Hedge Funds:
The Effects of SEC Regulation 204
on Returns & Strategy

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Historically, hedge funds have been viewed as the luxury alternative investment vehicle; a way to outperform the market in both bull and bear markets, and preferred over mutual funds for high net worth individuals. The new SEC 204 rule regulation addressing the short sales of securities directly affects hedge funds that utilize short or market neutral strategies. This paper analyzes the effects of rule 204 on hedge fund returns of various strategies both before and after the implementation of this regulation. Hedge funds that use a short strategy would be expected to experience negative effects with such new regulations in place, while other strategies should perform comparatively better than short funds. In addition to regulation, this paper examines the effects of risk, age, size, and strategy on hedge fund performance over a 20-quarter period, from 2005-2009. Ultimately, we find that initially regulation has positive effects on hedge fund returns, as it provides the framework for increased stability in the financial markets, however this effect is diminishing. Short strategies performed significantly better than other fund strategies before regulation was in place. However, after regulation was enacted we find no evidence that short funds performed significantly better than any other strategy.

I. Introduction

Historically, hedge funds have been viewed as the luxury alternative investment vehicle; a way to outperform the market in both bull and bear markets. However, since the beginning of the financial crisis in October 2007, hedge fund returns have fallen drastically. As a result of falling returns many hedge funds have closed to close. For instance, 693 hedge funds closed in the first 9 months of 2008. These closures are driven by client redemptions as well as a reduced desire for hedge fund investments among new investors. The reduced desire to hold hedge fund investments is likely the result of both shifts in investor expectations regarding the risk of hedge funds as well as the increased importance of management fees in a low return environment. The average hedge fund requires management fees of 2% of assets under management (AUM), 20% of gains achieved, and any negotiated agreed upon incentive while the average mutual fund charges only 2% of AUM.

Part of the increased risk of hedge fund investments may be shifts in investor expectations and confidence regarding the prospect of hedge fund regulation. Indeed, in an attempt to curb the effects of heavy short selling, the Securities and Exchange Commission (SEC) instituted new regulations in late 2008. These regulations, known as the 204 rule prohibit abusive naked short selling of securities and aims to increase market transparency.[1]

When a hedge fund, individual, or any other investment party short sells a security they must first secure the shares in the market; in essence the investor is making sure there are available shares to short.[2] This act of locating shares in the market is to assure these transactions won't fail on delivery. Short selling in its purest form isn't the issue, which is why *naked* short

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[1] There was another rule that heavily impacted hedge funds that was used in conjunction with 204, called 10a-3T, which specifically focused on market transparency. However, like 204 initially, 10a-3T was a temporary rule; after a trial period of both rules, 204 was the only rule made permanent

[2] This process is called getting a "Locate" on shares.

selling is the key issue addressed by Rule 204. Naked short selling involves the short sale of a security in which the investment party has not secured the shares (making sure there are available shares in the market), again creating the potential of a fail-on-delivery of the shares. Theoretically, an investor could heavily naked short sell shares of a company, drive down the price of the stock, cover the sale, make a nice profit, even if they hadn't secured the shares in the market. An action such as this could reap huge profits for short sellers, while negatively affecting the shorted company, and in some cases driving the firm into bankruptcy. After several companies, including Bear Stearns and Lehman Brothers, fell victim to abusive short selling, the SEC introduced Rule 204 as a way to make naked short selling illegal, while simultaneously protecting companies that are vulnerable to such trading activity.

A less easily measureable, but still significant, segment of 204 relates to market transparency around short sales. The SEC is seeking to make short sale information more readily available to the public, therefore trying to promote efficiency, through decreased information asymmetry. There are two potential outcomes to the 204 transparency rule; short hedge funds have diminished returns because of the higher costs of disseminating information, or they experience increased returns because reducing information asymmetries expands the pool of potential investors and investments (Akerlof, 1970). Particular investment positions will have to be disclosed, resulting in an increase in the transparency of hedge fund strategies. I will explore both the potential for both positive and negative ramifications from such a rule, and use year over year returns of long-short strategy hedge funds against other fund strategies to gauge the effects.

If 204 does have a significant impact on hedge fund returns, there could be a migration away from these types of investments, and into mutual funds, who charge lower fees and are

more transparent. The conclusions drawn from the statistical analysis, with regards to this migration, would be speculative, however if returns from funds before regulation versus after regulation are significantly different, then it is conceivable that such a movement among investors could take place.

Ultimately I seek to address and analyze two questions: what were the effects of Rule 204 regulation on hedge fund returns and how did this regulation impact the performance of affected hedge fund strategies relative to others. I anticipate that the 204 rule will increase the returns of the hedge fund industry, while hurting funds that utilize short strategies; consequently hedge funds that maintain non-shorting strategies stand to perform comparatively better than short funds.

II. Background

Hedge funds have been traditionally thought of as an alternative investment, mainly because their investment strategies are different from other financial assets (i.e. mutual funds). Koh, Lee, and Fai (2002) note that the reason why hedge funds remain so alluring and successful is their ability to allow investors to remain market neutral. Hedge fund managers traditionally will short assets they feel are overvalued, while simultaneously going long in assets that are undervalued, creating a market position that is in theory neutral. However, these strategies may vary with market conditions; for example, in bear markets, a manager may shift his long-short fund to heavily concentrated short positions, and vice versa. Consequently, the 204 rule may be devastating to a hedge fund with a diversified strategy. The majority of hedge funds generally not only outperform benchmark indices during bear markets, but usually post positive returns due to such shorting strategies. Rule 204 could act as an inhibitor to some short sale profits, hence limiting performance. Based on the arguments advanced by Koh, et al. the success of

hedge funds, reaffirms the potential negative effects of 204 on funds that employ a short strategy, who could see a large reduction in profits generated.

However, Lavino (1999) points out that simple comparisons of returns across asset classes and categories are deceptive. Assets that are composed of riskier investments possess the ability to have both large positive and large negative returns. In light of this we use the Sharpe Ratio, as the means for controlling for risk, with respect to the returns generated. Koh, et al (2002) point out, if there are two funds that achieve the same rate of return, however one uses more leverage and less liquid investments to achieve that return, than the other, the funds are not equal. These funds' risk-adjusted returns are crucial in making accurate comparisons across funds. Instead, risk-adjusted returns are more representative of hedge fund quality and performance than their officially posted returns, which can be misleading when not accounting for such risk variables.

A second objective of this paper is to illuminate which hedge fund classes perform the best using a comparative analysis of time periods pre and post introduction of rule 204. More simply, did 204 change the payoff to particular hedge fund strategies. Using techniques similar to Capocci (2009) we will investigate the change, if any, in returns for certain strategies during these pre and post regulation time periods. Capocci used data from the 1980's-1990's and found compelling evidence that there is non-random variation among hedge fund returns based on his study. Furthermore he analyzed 13 strategies, and found that 10 strategies outperformed any other investment. Like Capocci, I will analyze which hedge fund strategies outperformed other hedge fund strategies, however instead of looking at which hedge fund strategies outperform other investments, I will analyze which strategies performed the best against one another, given the new short-sale restrictions. Using a panel data set, I seek to identify the most effective hedge

fund strategy with risks considered (using the Sharpe Ratio as a variable to account for risk and dummy variable for each hedge fund strategy).

Other recent papers that compare hedge fund returns include: Fung and Hsieh (1997), Capocci, et al. (2005), and Frumkin and Vandegrift (2009).

Fung and Hsieh (1997) take an analytical approach to determine the factors that truly differentiate hedge funds, using mutual funds as the basis for comparison. Hedge fund structure is notably different. Fung and Hsieh explain that hedge funds are not subjected to the same types of regulations (like the fulcrum rule: where gains and losses must have a symmetric effect, hence eliminating wildly high performance fees) that mutual funds companies are. On the more legislative side, they conclude that there are two main determinants of the huge gaps of returns between hedge and mutual funds: regulation and strategy. Thus manipulating or changing regulation could cause a decrease in investment "spread" or margins of return between hedge funds versus other investments. I will explore these effects.

Capocci et al. (2005), analyzes the performance of hedge funds in bullish and bearish market trends and considers whether high hedge fund returns are correlated with market up and downswings. They mainly focus on the market neutral strategy, where losses in bear markets can be mitigated with effective use of shorting. They find that during the 1994-2000 time period that market neutral hedge funds gained more than long equity funds. The long equity funds profited largely in bull markets, and lost in bear markets while market neutral funds lost in bull markets, and gained during bear markets. Fund persistence, continuance in performance, isn't exhibited by the market neutral funds most likely due to their active and adaptive trading strategies, making these funds more apt to persistently beat the market than the long equity or the short only hedge funds. However the effect of regulation poses an interesting obstacle for short positioned

funds. As this paper's time period focus spans five years, in which there are both bull and bear markets, and pre-regulation and regulation periods, the market neutral funds who utilize short strategies can be examined in various scenarios.

Frumkin and Vandegrift (2009), they analyze a panel of hedge fund returns using a fixed-effects panel data regression procedure; to analyze the impact of a hedge fund registration requirement on hedge fund returns in excess of S&P 500 returns, they account for size, age, and beta of the funds selected. Additionally, they used a dummy variable to account for forced government registration of hedge funds, a regulation that was in effect during 2006. Similarly, I will use a dummy variable to account for the time periods in which Rule 204 regulation was in effect.

III. Data and Empirical Methods

To isolate the individual effects of regulation and strategy on hedge fund returns, we employ two separate panel data regression procedures. A fixed-effects regression was used to analyze the effect of regulation on hedge fund returns due to SEC rule 204. Separately, a random-effects regression was used to analyze how well each hedge fund strategy performed against short-selling strategy both before and after the regulation was imposed. The following fixed effects and random effects regression models were used:

$$\text{Fixed-effects model: NETRETURNS}_{it} = \alpha_i + \beta X_{it} + \varepsilon_{it}$$

$$\text{Random-effects model: NETRETURNS}_{it} = \alpha + \beta X_{it} + u_i + \varepsilon_{it}$$

where i indexes the particular hedge and t indexes time measured in quarters; NETRETURNS$_{it}$ are the net percentage returns of hedge funds subtracted from the net percentage returns of the

S&P 500 during period i. Through subtracting hedge fund returns from those of the S&P 500, we are able to pull out the effect of the markets, and focus on the net returns of hedge funds in excess of the broader market. The independent variables in this model are represented by X_{it} while α_i accounts for omitted characteristics that may influence NETRETURNS but do not vary over t, α accounts for omitted characteristics that may influence NETRETURNS but do not vary over t or i, u_i is the cross-sectional error, and lastly ε_{it} which accounts for random error of each fund in each time period.

In the fixed effects model, we regressed NETRETURNS as a function of hedge fund assets under management (Size), how well the return on investment compensates an investor for the risks taken or risk-adjusted performance (Sharpe Ratio), age of the fund in months (Age), and lastly a dummy variable to account for the 204 regulation (Regulation), where 1 indicates regulation was in effect, while 0 indicates the opposite.

Size is crucial, as noted in Frumkin and Vandegrift (2009), the larger funds are at a comparative disadvantage; as the asset base of the funds increase so do the size of their investments. Therefore, they experience diminishing marginal returns as they create demand in the market through the large quantities of an investment they seek, causing the market to adjust in response to such a stimulus. In essence, smaller funds have a comparative advantage, being that their investments aren't necessarily large enough to create a noticeable shift in demand and a corresponding adjustment in market price. It is for this reason I have only selected funds with over $100 million in real-assets. All size observations were inflation adjusted using 2005 as the base year.

Logically age could be expected to have a positive impact on net returns of hedge funds. As fund managers accumulate experience over time, it would make sense that their investment acumen and skill would increase, generating larger returns for the funds they manage. On the other hand, as the age of a fund increases, typically so does their investment base, as well their competition, or other funds that have identified their successes and replicated them. There are fees for shorting particular securities that are based on the demand of those shares in the shorting market. As more funds demand shares to short sell a security, the associated fees increase, and reduce profits. The increases in investment base (size) in conjunction with this 'copy-cat conundrum' lead to diminishing marginal returns over time; as the age of funds increase, it becomes increasingly more difficult to generate high returns. This difficulty could potentially catalyze fund managers to adopt strategies outside their funds' traditional focus and cause an additional reduction in net returns.

In response to the uncertainty of the effects of Rule 204 on hedge fund returns, the Sharpe Ratio was included in the model. The Sharpe Ratio is a way to gauge the risks taken with regards to the returns generated by a fund; it would make sense that in the wake of this newly imposed regulation, that some fund managers would try to raise their risk tolerances in order to generate returns similar to those before the regulation. The Sharpe Ratio captures the risk-premium paid by investors seeking to achieve returns over those of risk-free rates of return on benchmark assets like Treasury Bills. The Sharpe Ratio is:

$$S(x) = (r_x - R_f)/\text{StdDev}(x)$$

where, x is the investment, R_f is the return on a benchmark assets (such as the risk free rate of return, or T-Bill rate), r_x is the expected average rate of return over the benchmark return, StdDev is the standard deviation of the average rate of return of x.

The regulation dummy was designed to capture the effect of the rule 204 regulation. This regulation was designed to address the mounting concerns over abusive naked short selling of securities. Prior to Rule 204, there were no legal ramifications of naked short selling or fail-to-delivers, however this rule in conjunction with SHO[3] regulation made such activity illegal. Another facet of this regulation was aimed at increasing visibility among short-sale transactions; the SEC desired increased disclosure on which funds were shorting which securities. Thus the regulation lifts the veil on many funds' proprietary strategies. This regulation was introduced as a temporary rule, formally enacted during the beginning of Q4 2008. The rule was made permanent in July of 2009; as the data set spans 20 quarters, 2004-2009, the effects of regulation can be seen from Q16-Q20, where the value of the dummy is 1, and 0 for quarters prior.

Using the described variables, our fixed-effects model equation becomes:

$$\text{NETRETURNS}it = \alpha i + \beta_1 \text{Size}it + \beta_2 \text{SharpeRatio}it + \beta_3 \text{Age}it + \beta_4 \text{Regulation}it + \varepsilon_{it}$$

In the random-effects regression, we regressed NETRETURNS on hedge fund assets under management (Size), how well the return on investment compensates an investor for the risks taken or risk-adjusted performance (Sharpe Ratio), age of the fund in months (Age), dummy variable for geographic focus, 1 for domestic and 0 for global (Universe), and a series of dummy variables accounting for strategy including, emerging market strategy, fixed income strategy, distressed securities strategy, managed futures strategy, and multi-style strategy, all of which have 1 as an indicator of the strategy used, 0 for otherwise. Four different time periods were examined. Q1 – Q16 covers pre-regulation to the first quarter of the regulation, while the regressions were run on the four following time periods in which regulation was in effect: Q1 –

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[3] SEC regulation that governs short-selling activity and aims to reduce fails-to-deliver.

Q_{17}, $Q_1 - Q_{18}$, $Q_1 - Q_{19}$, and $Q_1 - Q_{20}$. The time periods were chosen to isolate and examine the effects of regulation when it was first enforced, and how it changed returns over the subsequent quarters.

Using the described variables, our random-effects model equation becomes:

$$NETRETURNS_{it} = \alpha + \beta_1 Size_{it} + \beta_2 SharpeRatio_{it} +$$

$$\beta_3 Age_{it} + \beta_x StrategyDummy_i + u_i + \varepsilon_{it}$$

where β_x are time-independent dummy variables indicating strategy, u_i is the cross-sectional error term, and ε_{it} is the random error.

The data used for these models was obtained using the Bloomberg Terminal, in which there is a database of tens of thousands of funds. To focus on hedge funds of interest, several searching parameters were implemented to improve the quality of the sample selections. Specifically, as of December 31, 2009 hedge funds needed to have at least $100 million in assets under management, funds had to be based in US Dollar currency (to eliminate currency fluctuations distorting returns), and lastly funds needed to have been founded no later than December 31, 2004. Hedge funds were selected at random using a Monte Carlo simulation. A sample of 50 hedge funds were chosen for this study; the data collected on these 50 funds spans 20 quarters, from Q_1 of 2005 through Q_4 of 2009, (Q_1-Q_{20}). There were several other fund strategy types found in the data selection process, including Macro-strategy and Arbitrage funds, however these strategies appeared very rarely. In hopes of gathering more meaningful data, the less commonly used strategies were collapsed into a broader strategy class of multi-style.

Because the dummy independent variables remain unchanged throughout the quarters, we could not estimate the relationship using fixed effects.

Two time periods were examined. The first time period spans from $Q_1 - Q_{15}$, in which the entire period consists of pre-regulation observations, while the second time period covers $Q_{16} - Q_{20}$, the period in which the regulation is enforced. The SHORTSTRAT[4] variable is the strategy of interest in these regressions, as it should be the most heavily affected variable/strategy by the regulation; it is for this reason this variable has been omitted, so that the short strategy funds may be tested against the other strategies in the model to gauge the effects of regulation with respect to fund returns across strategies. The goal is to analyze the effects of regulation from the perspective of how well short strategy funds performed against funds of other classes in these two time periods. The regulation wouldn't have directly affected funds that weren't short strategy funds, so the effectiveness of the regulation can be determined by how much short-selling funds outperformed other strategies before the regulation and after.

IV. Results

In Table 1, the means, standard deviations, minimums, and maximums are displayed for the dependent and independent variables over five time intervals: $Q_1 - Q_{20}$, $Q_1 - Q_5$, $Q_6 - Q_{10}$, $Q_{11} - Q_{15}$, and $Q_{16} - Q_{20}$.

Hedge funds are desirable investments because of their consistent outperformance of the broader markets; both in bull and bear market environments. NETRETURNS confirms this, as the means of the dependent variable were above 0 for the entire five-year period, as well as each interval within the time period. Over the past five years, hedge funds had outperformed the S&P 500 by an average of 2.6%.

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[4] Includes both Short-only funds and Long-Short funds

NETRETURNS were broken down into fund class, and collapsed into two categories: short funds and non-short funds, to analyze the changes in mean NETRETURNS for both categories before regulation and after regulation. While not depicted in Table 1, there was a drop in short fund returns from 2.87% before regulation was enacted, to 1.78% after regulation. Furthermore, returns for the non-short funds increased modestly over these two time periods. These differences, however, were insignificant, as the standard deviations for short and non-short funds were too high; a larger sample size could remedy this insignificance as standard deviations could be reduced.

The Sharpe Ratio results provide some very intriguing evidence of the effect of regulation, and/or omitted variables affecting hedge fund returns. When analyzing the Sharpe Ratio, a value of 1 or greater is considered to be a good risk-adjusted return for a fund; the mean Sharpe Ratio value over Q_1 – Q_{20} was 1.00, indicating that after accounting for risk, the returns generated were still very sound during the entire sample period. For each interval over the 20 quarters, the Sharpe Ratio is over 1, except for Q_{16} – Q_{20}, where the value is 0.21. In this interval, risk-adjusted returns aren't impressive; coincidentally it is during Q_{16} – Q_{20} where the SEC regulation has been implemented. It is likely that after the regulation had been put into law, risk-adjusted returns weren't nearly as great because funds were not able to short as aggressively as they had previously. In conjunction, funds may not have generated substantial enough returns to justify the risks taken, which would deflate the ratio value as well. On average during Q_{16} – Q_{20} hedge funds outperformed the S&P 500 by 2.05%. However, the Sharpe Ratio suggests that during this quarter, given the amount of risk taken, returns were weak. As seen near the bottom of Table 1, 30% of the randomly chosen hedge funds used some form of short selling in their

strategy. This large percentage of funds would be the strategy most affected by the regulation. This may explain the decrease in the Sharpe Ratio during this last time period Q_{16} – Q_{20}.

The mean size for funds across the sample was $549.26 million. There is a noticeable increasing trend in asset base of funds over the course of the time period, Q_1 – Q_{15}. However, from Q_{16} – Q_{20} there is 48% decrease, from $719.70 million to $372.57 million, in mean assets from the previous time period of Q_{11} – Q_{15}; this is most likely the result of a systemic panic from hedge fund investors. During 2008, after Lehman Brothers collapsed and Bernard Madoff's Ponzi scheme was revealed, a fear set in among investors that their money wasn't secure anywhere. In response to such negative stimuli, many investors withdrew their investments from hedge funds, leading to a very unstable and volatile asset base. These withdrawals in combination with aggregately poor returns led to such a large decrease in fund asset size during these consecutive time periods.

Lastly, the mean age for funds was approximately 9 years old for the sample, with a standard deviation of approximately 61 months. This may be suggestive of the competitive nature of the industry; a climate in which many new entrants fail. As the funds themselves had to be at least 5 years old at the end of 2009 to qualify for this study, a mean age of 9 years old indicates that despite the considerable amount of hedge funds that open every year, few are able to remain in business.

Table 2 reports the results of fixed-effects regressions; because quarter 16 is the first full quarter the regulation was in effect, we ran a regression to examine the effect of the regulation after 1 quarter. Subsequent regressions add an additional quarter and repeat the same specification.

The regulation imposed by the SEC, was designed to increase transparency while providing protection, specifically in the short-term, to vulnerable companies. The results of the regressions in Table 2 show an initially surprising relationship between the REGULATION variable and net returns; the coefficients of REGULATION are all positive, indicating that regulation increased net returns when it was in effect. Furthermore, REGULATION has a significant (at the 0.05 level) relationship with net returns during every time period examined, except for $Q_1 - Q_{20}$. During the first regression, $Q_1 - Q_{16}$, regulation has a positive impact of 9.33% on net returns; in the next quarter, $Q_1 - Q_{17}$, net returns increased by an even greater margin of 11.64% when regulation is in effect. For the rest of the regression time periods, $Q_1 - Q_{18}$, $Q_1 - Q_{19}$, and $Q_1 - Q_{20}$, the positive effect of regulation on net returns steadily decreases from 6.58%, to 3.69%, to an 'insignificant' 2.16%, respectively. The REG_QUARTER variable represents the interaction of regulation on each subsequent quarter that regulation is in effect. During the regulation period, the gap between hedge fund returns and S&P 500 returns narrows over each consecutive quarter that the regulation is in effect by approximately -4.23% each quarter. The REGULATION variable was also significant and positive. This further reinforces the effects of the 204 regulation: although there is an initial positive effect of regulation on net returns, each consecutive quarter that regulation is in effect, net returns drop by 4.23 percentage points.

As expected, the Sharpe Ratio is significant in the all the time periods. This is not surprising given that the Sharpe Ratio is a function of returns; as returns increase so will the Sharpe Ratio value, and vice versa. Over the entire time period, $Q_1 - Q_{20}$, for every 1 point increase in the Sharpe Ratio value, net returns increased by 1.92%. In this model, the Sharpe

Ratio rewards stability; if funds were able to reduce the variance in their investments, they would also have experienced larger net returns.

Across the five fixed effects regressions run, neither age nor size is significant. This result is inconsistent with Frumkin and Vandegrift (2009). From the Table 1, we see that the mean size of the funds in this study was $549 million; the positions that these funds take in certain investments are likely not large enough to cause a shift in demand. Larger funds, that have more than $1 billion in assets, can shift the market when they take such large positions in an investment. These large investments shift both the supply-demand equilibrium would have a market-moving effect, while market neutral funds would see their shorting fees increase as the market demand shifts outward; however funds in the $500 million range likely won't experience either of these positive or negative net return effects from their size.

From Table 1, we see the mean assets of funds sampled experience a sharp decline in the last 5 quarters of the study, this may influence the effect of size on net returns. The 'copy-cat' conundrum that accompanies aging funds was not experienced. This may be caused by the small average fund size. In essence, the funds were not large enough to warrant strategy replication by competing funds. Therefore, their net returns remain independent from their age and size.

Table 3, reports the results of random-effects regressions for time periods: $Q_1 - Q_{15}$ and $Q_{16} - Q_{20}$. $Q_1 - Q_{15}$ defines the pre-regulation time period, while $Q_{16} - Q_{20}$ defines the period where regulation was enforced. The SHORTSTRAT variable was omitted, in order to test the returns of short funds with respect to other strategies both before and after the regulation.

Hedge funds that incorporate shorting strategies into their portfolio of investments tend to outperform other fund strategies as they are well positioned for both expanding and contracting economic environments. In the first time period ($Q_1 - Q_{15}$), we regressed every strategy, except

for managed futures, possessed a negative coefficient, indicating that short strategy funds performed better than nearly all other strategies. However, the only significant variables in this first regression were: UNIVERSE, FIXEDINCOMESTRAT, DISTRESSEDSTRAT, and MULTISTYLESTRAT. In the second regression, $Q_{16} - Q_{20}$, the regulation enforced time period, none of the independent variables retained their significance, nor was the entire second regression significant. This insignificance most likely results from the combination of large standard deviations of each fund strategy and a small sample size.

Additional methods, not reported in Table 3, were used in isolating the effects of regulation on short funds versus all other fund strategy types. Funds were collapsed into two categories: short funds and non-short funds and the random-effects regressions were rerun. These regressions were insignificant as well; however, if the managed futures variable was omitted from the non-short fund variable, the regression becomes significant. This result demonstrates that the managed futures strategy has produced significantly better returns than both short and non-short funds. In essence, the managed futures strategy may be an outlier in terms of returns produced, as when the variable is omitted, short-funds perform significantly better than non-short funds when the regulation is not in place.

The universe variable defined the geographic focus of a fund's strategy; the results of this regression indicate that domestically (USA) focused funds, on aggregate performed -1.73% worse than short strategy funds. In essence, short funds outperformed the average of all USA focused funds during the pre-regulation period by 1.73%. This result denotes the comparative advantage short funds had over other domestic fund classes during the pre-regulation time period. In the subsequent time period, $Q_{16} - Q_{20}$, universe was not significant, suggesting that

after regulation was introduced, short funds produced no significantly better returns than the rest of the domestically focused fund strategies, as in the previous time period.

As in the previous fixed-effects regressions, neither age nor size was significant in the random-effects regressions. Again, this is most likely due to fund size not being large enough to move the market with the fund's investments. In this case, the age of funds could not prepare or help mitigate the volatility and non-fundamental market moves, hence was independent from net returns.

The comparison across strategies over these two time periods, offers valuable insight into the way the short funds were affected with respect to other fund strategies. In the pre-regulation period, short strategy funds outperformed fixed income funds by 2.5%, distressed strategy funds by 2.71%, and multi-style funds by 1.34%. However, short funds did not perform significantly better than emerging market or managed futures funds during this pre-regulation period.

In the second regression, consisting of $Q_{16} – Q_{20}$ observations during the regulation time period, short strategy funds did not significantly outperform any other strategy. The comparative results of these two time periods provide significant evidence that there was considerable influence of regulation over the net returns of short funds, expressed in terms of performance against other fund strategies.

V. Conclusion

It is imperative to understand that substantial risk and volatility are factors in the returns of hedge funds, as is the nature of any high return investment. However, naked short selling it projected risk and volatility on exposed institutions. This risk triggered systemic risks across the

financial system. While short selling in its purest form is an absolutely valid and effective investing strategy, it can also be a strategy that, if abused, can be detrimental to the broader markets. This is exemplified by the increase in aggregate hedge fund net returns across strategies after the implementation of regulation, when naked short selling became illegal.

In the wake of the market meltdown that began in the fall of 2007, the federal government sought to enact new regulations to increase the stability of the financial markets. Rule 204 represents the SEC's most important effort to increase financial market stability. Vulnerable companies were becoming victims of aggressive naked short selling, driving down share their prices, and triggering panic that was reflected in huge downward moves in the stock market. These unpredictable moves and volatility in the markets provided huge return potential for short positioned hedge funds. Consequently however these moves were hurting funds of other strategies, like fixed income and distressed securities funds, which found it hard to compete in such a capricious market environment. When 204 was put into place short funds were negatively impacted, however only 30% of the funds collected in the sample were of short strategy. In the aggregate, hedge funds were better off, as a more stable market had emerged from regulations like 204. This helped fund managers of all strategies make more fundamentally based decisions, as opposed to having to navigate emotionally charged market swings. Additionally, as the market regained some stability throughout 2009, $Q_{17} - Q_{20}$, the coefficients of regulation increased, and then began to steadily decrease. In effect the markets were naturally providing the stability throughout the later part of 2009, which the 204 regulation had provided during the turmoil towards the end of 2008. As the market rebounded and began it's relative recovery throughout 2009, the regulation impacted net returns less and less, until the point when regulation wasn't

even a significant predictor of returns during the final quarter of 2009. Further tests need to be run to confirm this theory, however it is likely that a large sample size and

The above conclusion is reaffirmed by the random effects regressions run on the strategy variables. Short funds performed significantly better than 3 of the 5 funds tested against it, including fixed income, distressed securities, and multi-style funds during the pre-regulation period. However, once regulation was enforced, short funds did not perform significantly better than any of the strategies listed, nor was the second regression significant. For future study a larger sample of funds needs to be selected as a way to lower the standard deviations for each fund strategy, and improve the accuracy of net returns estimation. On aggregate however, the 204 regulation helped the hedge fund industry, and stabilized the capital markets.

Appendices

Table 1: Means and Standard Deviations				
Variable	*Mean*	*Standard Deviation*	*Minimum*	*Maximum*
NETRETURNS (Q1-Q20)	2.6	9.79	-37.95	86.44
NETRETURNS (Q1-Q5)	3.65	7.34	-22.02	33.83
NETRETURNS (Q6-Q10)	0.721	5.99	-16.58	31.84
NETRETURNS (Q11-Q15)	3.97	9.23	-37.32	54.20
NETRETURNS (Q16-Q20)	2.05	14.24	-37.95	86.44
SIZE (Q1-Q20)	549.26	793.37	5.68	5747.88
SIZE (Q1-Q5)	478.63	671.97	5.68	3712.27
SIZE (Q6-Q10)	610.37	837.78	19.48	4298.61
SIZE (Q11-Q15)	719.70	1009.66	42.28	5747.88
SIZE (Q16-Q20)	372.57	510.60	36.72	2931.77
SHARPERATIO (Q1-Q20)	1.00	1.09	-2.71	5.63
SHARPERATIO (Q1-Q5)	1.34	1.10	-2.5	4.82
SHARPERATIO (Q6-Q10)	1.40	0.908	-1.58	4.51
SHARPERATIO (Q11-Q15)	1.08	0.967	-2.12	3.98
SHARPERATIO (Q16-Q20)	0.21	0.961	-2.71	5.63
AGE (Q1-Q20)	108.38	61.22	6	309
AGE (Q1-Q5)	86.10	59.30	6	264
AGE (Q6-Q10)	101.02	59.19	21	279
AGE (Q11-Q15)	115.7	58.79	36	294
AGE (Q16-Q20)	130.70	58.79	51	309
REGULATION	0.250	0.433	0	1
UNIVERSE	0.120	0.325	0	1
SHORTSTRAT	0.300	0.458	0	1
EMERGINGMKTSTRAT	0.100	0.300	0	1
FIXEDINCOMESTRAT	0.120	0.325	0	1
DISTRESSEDSTRAT	0.100	0.300	0	1
MANAGEDFUTSTRAT	0.120	0.325	0	1
MULTISTYLESTRAT	0.260	0.439	0	1

NETRETURNS: Average percentage hedge funds returns in excess of the S&P 500.
SIZE: Average assets under management in real-terms using 2005 as the Base year.
SHARPERATIO: Sharpe Ratio of hedge fund, based on: $S(x) = (rx – Rf)/StdDev(x)$.
AGE: Age, in months, of each fund from its inception.
REGULATION: 204 SEC regulation.
EMERGINGMKTSTRAT: Emerging market strategy funds.
FIXEDINCOMESTRAT: Fixed income strategy funds.
MANAGEDFUTSTRAT: Managed futures strategy funds.
MULTISTYLESTRAT: Multi-style strategy funds. (Includes Multi-style, Arbitrage, & Macro).

Table 2: Regression results - Fixed-Effects Regressions

Regression Variable	*(Q1-Q16)*	*(Q1-17)*	*(Q1-Q18)*	*(Q1-Q19)*	*(Q1-Q20)*	*(Q1-Q20)*
CONSTANT	-5.2874	-5.4325	-2.9644	-0.12699	2.4818	-3.6344
	(3.5133)	(3.3223)	(3.0106)	(2.7601)	(2.7253)	(3.2148)
SIZE	0.0016	0.00097	0.00050	0.00023	0.00023	-0.000603
	(0.00088)	(0.00088)	(0.00095)	(0.00100)	(0.00098)	(0.00105)
SHARPERATIO	3.6466*	3.4590*	3.0369*	2.5112*	1.9207*	2.5976*
	(0.69835)	(0.61852)	(0.00095)	(0.57877)	(0.54310)	(0.49536)
AGE	0.02315	0.03088	0.01505	-0.00450	-0.02266	0.03422
	(0.03646)	(0.03534)	(0.03345)	(0.03130)	(0.03128)	(0.03604)
REGULATION	9.3344*	11.6427*	6.5805*	3.6902*	2.1625	13.8332*
	(3.10007)	(1.72548)	(1.48080)	(1.61969)	(1.55269)	(2.39260)
REG_QUARTER	-	-	-	-	-	-4.2280*
						(0.89990)
	n=675	n=711	n=749	n=787	n=826	n=826
R-sq: within=	0.1196	0.1488	0.0730	0.0419	0.0294	0.1132
between=	0.0184	0.0109	0.0000	0.0114	0.0146	0.0008
overall=	0.0456	0.0753	0.0463	0.033	0.0217	0.0770
	F=9.36	F=17.48	F=14.84	F=5.84	F=3.24	F=11.06
	Pr>F=0.0000	Pr>F=0.0000	Pr>F=0.0000	Pr>F=0.0007	Pr>F=0.0198	Pr>F=0.0000

REG_QUARTER: Interaction term between Regulation and quarters: effects on net returns in each subsequent quarter that regulation is in effect.

Robust standard errors in parentheses

*Significant at 0.05

Table 3: Regression results - Random Effects Regressions		
Regression Variable	*(Q1-Q15)*	*(Q16-Q20)*
CONSTANT	1.5257	2.4858
	(1.14878)	(3.91269)
SIZE	-0.00052	-0.00054
	(0.00033)	(0.00173)
SHARPERATIO	2.2128*	0.27811
	(0.43807)	(0.88613)
AGE	-0.00142	0.00742
	(0.00603)	(0.02034)
UNIVERSE	-1.7270*	-2.6972
	(0.76570)	(2.90494)
EMERGINGMKTSTRAT	-1.6218	0.02198
	(1.76400)	(4.22702)
FIXEDINCOMESTRAT	-2.5019*	1.0903
	(0.86857)	(3.51784)
DISTRESSEDSTRAT	-2.7060*	-2.3016
	(0.96170)	(3.57206)
MANAGEDFUTSTRAT	1.21490	-0.1725
	(1.32432)	(6.18862)
MULTISTYLESTRAT	-1.33720**	-1.5294
	(0.79494)	(2.72947)
	n=638	n=188
R-sq:	within=0.0793	within=0.0271
	between=0.2454	between=0.0944
	overall=0.0899	overall=0.0081
	Chi=56.17	Chi=2.33
	Pr>Chi=0.0000	Pr>Chi=0.9851

Robust standard errors in parentheses
*Significant at 0.05
**Significant at 0.10

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