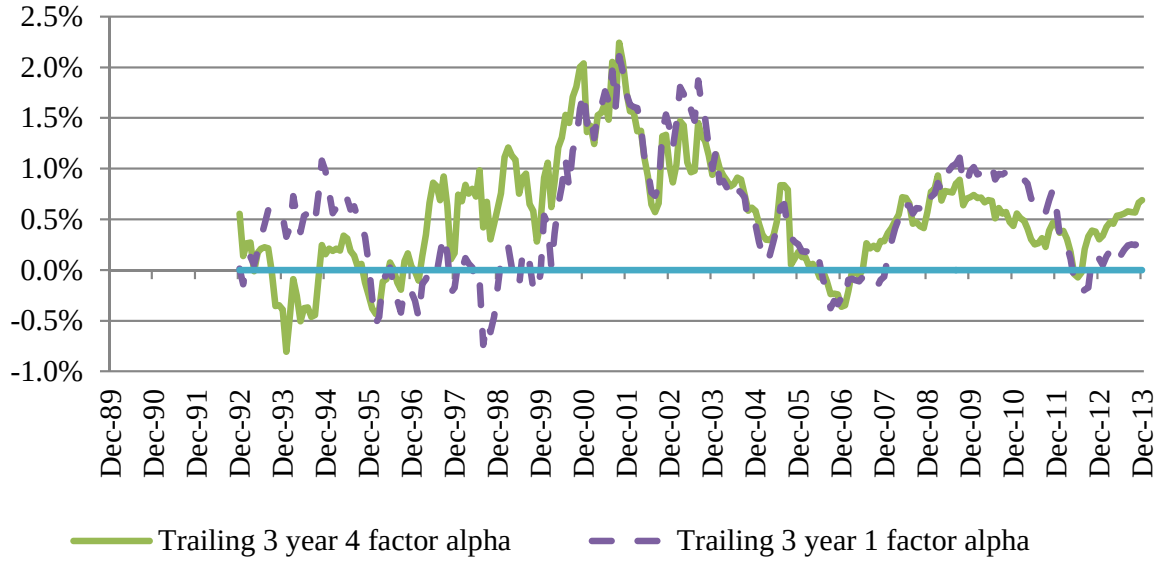


Figure 4: Event Study, Equal Weight All Positions, Hold Regardless of Subsequent Manager Activity

This figure displays the equal-weighted average DGTW-adjusted performance to date (left hand scale, solid line) and corresponding t-statistic (right hand scale, dashed line) of the pool of all double down positions in event time. This figure treats date 0 as the date in which a manager doubles down in a position. In this figure, calculations are made by holding positions regardless of a manager's trading behavior subsequent to doubling down.

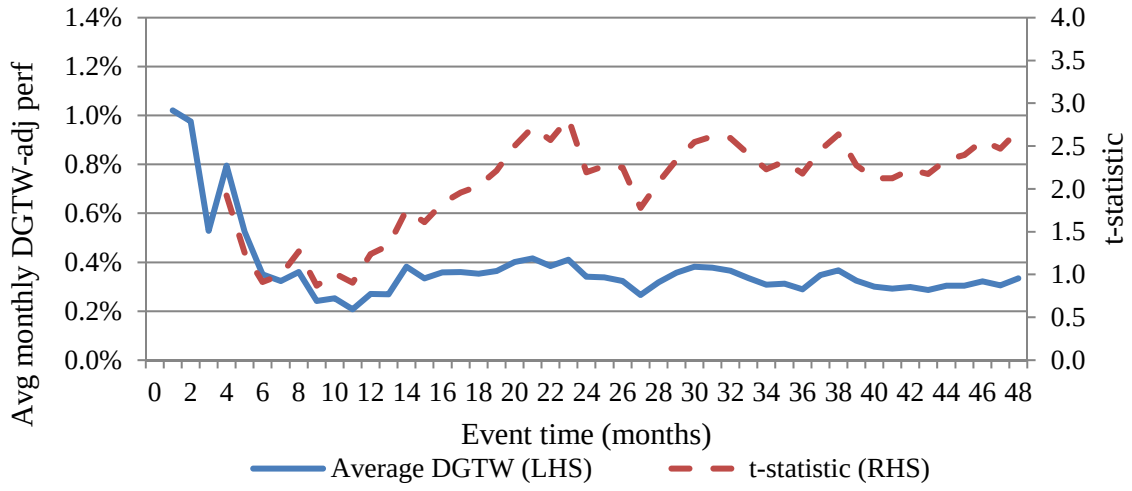


Figure 5: Event Study, Equal Weight Positions, Remove When Manager Sells

This figure displays the equal-weighted average DGTW-adjusted performance to date (left hand scale, solid line) and corresponding t-statistic (right hand scale, dashed line) of the pool of all double down positions in event time. This figure treats date 0 as the date in which a manager doubles down in a position. In this figure, calculations are made by removing positions from the underlying portfolio when a manager sells that position.

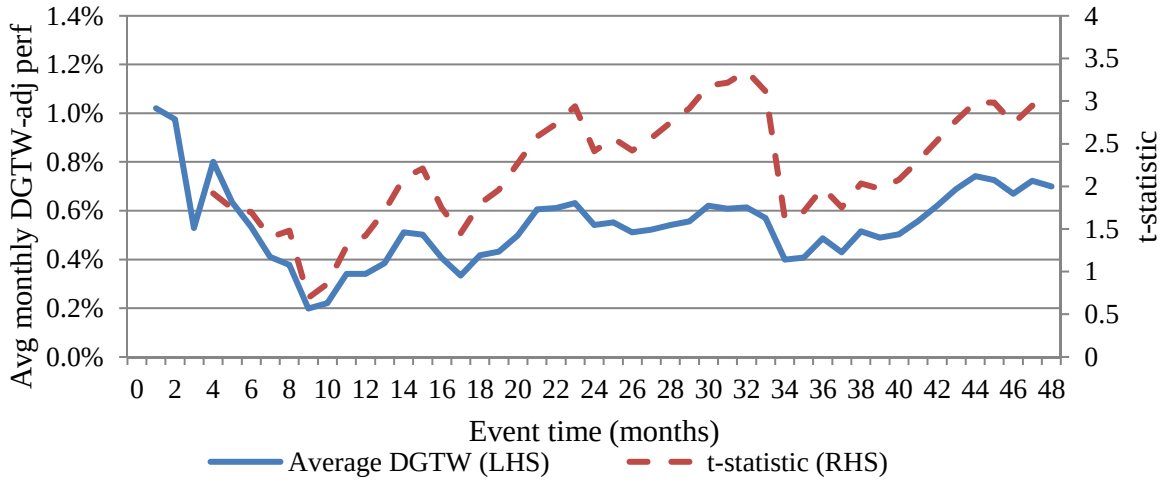
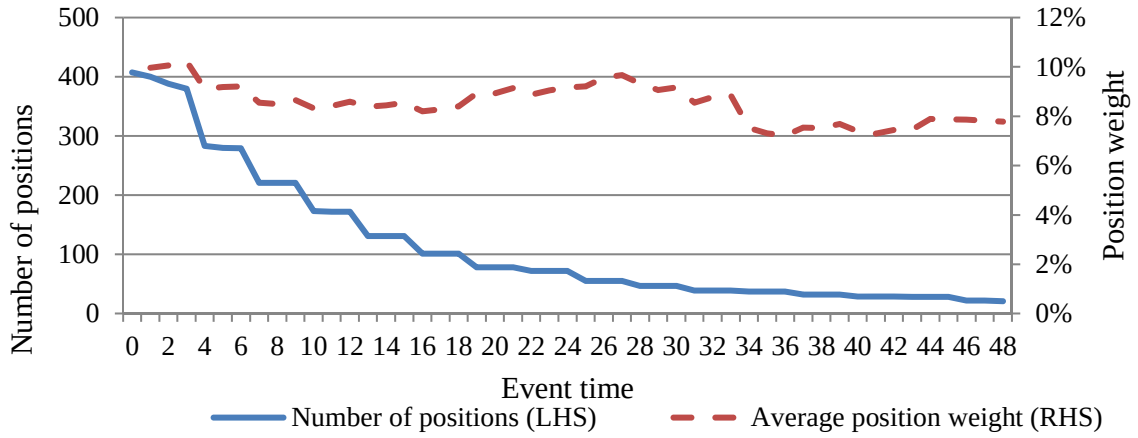


Figure 6: How Managers Exit and Size Double Down Positions

This figure displays how long managers hold each of their double down positions (left hand scale, solid line), treating date 0 as the date in which the manager doubled down in that position. It also displays the average position size of the remaining double down positions (right hand scale, dashed line).



Appendix

Table A1: Double down portfolio, without removing bottom decile of asset changes

This table displays the performance of the double down portfolio, formed as described in the text, but without removing positions in which managers double down over a portfolio formation period during which the manager's proportional change in 13F assets falls in the bottom decile of the proportional change in assets of all managers in the sample. The baseline parameter values are used here. Portfolio performance is calculated from 12/31/1989-12/31/2013 for alpha calculations, and from 12/31/1989-6/30/2012 for DGTW calculations. Positions are weighted equally across managers but value-weighted within a given manager's portfolio, as described in the text. T-statstics are displayed in brackets. ** and * denote significance at the 5% and 10% levels, respectively.

Trailing ret interval	Raw return	DGTW adjusted	4 factor alpha	market	size	book	mom	CAPM alpha	market	Avg # pos in in alpha portfolios
3 months	1.22%	0.41%	0.81%	1.09	-0.03	0.23	-0.31	0.58%	1.23	13.2
		[1.41]	[2.52]**	[14.5]	-[0.3]	[1.8]	-[2.7]	[1.89]*	[17.8]	
6 months	1.52%	0.65%	0.64%	1.12	0.16	0.36	-0.26	0.54%	1.23	24.5
		[2.93]**	[2.84]**	[17.9]	[1.5]	[3.9]	-[4.4]	[2.25]**	[19.3]	
9 months	1.39%	0.62%	0.56%	1.12	0.20	0.36	-0.26	0.47%	1.22	26.0
		[2.52]**	[2.12]**	[16.1]	[2.1]	[3.5]	-[3.0]	[1.80]*	[16.9]	
12 months	1.21%	0.35%	0.33%	1.11	0.29	0.38	-0.18	0.33%	1.18	21.7
		[1.54]	[1.43]	[17.1]	[2.7]	[5.2]	-[2.8]	[1.39]	[17.0]	

Table A2: Double down portfolio, different position cutoffs

This table displays the performance of the double down portfolio, formed as described in the text, but defining sizable as the maximum of (1) X% and (2) the manager's average position size across all 13Fs filed by the manager to date. The value of X used for each portfolio is denoted in the table. Otherwise, the baseline parameter values are used. Portfolio performance is calculated from 12/31/1989-12/31/2013 for alpha calculations, and from 12/31/1989-6/30/2012 for DGTW calculations. Positions are weighted equally across managers but value-weighted within a given manager's portfolio, as described in the text. T-statstics are displayed in brackets. ** and * denote significance at the 5% and 10% levels, respectively.

Position	Dgtw-adjusted			4-factor alpha			CAPM alpha		
cutoff	3 mo	6 mo	9 mo	3 mo	6 mo	9 mo	3 mo	6 mo	9 mo
1.5%	0.43%	0.41%	0.42%	0.54%	0.41%	0.42%	0.35%	0.39%	0.45%
	[1.59]	[2.70]**	[2.48]**	[1.74]*	[2.57]**	[2.24]**	[1.10]	[2.33]**	[2.24]**
2.0%	0.53%	0.66%	0.55%	0.83%	0.57%	0.46%	0.62%	0.54%	0.50%
	[1.76]*	[3.69]**	[2.47]**	[2.59]**	[2.99]**	[1.91]*	[1.93]*	[2.79]**	[2.03]**
3.0%	0.02%	0.65%	0.72%	0.49%	0.81%	0.61%	0.25%	0.65%	0.63%
	[0.04]	[2.42]**	[2.61]**	[1.07]	[2.95]**	[2.22]**	[0.55]	[2.38]**	[2.26]**
3.5%	0.28%	0.80%	1.16%	0.86%	1.06%	1.05%	0.69%	0.88%	1.16%
	[0.54]	[2.16]**	[3.13]**	[1.75]*	[2.88]**	[3.00]**	[1.43]	[2.38]**	[3.23]**

Table A3: Double down portfolio, different average factors

This table displays the performance of the double down portfolio, formed as described in the text, but defining sizable as the maximum of (1) 2.5% and (2) X * the manager's average position size across all 13Fs filed by the manager to date. The value of X used for each portfolio is denoted in the table. Otherwise, the baseline parameter values are used. Portfolio performance is calculated from 12/31/1989-12/31/2013 for alpha calculations, and from 12/31/1989-6/30/2012 for DGTW calculations. Positions are weighted equally across managers but value-weighted within a given manager's portfolio, as described in the text. T-statstics are displayed in brackets. ** and * denote significance at the 5% and 10% levels, respectively.

Avg pos	Dgtw-adjusted			4-factor alpha			CAPM alpha		
factor	3 mo	6 mo	9 mo	3 mo	6 mo	9 mo	3 mo	6 mo	9 mo
0.50	0.44%	0.73%	0.61%	0.74%	0.62%	0.46%	0.47%	0.52%	0.47%
	[1.37]	[3.26]**	[2.70]**	[2.07]**	[2.96]**	[1.82]*	[1.35]	[2.34]**	[1.90]*
0.75	0.43%	0.75%	0.59%	0.70%	0.59%	0.42%	0.45%	0.52%	0.45%
	[1.29]	[3.38]**	[2.59]**	[1.92]*	[2.87]**	[1.69]*	[1.26]	[2.34]**	[1.80]*
1.25	0.37%	0.78%	0.69%	0.70%	0.76%	0.58%	0.51%	0.66%	0.55%
	[1.00]	[3.14]**	[2.69]**	[1.77]*	[3.07]**	[2.12]**	[1.33]	[2.60]**	[2.01]**
1.50	0.52%	0.87%	0.97%	0.76%	0.94%	0.83%	0.60%	0.88%	0.84%
	[1.30]	[2.97]**	[3.20]**	[1.86]*	[3.16]**	[2.62]**	[1.49]	[2.92]**	[2.65]**
2.00	0.25%	1.19%	1.06%	0.72%	1.29%	1.02%	0.52%	1.22%	1.07%
	[0.43]	[3.32]**	[2.97]**	[1.30]	[3.64]**	[2.77]**	[0.98]	[3.47]**	[2.96]**

Table A4: Double down portfolio, different stock underperformance cutoff

This table displays the performance of the double down portfolio, formed as described in the text, but requiring that over the relevant portfolio formation period, a stock's return must fall short of the CRSP value weighted market index by at least X%. The value of X used for each portfolio is denoted in the table. Otherwise, the baseline parameter values are used. Portfolio performance is calculated from 12/31/1989-12/31/2013 for alpha calculations, and from 12/31/1989-6/30/2012 for DGTW calculations. Positions are weighted equally across managers but value-weighted within a given manager's portfolio, as described in the text. T-statstics are displayed in brackets. ** and * denote significance at the 5% and 10% levels, respectively.

Fall relative	Dgtw-adjusted			4-factor alpha			CAPM alpha		
to market	3 mo	6 mo	9 mo	3 mo	6 mo	9 mo	3 mo	6 mo	9 mo
0%	0.32%	0.45%	0.45%	0.55%	0.38%	0.32%	0.40%	0.33%	0.33%
	[1.65]*	[2.55]**	[2.21]**	[2.54]**	[2.06]**	[1.64]	[1.97]**	[1.75]*	[1.58]
5%	0.30%	0.57%	0.56%	0.53%	0.46%	0.42%	0.36%	0.41%	0.36%
	[1.09]	[2.97]**	[2.62]**	[1.86]*	[2.28]**	[2.02]**	[1.26]	[2.00]**	[1.68]*
15%	0.96%	1.17%	0.72%	1.40%	1.01%	0.48%	1.22%	0.99%	0.50%
	[2.00]**	[3.64]**	[2.47]**	[2.76]**	[3.30]**	[1.72]*	[2.45]**	[3.13]**	[1.76]*

Table A5: Double down portfolio, different relative position increase requirement

This table displays the performance of the double down portfolio, formed as described in the text, but requiring that over the relevant portfolio formation period, the manager must have increased the position portfolio weight to X * its weight at the begining of the formation period. The value of X used for each portfolio is denoted in the table. Otherwise, the baseline parameter values are used. Portfolio performance is calculated from 12/31/1989-12/31/2013 for alpha calculations, and from 12/31/1989-6/30/2012 for DGTW calculations. Positions are weighted equally across managers but value-weighted within a given manager's portfolio, as described in the text. T-statstics are displayed in brackets. ** and * denote significance at the 5% and 10% levels, respectively.

Increase in	Dgtw-adjusted			4-factor alpha			CAPM alpha		
port wtd	3 mo	6 mo	9 mo	3 mo	6 mo	9 mo	3 mo	6 mo	9 mo
1.50	0.10%	0.32%	0.39%	0.40%	0.29%	0.38%	0.23%	0.29%	0.44%
	[0.56]	[2.29]**	[2.59]**	[1.93]*	[1.87]*	[2.41]**	[1.09]	[1.73]*	[2.47]**
1.75	0.41%	0.58%	0.46%	0.80%	0.47%	0.48%	0.62%	0.41%	0.49%
	[1.53]	[2.97]**	[2.62]**	[2.85]**	[2.51]**	[2.45]**	[2.27]**	[2.07]**	[2.41]**
2.25	0.29%	1.23%	0.80%	0.86%	1.20%	0.72%	0.43%	0.96%	0.71%
	[0.67]	[3.45]**	[2.83]**	[1.79]*	[3.55]**	[2.54]**	[0.94]	[2.75]**	[2.42]**