HEDGE FUND SIZE AND RETURN ANALYSIS BEFORE AND AFTER 2008 FINANCIAL CRISIS

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Abstract

In this paper, we attempt to examine the relationship between hedge fund asset under management (AUM) and fund return. We refer to the methodology and conclusions used in Platt, Cai, and Platt (2015). Focusing on funds reporting in US dollar, we analyze a sample of 2355 hedge funds from Lipper Hedge Fund database. We conduct equal-weighted method and AUM-weighted method to form the return indices.

We find that the AUM of hedge fund has a negative impact on the fund return performance before the 2008 financial crisis. This finding is consistent with researchers such as Brorsen and Harri (2004) and Platt, Cai, and Platt (2015). However, after the crisis, this effect becomes ambiguous. Moreover, we find that either market neutral or directional approach does not influence the fund return. S&P 500 also has significant power to explain the fund return.

Compared with the conclusions in Platt, Cai, and Platt (2015), we reach the same conclusion about the negative relationship between return and size of AUM and the indifferent influence power of market neutral and directional fund approach.

Keywords: hedge fund; asset under management; return performance; investment strategy; financial crisis; S&P 500; market neutral; market directional;

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Glossary

OLS	"Ordinary Least Square" stand for an approach that the methods of linear regression
AUM	"Asset Under Management" measures the value of asset holding in the portfolio
Lipper	Lipper is a database company bought HedgeWrold and TASS Research database in 2005. "Trading Advisor Selection System" is equivalent to Lipper Hedge World Fund Database
HFR	"Hedge Fund Research Inc." is a hedge fund database provider with over 20 years operations

1: Introduction

The hedge fund industry has rapidly grown its asset under management (AUM) in the last two decades. According to Ibbotson et al. (2011), from 1990 to 2009, the number of hedge fund increased from 530 to 8000, along with the AUM dramatically rising from $50 billion to $1.6 trillion. Hedge funds are known as the special investment vehicle for the great diversification and attractive return. Therefore, this investment product is tailored for high net-worth target investors. In terms of regulation, hedge funds have the right not to register with the SEC and reveal information about their portfolio holdings (Liang, 2000). With low supervision from regulators, hedge funds can deploy more flexible investment strategies in different asset classes and increase their leverage to boost up their performances. However, the loose regulation reduces the transparency of hedge funds reporting, making it harder for investors and researchers to analyze their performance.

Some researchers attempted to explain hedge fund returns by their investment styles. Our paper includes 13 fund styles covering different asset classes with various strategies. Following another classification of hedge fund, some researcher take into account the impact of two hedge funds types, market neutral or directional. Market neutral hedge funds move less closely with market fluctuation, while directional hedge funds are more influenced with the market movement (Brorsen & Harri, 2004).

Other researchers focus on the relationship between hedge fund return and the size of AUM. Ibbotson et al. (2011) discovered a positive relationship between hedge fund returns and fund size using 8400 hedge funds data in TASS from January 1995 through December 2009.

Interestingly, Bali et al. (2007) found a negative relationship between return and size for operating fund, and a positive relationship for discontinued funds by using 2064 hedge funds in HFR and TASS databases from January 1995 to December 2003. Lastly, Platt et al. (2015), using monthly hedge fund data in Lipper's Hedge World Database (LHWD) from January 1994 to June 2013, found a negative relationship between the size of AUM and hedge funds return.

It is suspicious about hedge fund managers' ability to maintain attractive return under such rapid asset growth rate. The amount of investment opportunities available for hedge funds is not increasing as fast as the capital managed by hedge fund managers, and the capability for the hedge fund managers to seize potential investment opportunities has its boundary.

Therefore, the objective of this research is to clarify this suspicion by replicating "The Impact of New Capital on Hedge Fund Returns" by Platt et al. (2015). We use the Lipper Hedge Fund Database (TASS) to exam how the capital flows may affect the hedge fund return using data in different periods.

This paper is structured as follows: It starts with a literature review on related academic articles, followed by hypothesis and development. Then we explain the data collection, assessment, and procession in our dataset. Next, we introduce the methodology to analyze how the change of hedge fund size affects the hedge fund performance. Finally, we discuss individual variables with empirical evidence.

2: Literature Review

Some researchers have analyzed the relationship between hedge fund performance and fund size. Most of them used the Trading Advisor Selection System (TASS) database. What distinguishes these research findings are the time range, the data sample, and the different methodologies.

On the one hand, several researchers claim that hedge fund return response negatively to hedge fund size. Harri and Brorsen (2004) used the multi-factor model to perform style analysis on 1209 hedge funds data from 1977 to 1998. They found a significant negative relationship between size and return. Harri and Brorsen (2004) explained this negative relationship with the hypothesis that investment opportunities become more difficult for a hedge fund manager to capture. Bali, Gokcan, and Liang (2007) is the first paper using cross-sectional regression between hedge fund risk and return at both individual and aggregate level. Bali et al. (2007) supported the view that funds return is negatively related to sizes, among live hedge funds from January 1995 to December 2003. This finding is explained by the limited capacity of the hedge fund manager. Namely, there are different optimal sizes of hedge fund corresponding to different capacities of hedge fund managers. As mentioned in the introduction, Platt et al. (2015) found a negative relationship between hedge fund size and fund return using 234 months hedge fund data in Lipper Hedge World Database (LHWD).

On the other hand, some papers support the argument that AUM has a positive relationship between hedge fund returns. Liang (1999) investigated about 380 hedge funds in the early period, from January 1994 to December 1996, and found a positive relationship between fund size and return. However, Ammann and Moerth (2008) argue that Liang's research focused on how performance impacts fund size, but not how fund size affects performance. Ammann and

Moerth (2008) suggested a positive relationship by conducting cross-sectional regression on the returns and sizes of 3355 funds. Ammann and Moerth (2008) argued that hedge fund managers mostly receive higher management fees from a larger asset size because of the fixed management fee. Moreover, they suggest that at the same time hedge fund managers face a dilemma between increasing the asset size to gain more benefit for themselves and maintaining the optimal fund size to generate the best profit for clients. Bali et al. (2007) discover that closed funds have a positive relationship between return and asset size using data from January 1995 to December 2003. Bali et al. (2007) view that reporting data to data vendor is an approach of advertisement. Once live funds attract a significant amount of investment, they are likely to drop out of the database to protect the safety of their trading strategies. The authors also suggest that small fund may drop out of the database due to cash flow shortfall to cover operating cost. Brown et al. (2008), using 408 individual fund-of-funds, found that higher AUM generates higher economies of scale, leading to higher fund return.

Regarding positive relationship, we also found two papers mentioning about the diminishing return to scale. Edwards and Caglayan (2001) conducted a six-factor regression model to explain the excess return of individual hedge funds ranging from January 1990 to August 1998. Their regression results show a positive coefficient of size variable and a negative coefficient of size reciprocal variable, implying that hedge funds return has a non-linear and deceleratingly positive relationship between fund size. The authors reminded that the 9-year data history is a bull market and raised the concern about limited skill from hedge fund manager and diminishing market inefficiency. Aggarwal and Jorion (2010) analyzed the individual hedge funds in TASS database ranging from November 1977 to December 2006 and found that new funds have the persistence return performance in the first five years and the existence of

decreasing return to scale thereafter. Aggarwal and Jorion (2010) explained that the relatively small size of new hedge fund suspends the impact of diseconomies of scale.

3: Hypothesis and Development

To explore the relationship between hedge fund AUM and fund return, we developed four hypotheses based on the conclusions in the paper written by Platt et al. (2015).

The first hypothesis is consistent with Platt et al. (2015) that the increased size of AUM has a negative impact on the return of hedge funds. As we discussed in the introduction, hedge fund managers cannot utilize the new capital to generate the same level of return in a timely manner.

Secondly, in contrast to Platt et al. (2015), we believe that the investment approach as either market neutral or directional has a significant effect on the return of hedge funds given the bull market in the last ten years. When the market has the direction of the trend, the directional type is more likely to outperform market neutral type. In contrast, the return of market neutral funds is less related to market movement.

Thirdly, in contrast to Platt et al. (2015), we intuitively assume that the investment strategies deployed by hedge fund managers affect the return of hedge funds. Instead of using 9 fund styles analyzed by Platt et al. (2015), our paper includes 13 funds styles. As shown in Table 4.1, the investment approaches cover different asset classes and positions.

Finally, as opposed to Platt et al. (2015), we assume that S&P 500 performance has an insignificant relationship with hedge fund performance. Given the low correlation feature of hedge fund, we expect the fluctuation of the stock market has a mere impact on hedge fund return.

4: Data and Methodology

4.1 Data Collection

Some of the characteristics of hedge funds are the loose regulation and less restrictive rules on data reporting. However, the inadvertent result of the less restrictive regulations environment for hedge funds provides hedge funds with controls on information reporting. The data of hedge funds on that AUM and investment results are issued on a voluntary basis. This creates difficulty in researching hedge fund performance and the change of AUM due to the limited data available.

To our best resources, we use the Lipper Hedge Fund Database via Thomson Reuter Eikon as the data source for this study. We cannot find hedge fund indices from the database to closely replicate the dataset as the paper written by Platt et al. (2015). Our database contains data on AUM and monthly return for individual hedge funds and their style categories. We obtain individual hedge fund data by filtering funds reporting in U.S. dollar to avoid currency change effect in our data and then by filtering each Lipper hedge fund classification. A monthly data series of AUM and return is generated for each hedge fund disregarding the non-continuousness.

There are 13 fund styles and 2355 hedge funds under our criteria as of December 2016 (Table 4.1). However, the database does not give the option to choose a live or dead fund. We believe that the Thomson Reuters Lipper Hedge Fund dataset includes both live and dead fund. With our analysis, our dataset contains funds which have reported continuously and funds which reported in the early periods but not the recent ones. Long/Short Equity has the largest numbers while dedicated short bias has only 11 numbers. 11 Dedicated short bias may not fully represent this fund style, but this is the best resource we can get.

Table 4.1 Number of Funds in Thirteen Fund Styles

Fund Styles	**Number of Funds**
Convertible Arbitrage	46
Credit Focus	136
Dedicated Short Bias	11
Emerging Market	293
Equity Market Neutral	87
Event Driven	199
Fixed Income Arbitrage	65
Global Macro	178
Long Bias	69
Long/Short Equity	628
Managed Futures	343
Options ArbStratOther Hedge	17
Fund of Fund	283
Total Fund	**2355**

We also categorized hedge funds into 2 fund types – market neutral and directional (Table 4.2). All 13 fund styles cover a wide range of asset classes, including equity, fixed income, and options. Based on the nature of funds styles, we label them as either market neutral or directional, which is a dummy variable in our regression as either 0 or 1 respectively. Four circled fund styles are the market neutral, the rest of them are directional.

Table 4.2 Description and fund type (either market neutral or directional) of thirteen fund styles

Fund Style	Description	Fund Type
Convertible Bond	Long in convertible securities and short in corporation's common stock	Market Neutral
Credit Focus	Distressed investing, credit long/short, and emerging market debt	Directional
Dedicated Short Bias	A net short positioin including both long and short securities	Directional
Emerging Markets	Investment in equity of developing contries	Directional
Equity Market Neutral	An equal long short position in equity market	Market Neutral
Event Driven	Primarily analyze corporate events	Directional
Fixed-Income Arbitrage	Exploit inefficiency embedded in fixed-income instruments	Market Neutral
Global Macro	Focus on economic events	Directional
Long Bias	A strategy half way between neutral and long only	Directional
Long/Short Equity Hedge	Long in undervalued company and short in overvalued company	Market Neutral
Managed Futures	A portfolio of futures contracts	Directional
Option Arbitrage	A zero risk position combining options and equity to earn small profits	Directional
Fund of Funds	A well diversified investment instrument consisting of other hdege funds	Uncertain

4.2 Data Assessment

Table 4.3 Growth of aggregate AUM for hedge fund styles from January 1997 to December 2016

		Period Average		240-Month Average		
Style Category	**As of January 1997**	**Jan 1997 - Dec 2008**	**Jan 2009 - Dec 2016**	**Jan 1997 - Dec 2016**	**As of Dec 2016**	**CAGR Start Date - Dec 2016**
Convertible Arbitrage	249,213,657	3,971,037,934	2,134,923,661	3,236,592,224	2,569,039,112	12.37%
Credit Focus	9,600,000 (Starts Feb 1997)	2,921,167,826	20,447,107,967	9,960,876,000	28,884,979,189	49.50%
Dedicated Short Bias	120,100,000	78,903,287	131,593,623	105,525,773	408,668,545	6.31%
Emerging Market	638,063,253	7,040,516,711	14,100,565,406	9,864,536,189	17,804,058,075	18.11%
Equity Market Neutral	362,020,578	3,485,563,494	1,538,745,467	2,706,836,283	3,648,699,092	12.25%
Event Driven	1,098,778,861	13,826,826,974	20,494,423,458	16,493,865,568	20,825,531,296	15.85%
Fixed Income Arbitrag	669,711,351	3,498,476,417	5,148,316,691	4,158,412,527	6,852,238,176	12.33%
Fund of Funds	487,601,150	18,522,700,178	36,341,080,507	25,650,052,310	22,404,002,642	21.09%
Global Macro	44,779,810	9,046,208,917	50,378,258,131	25,579,028,603	66,394,866,008	44.06%
Long Bias	1,000,322 (Starts Jan 1999)	277,467,189	1,898,372,211	997,869,421	4,260,787,621	59.09%
Long/Short	1,403,925,430	24,667,493,811	37,053,149,463	29,621,756,072	42,832,296,259	18.64%
Managed Futures	3,663,875,907	21,385,030,121	45,905,628,787	31,193,269,588	35,890,870,722	12.09%
Option Arbitrage	1,000,000	407,679,500	348,884,141	383,762,744	524,903,067	36.77%

Table 4.3 presents the growth of aggregate AUM for 13 hedge fund styles from January 1997 to December 2016. The first five columns contain the aggregate AUM data at the start date, average aggregate AUM of the first 144 months and the last 96 months, average aggregate AUM of the total 240 months, and the aggregate AUM data at the last date. The last column is the compound annual growth rate (CAGR) throughout the total period.

As shown in Table 4.3, several hedge fund types experienced tremendous growth in AUM from January 1997 to December 2016. A 44.06% CAGR of global macro and 49.50% of credit focus correspond to the rapid development of globalization in the last two decades. During the whole period, the hedge funds with most AUM changed from managed futures style to global

macro style and those with the least fund size changed from option arbitrage style to dedicated short bias style.

To check the impact of the financial crisis on our data, we deliberately break 240 months at the end of 2008. Most hedge fund styles were able to increase in fund size after the financial crisis. Credit focus, global macro, and long bias had over 450% increase in AUM. This rise of fund size could be related to the progress of globalization and a good sentiment about the overall investing environment.

By comparison, convertible arbitrage, equity market neutral and option arbitrage fund styles decreased in AUM after the financial crisis. This reduction of fund size was reasonable given the limited market inefficiency.

Table 4.4 Individual Styles' growth of unadjusted returns and returns adjusted by S&P500

	Unadjusted Return			Return Less the S&P 500 Return		
Style Category	**Full Period: Start Date - Dec 2016**	**First 144 Months: Jan 1997 - Dec 2008**	**Last 96 Months: Jan 2009 - Dec 2016**	**Full Period: Start Date - Dec 2016**	**First 144 Months: Jan 1997 - Dec 2008**	**Last 96 Months: Jan 2009 - Dec 2016**
Convertible Arbitrage	9.52%	7.21%	12.98%	2.79%	4.27%	0.59%
Credit Focus	11.27%	10.97%	11.70%	5.70%	10.17%	-0.69%
Dedicated Short Bias	0.50%	N/A	0.50%	-8.94%	N/A	-8.94%
Emerging Market	15.06%	16.79%	12.47%	8.33%	13.84%	0.08%
Equity Market Neutral	9.14%	10.28%	7.44%	2.42%	7.33%	-4.95%
Event Driven	9.03%	8.91%	9.20%	2.31%	5.97%	-3.19%
Fixed Income Arbitrage	8.17%	7.44%	9.27%	1.45%	4.49%	-3.11%
Fund of Funds	6.36%	7.78%	4.23%	-0.36%	4.83%	-8.16%
Global Macro	13.22%	16.74%	7.94%	6.50%	13.80%	-4.45%
Long Bias	15.22%	14.34%	16.52%	8.49%	11.40%	4.14%
Long/Short	12.65%	14.32%	10.15%	5.93%	11.38%	-2.24%
Managed Futures	10.83%	15.76%	3.44%	4.11%	12.81%	-8.95%
Option Arbitrage	10.23%	7.53%	13.27%	6.63%	11.74%	0.88%

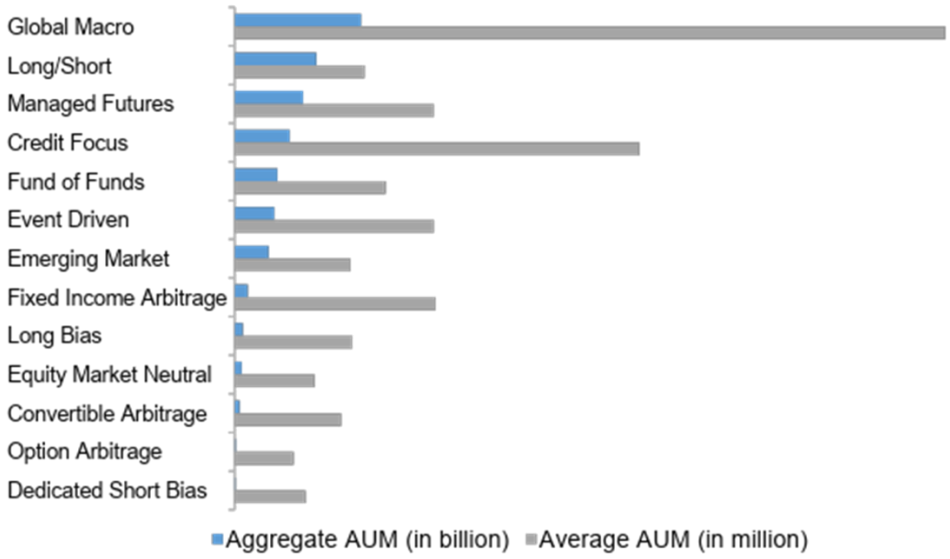
With the rapid growth of AUM, it does not indicate that the return of hedge fund outperformed the equity market. Table 4.4 shows that the annualized unadjusted return and adjusted return for in different period for each fund styles.

To the whole period, emerging market and long bias styles have the top average performance than the other fund styles. For hedge funds focusing on emerging market, investors' concerns regarding political risk, foreign exchange risk, and illiquidity risk might slow down the asset growth, which is only 18.11% CAGR compared to the 59.09% CAGR regarding long-bias funds (Table 4.3).

It is evident that convertible arbitrage, credit focus, event driven, fixed income arbitrage, long bias, and option arbitrage had a better average annualized unadjusted return in the last 96 months than in the first 144 months. However, after the adjustment of S&P 500 return, these hedge fund styles were not able to maintain their active return in the last 96 months. This negative active return after the 2008 financial crisis suggests hedge fund did not beat the benchmark from January 2009 to December 2016.

4.3 Data Processing

Figure 4.1 Thirteen fund styles' Aggregate AUM as of December 2016



As we have concerns about the accuracy of the reported data, we would like to exclude the funds which have data reported in either return data or AUM data surpass our threshold. We believe that the more the missing data reported by the hedge fund, the lower the reliability the data the fund reported. In our data assessment, we ranked thirteen fund styles by their average AUM and aggregate AUM (Figure 4.2). We found some fund types do not have the same ranking under two methods, such as credit focus. Therefore, we believe that average AUM better represents the characteristics of the individual fund in each style.

Given the facts that hedge funds data suffer significant impact from voluntary reporting, we assess our dataset to improve the quality and accuracy. In the data processing section (Table 4.5), we group hedge fund by AUM and return data of each fund into a different percentage of missing data. We set the threshold as no more than 5%. Only 1,961 funds out of 2,355 funds fulfil our threshold standard. Moreover, we identify the data for these 1,961 funds if the return

data and AUM data is not reported together in the same month. We remove the identified data from our dataset when we conduct our return indices using the equal-weighted method and AUM-weighted method.

Table 4.5 Data Quality in the Thomson Reuter Eikon Lipper Hedge Fund Database

Missing Returns	in Funds	in %
1 datapoint	323	13.72%
More than 5%	285	12.10%
More than 10%	285	12.10%
More than 30%	285	12.10%
More than 50%	285	12.10%

Missing AUM	in Funds	in %
1 datapoint	405	17.20%
More than 5%	394	16.73%
More than 10%	382	16.22%
More than 30%	359	15.24%
More than 50%	314	13.33%

4.4 Methodology

4.4.1 Index Formation

Reporting mechanism in the hedge fund industry allows hedge funds to adjust the frequency of reporting, which might create gaps in their historical data. The ability to revise the past reported data also increase the concerns regarding the accuracy of reported data.

Our hedge fund data still fall to the restriction from survivorship bias and backfill bias. When a hedge fund seizes its operations, its historical performance and AUM data will be removed from the live database to the graveyard. Also, hedge funds have the incentive to revise the reported data to outstand their impressive returns for capital attraction.

Therefore, we exclude the historical data in 2017 and 2018 in order to address the revisable issue. We use the aggregated result of hedge funds by styles instead of by individuals to lower the infrequency effect on our data. By using the equal-weighted method and AUM-weighted method, we generate two indices with a more representable performance for each style. For AUMs, we use the equal-weighted method to better measure the average AUM represented for each style.

As we mentioned, the AUM and return data is reported by hedge funds voluntarily, the inconsistency of data reporting exists in most of the funds. As a result, certain funds have entered and exited the dataset during our predefined period. Aggregating the data on a monthly basis smooths out the series but does not solve the inconsistent issue in our dataset. Combining the data cleaning method as mentioned before and the aggregating method, we have a smoother series with better consistency as well as accuracy.

4.4.2 Categorization in Linear Regression

A classification of fund type as market neutral or directional is a reasonably straightforward categorization based on the investment strategies of the funds. Fund of funds style is ambiguous in determining the fund type. We categorize fund of funds as market neutral first and then as directional. There is no material difference between the two alternatives for fund of funds categorization. Therefore, we put fund of funds as directional for simplicity.

Data on monthly returns and AUMs on all styles are stacked to allow a single regression across various fund categories. The inclusion of categorical variables regarding fund types as well as investment styles addresses the effects of different approaches in the hedge fund industry on the return performance of funds.

4.4.3 Regression Equation

We run the regression about monthly average hedge fund return against the monthly historical value of the asset under management, fund type categorized variable (market neutral or discretionary), fund style categorized variables (investment strategies), and the categorized variables interacted with S&P 500 return. We intentionally use the interacted term with S&P 500 to replicate Platt et al. (2015). By doing so, we can have a better understanding about the degree of influences different fund style received from the equity markets. For monthly average hedge fund return, we generate two indices via the equal-weighted method and AUM-weighted method. We run our regressions with data in three different periods: the first 144 months (from January 1997 to December 2008), the last 96 months (from January 2009 to December 2016), and the full period (from January 1997 to December 2016).

$$Return_{\,i,t} = a + b_1\, AUM_{i,t} + b_2\, Fund\ Type_i + b_{3\,i}\, Style_i + b_{4\,i}\,(S\&P\ 500\ Return * Style) + \in_1 \qquad (1)$$

where

Return = average monthly return for style *i* and time *t*

AUM = asset under management

Fund Type = market neutral (notation as zero) or directional (notation as one)

Style = a categorical variable for the thirteen hedge funds styles

S&P 500 Return = monthly return for S&P 500

$\in_1$ = a normally distributed error process

5: Empirical Result

Due to the limitation of our dataset, we do not have data of dedicated short bias and option arbitrage styles for our regressions in the first 144 months, which is between January 1997 and December 2008. Therefore, the empirical results of these two styles in the first period are marked as "N/A".

5.1 Equal-weighted Regression

Table 5.1 below contains the OLS regression results on equation (1) for all three periods with the equal-weighted return index. The F-test values for each period significantly show that these regression results provide a reasonable framework to understand the hedge fund returns. This model provides nearly 17%, 15%, and 22% explanation power in average style-based hedge funds returns according to the adjusted R-squared statistic for the full 240-month period, the first 144-month period and the last 96-month period, respectively.

The empirical results for the first 144-month period and the full period both suggest that a growing AUM level has a negative impact on the return performance of hedge funds. Both coefficients estimated on AUM is negative and significant at 99% confidence level. The empirical result for the last 96-month period supports this negative relation at 90% confidence level (Appendix 2). The order of magnitude of the estimated coefficient is minimal because the AUM data is measured in dollars and the returns are recorded in percentages. Moreover, the AUM negative impact to the return performance is relatively less in the last 96-month period than in the first 144-month period. One of the reasons is that hedge fund manager has better mitigations to lower the drawdown of return performance caused by the new capital. Another

reason is that hedge fund manager has more investment vehicles than before to utilize the new capital and maintain the return performance of the fund.

Table 5.1 Equal-weighted Return Index Regression Result Summary

Equal-weighted Return Index Regression Result Summary

	Full Period		First 144 Months		Last 96 Months	
Variables	**Coefficients**	***t*-Stat**	**Coefficients**	***t*-Stat**	**Coefficients**	***t*-Stat**
Intercept	0.01059	14.1267	0.01150	10.7898	0.00873	8.1308
AUM	-5.53E-12	-5.0625	-7.86E-12	-3.9744	-2.73E-12	-1.8886
Fund Type	-0.00020	-0.2143	-0.00031	-0.2270	0.00068	0.5427
d1 Convertible Arbitrage	-0.00265	-1.5384	-0.00440	-1.7692	-0.00125	-0.5592
d2 Credit Focus	-0.00007	-0.0383	-0.00078	-0.3101	0.00095	0.4301
d3 Dedicated Short Bias	-0.00430	-1.1455	N/A	N/A	-0.00278	-0.8883
d4 Emerging Market	-0.00101	-0.5875	0.00163	0.6568	-0.00473	-2.1221
d5 Equity Market Neutra	-0.00256	-1.4834	-0.00143	-0.5760	-0.00356	-1.5921
d6 Event Driven	-0.00383	-2.2382	-0.00422	-1.7170	-0.00357	-1.5894
d7 Fixed Income Arbitrag	-0.00167	-0.9581	-0.00133	-0.5242	-0.00223	-0.9944
d8 Fund of Funds	-0.00335	-1.9514	-0.00158	-0.6261	-0.00548	-2.4795
d9 Global Macro	0.00245	1.3748	0.00199	0.8085	0.00087	0.3204
d10 Long Bias	-0.00148	-0.8174	-0.00075	-0.2795	-0.00299	-1.2976
d11 Long/Short	-0.00072	-0.4173	0.00160	0.6480	-0.00499	-2.2355
d12 Managed Futures	0.00107	0.6282	0.00461	1.8831	-0.00512	-2.3063
d13 Option Arbitrage	-0.00061	-0.1920	N/A	N/A	0.00028	0.1051
d1 * S&P 500	0.27724	7.7844	0.21721	4.4049	0.37978	7.6966
d2 * S&P 500	0.13521	3.7273	0.13539	2.6612	0.13130	2.6609
d3 * S&P 500	-0.27657	-2.3485	N/A	N/A	-0.27551	-2.8931
d4 * S&P 500	0.65172	18.3224	0.70418	14.3148	0.57556	11.6644
d5 * S&P 500	0.19796	5.5654	0.25745	5.2334	0.09796	1.9853
d6 * S&P 500	0.29975	8.4271	0.26194	5.3240	0.37147	7.5283
d7 * S&P 500	0.07402	2.0810	0.04038	0.8206	0.14075	2.8525
d8 * S&P 500	0.15852	4.4295	0.15033	3.0247	0.17983	3.6445
d9 * S&P 500	0.26522	7.4563	0.28927	5.8666	0.21003	4.2563
d10 * S&P 500	0.69585	17.9528	0.63525	11.1449	0.79827	16.1779
d11 * S&P 500	0.40769	11.4616	0.38896	7.9064	0.46185	9.3600
d12 * S&P 500	-0.09574	-2.6916	-0.16456	-3.3450	0.06100	1.2362
d13 * S&P 500	-0.09008	-1.0134	N/A	N/A	-0.09009	-1.2534
Regression Statistics						
R^2	0.170		0.156		0.232	
Adjusted R^2	0.166		0.150		0.222	
Standard Error	0.024		0.027		0.020	
Observations	2,719		1,549		1,170	
F-Stat	39.598		23.701		24.904	

The fund type, categorized as market neutral and directional, has no significant influence power on the return of hedge funds as the estimated coefficients are insignificant in empirical results in all three regressions. The empirical results suggest that hedge funds with investment approaches categorized as either directional or market neutral perform similar returns. Together, our first two results argue that the return of a hedge fund is negatively affected by the size of the asset under management and is not affected by the fund type.

Our third hypothesis focusses on the relationship between the fund styles (the categorical variables) and the return performance. In the full 240-month regression, the estimated coefficient of event driven style is the only coefficient significant at 95% confidence level, and the coefficient is negative (Appendix 3). According to the estimated coefficients in the first 144-month regression, three of thirteen investment styles, which are convertible arbitrage, event driven, and managed future, have significant impacts on the return performance at 90% confidence level. Fund styles as convertible arbitrage and event drove negatively impact the return performance, and managed futures style positively impacts the return performance (Appendix 1). However, four fund styles, emerging markets, long/short, managed futures and fund of funds, are negatively related to the hedge fund performance at 95% confidence level in the last 96-month regression (Appendix 2).

Our final hypothesis focusses on the differential relationship between the fund styles (the categorical variables) interacted with the S&P 500 returns and the return performance. In the first 144-month regression, empirical results show that all estimated coefficients of interaction terms are significant at 95% confidence level, except fixed income arbitrage style. These coefficients imply the returns performance in related to the S&P 500. The return of managed future is moving against the return of S&P 500 with coefficient -0.16, which means for 1% increase in

S&P 500 return, 16 bps drop in the return of managed future fund. The return of emerging markets has the highest influence from the return of S&P 500. For 1% increase in S&P 500 return, 70 bps increase in the return of emerging markets fund (Appendix 1). In the last 96-month regression, only managed futures and option arbitrage styles are not significant at 95% confidence level according to the empirical results. In the last 96 months, long bias receives the highest influence from S&P 500, and dedicated short bias moves against S&P 500. These results are due to the investment strategies that hedge funds deploy (Appendix 2). In the full-period regression, options arbitrage is the only fund style with no significant interaction with S&P 500 (Appendix 3).

5.2 AUM-weighted Regression

Table 5.2 contains the OLS regression results on equation (1) for all three periods with AUM-weighted return index. The F-test values for each period significantly show that these regression results provide a reasonable framework to understand the hedge fund returns. This model provides nearly 12%, 10%, and 18% explanation power in average style-based hedge funds returns according to the adjusted R-squared statistic for the full 240-month period, the first 144-month period and the last 96-month period, respectively.

The empirical results for the first 144-month period and the full period both suggest that a growing AUM level has a negative impact on the return performance of hedge funds. Both coefficients estimated on AUM is negative and significant at 99% confidence level. However, the empirical result for the last 96-month period suggests no significant relation between AUM size and the hedge fund return performance (Appendix 5). As discussed before, the order of magnitude of the estimated coefficient is minimal due to the measurement units of AUM and return.

The fund type, categorized as market neutral and directional, shows no significant influence power on the return of hedge funds as all three estimated coefficients in our regressions with AUM-weighted average return index is insignificant. Together, our have the same conclusion regarding our first two hypothesizes using equal-weighted return index and AUM-weighted return index.

The similar empirical results from two return indices with different methods in different periods suggest that the negative relationship between the size of the asset under management and the return performance of hedge funds is robust. The coefficients of fund types in all regressions also indicate the robustness of the insignificant relation between fund types and return performance.

Our third hypothesis focusses on the relationship between the fund styles (the categorical variables) and the return performance. In the first 144-month regression, all coefficients are not significant to show the relation between fund style and return performance (Appendix 4). However, in the last 96-month regression, long/short strategy, managed futures and fund of funds show negative coefficients significant at 95% confidence level (Appendix 5). In the full 240-month regression, no estimated coefficients of fund styles are significant at 95% confidence level (Appendix 6).

Table 5.2 AUM-weighted Return Index Regression Result Summary

AUM-weighted Return Index Regression Result Summary

	Full Period		First 144 Months		Last 96 Months	
Variables	**Coefficients**	***t*-Stat**	**Coefficients**	***t*-Stat**	**Coefficients**	***t*-Stat**
Intercept	0.00979	12.0380	0.01157	9.5603	0.00671	6.5575
AUM	-5.03E-12	-4.2405	-9.08E-12	-4.0456	-9.15E-13	-0.6651
Fund Type	-0.00091	-0.8756	-0.00211	-1.3416	0.00170	1.4325
d1 Convertible Arbitrage	-0.00154	-0.8263	-0.00211	-0.7517	-0.00099	-0.4641
d2 Credit Focus	-0.00004	-0.0207	-0.00023	-0.0821	0.00048	0.2258
d3 Dedicated Short Bias	-0.00429	-1.0528	0	N/A	-0.00171	-0.5716
d4 Emerging Market	-0.00083	-0.4436	-0.00013	-0.0476	-0.00188	-0.8837
d5 Equity Market Neutra	-0.00314	-1.6776	-0.00272	-0.9631	-0.00407	-1.9116
d6 Event Driven	-0.00322	-1.7330	-0.00411	-1.4702	-0.00296	-1.3848
d7 Fixed Income Arbitrag	-0.00156	-0.8261	-0.00076	-0.2648	-0.00203	-0.9488
d8 Fund of Funds	-0.00235	-1.2619	0.00002	0.0067	-0.00526	-2.4978
d9 Global Macro	0.00275	1.4171	0.00101	0.3618	0.00119	0.4602
d10 Long Bias	0.00004	0.0188	0.00198	0.6495	-0.00087	-0.3984
d11 Long/Short	-0.00013	-0.0714	0.00231	0.8226	-0.00420	-1.9741
d12 Managed Futures	-0.00033	-0.1801	0.00231	0.8297	-0.00478	-2.2587
d13 Option Arbitrage	-0.00129	-0.3766	0	N/A	-0.00095	-0.3792
d1 * S&P 500	0.16316	4.2249	0.16559	2.9649	0.15111	3.2127
d2 * S&P 500	0.08920	2.2648	0.11218	1.9425	0.05189	1.1032
d3 * S&P 500	-0.22281	-1.7427	0	N/A	-0.22125	-2.4374
d4 * S&P 500	0.59613	15.4371	0.63112	11.3019	0.53670	11.4104
d5 * S&P 500	0.07035	1.8218	0.06484	1.1612	0.08683	1.8460
d6 * S&P 500	0.23801	6.1632	0.15486	2.7728	0.39562	8.4110
d7 * S&P 500	0.16370	4.2391	0.13707	2.4542	0.21451	4.5605
d8 * S&P 500	0.09623	2.4765	0.06238	1.1056	0.16601	3.5295
d9 * S&P 500	0.08622	2.2326	0.06194	1.1067	0.11041	2.3473
d10 * S&P 500	0.68179	16.2019	0.75231	11.6269	0.61351	13.0434
d11 * S&P 500	0.38742	10.0324	0.39242	7.0269	0.39275	8.3500
d12 * S&P 500	-0.10339	-2.6772	-0.16453	-2.9461	0.03388	0.7203
d13 * S&P 500	-0.07605	-0.7879	0	N/A	-0.07606	-1.1100
Regression Statistics						
R^2	0.121		0.110		0.189	
Adjusted R^2	0.116		0.103		0.179	
Standard Error	0.026		0.031		0.019	
Observations	2,720		1,550		1,170	
F-Stat	26.528		15.823		19.197	

The final hypothesis focusses on the differential relationship between the fund styles (the categorical variables) interacted with the S&P 500 returns and the return performance. In the first 144-month regression, empirical results show that four out of thirteen fund styles are estimated insignificant for interaction terms at 95% confidence level, which is credit focus, equity market neutral, fund of funds and global macro. The estimated coefficients imply the returns performance in related to the S&P 500. The return of managed future moves against the return of S&P 500 with coefficient -0.16, which is similar to the estimated coefficient of the same style during the same period with the equal-weighted method. The coefficient of long bias is the largest (0.75), and the coefficient of emerging markets comes the next (0.63). (Appendix 4) As we discussed, the coefficient shows the proportional change to the change in S&P 500 return. In the last 96-month regression, credit focus and equity market neutral styles are still insignificant at 95% confidence level along with managed future and option arbitrage according to the empirical results. In the last 96 months, long bias and emerging markets still have the first two largest coefficients, indicating the same conclusion as the one in the first 144 months (Appendix 5). In the full-period regression, options arbitrage and equity market neutral are the only two fund style with no significant interaction with S&P 500 (Appendix 6).

6: Conclusion

In conclusion, we use two different methods to generate return indices for our regression models in three different time horizons. The empirical results of these regressions support our hypothesis about the negative relationship between the size of the asset under management and the return performance of hedge funds. However, the AUM-size impact only makes a difference if the AUM size over one billion because of the small order of magnitude of our estimated coefficients. These results also show no significant relation between fund types and the return performance. Moreover, S&P 500 has significant influences on most of the fund styles, showing the correlation between US equity markets and hedge funds are strong. This finding contradicts the purpose of being a hedge fund, which is an alternative investment vehicle with a low correlation to other asset classes for diversification.

Our paper has consistent results comparing with Platt et al. (2015) in regard to the negative relationship between return performance and the size of AUM, the insignificant influence power of fund type. However, we reach different conclusions about the relationships between return performance and the fund styles as well as the S&P 500 performance. Platt et al. (2015) suggest that no significant evidence supports that fund styles have impacts on return performance. We show that some fund styles have significant coefficients to the return after 2008 in both of indexing methods as well as the interacted term with S&P 500. We believe these inconsistencies are contributed to our broader range of fund styles and the different time horizons.

This paper focuses on the return and AUM during the same period. As a result, our finding only supports the negative relation between return and AUM within the same month. However, the hedge fund manager might require time to allocate new capital to affect the fund

return. For further research, it might be meaningful to analyze the relationship between return and AUM in different time lags.

Appendices

Appendix 1 Statistic Result with Equal-weighted Method: January 1997 to December 2008

Regression with Data between January 1997 and December 2008 with Equal-weighted Index

Variables	Coefficients	Standard Error	*t*-Stat	p-Value
Intercept	0.01150	0.00107	10.7898	1.15E-26
AUM	-7.86E-12	1.98E-12	-3.9744	0.00007
Fund Type	-0.00031	0.00139	-0.2270	0.82045
d1 Convertible Arbitrage	-0.00440	0.00248	-1.7692	0.07696
d2 Credit Focus	-0.00078	0.00250	-0.3101	0.75650
d3 Dedicated Short Bias	N/A	N/A	N/A	N/A
d4 Emerging Market	0.00163	0.00249	0.6568	0.51138
d5 Equity Market Neutral	-0.00143	0.00248	-0.5760	0.56466
d6 Event Driven	-0.00422	0.00246	-1.7170	0.08608
d7 Fixed Income Arbitrage	-0.00133	0.00254	-0.5242	0.60021
d8 Fund of Funds	-0.00158	0.00252	-0.6261	0.53132
d9 Global Macro	0.00199	0.00246	0.8085	0.41884
d10 Long Bias	-0.00075	0.00269	-0.2795	0.77988
d11 Long/Short	0.00160	0.00248	0.6480	0.51705
d12 Managed Futures	0.00461	0.00245	1.8831	0.05978
d13 Option Arbitrage	N/A	N/A	N/A	N/A
d1 * S&P 500	0.21721	0.04931	4.4049	1.09E-05
d2 * S&P 500	0.13539	0.05087	2.6612	0.00783
d3 * S&P 500	N/A	N/A	N/A	N/A
d4 * S&P 500	0.70418	0.04919	14.3148	4.83E-45
d5 * S&P 500	0.25745	0.04919	5.2334	1.78E-07
d6 * S&P 500	0.26194	0.04920	5.3240	1.09E-07
d7 * S&P 500	0.04038	0.04920	0.8206	0.41191
d8 * S&P 500	0.15033	0.04970	3.0247	0.00251
d9 * S&P 500	0.28927	0.04931	5.8666	4.92E-09
d10 * S&P 500	0.63525	0.05700	11.1449	2.63E-28
d11 * S&P 500	0.38896	0.04920	7.9064	3.66E-15
d12 * S&P 500	-0.16456	0.04920	-3.3450	0.00083
d13 * S&P 500	N/A	N/A	N/A	N/A

Regression Statistics	
R^2	0.156
Adjusted R^2	0.150
Standard Error	0.027
Observations	1,549
F-Stat	23.701

Appendix 2 Statistic Result with Equal-weighted Method: January 2009 to December 2016

Regression with Data between January 2009 and December 2016 with Equal-weighted Index

Variables	Coefficients	Standard Error	*t*-Stat	p-Value
Intercept	0.00873	0.00107	8.1308	6.88E-16
AUM	-2.73E-12	1.44E-12	-1.8886	0.05908
Fund Type	0.00068	0.00125	0.5427	0.58741
d1 Convertible Arbitrage	-0.00125	0.00223	-0.5592	0.57610
d2 Credit Focus	0.00095	0.00221	0.4301	0.66714
d3 Dedicated Short Bias	-0.00278	0.00313	-0.8883	0.37447
d4 Emerging Market	-0.00473	0.00223	-2.1221	0.03393
d5 Equity Market Neutral	-0.00356	0.00223	-1.5921	0.11150
d6 Event Driven	-0.00357	0.00224	-1.5894	0.11211
d7 Fixed Income Arbitrage	-0.00223	0.00224	-0.9944	0.32012
d8 Fund of Funds	-0.00548	0.00221	-2.4795	0.01323
d9 Global Macro	0.00087	0.00272	0.3204	0.74868
d10 Long Bias	-0.00299	0.00230	-1.2976	0.19457
d11 Long/Short	-0.00499	0.00223	-2.2355	0.02548
d12 Managed Futures	-0.00512	0.00222	-2.3063	0.02118
d13 Option Arbitrage	0.00028	0.00264	0.1051	0.91632
d1 * S&P 500	0.37978	0.04934	7.6966	2.05E-14
d2 * S&P 500	0.13130	0.04934	2.6609	0.00785
d3 * S&P 500	-0.27551	0.09523	-2.8931	0.00385
d4 * S&P 500	0.57556	0.04934	11.6644	1.37E-30
d5 * S&P 500	0.09796	0.04934	1.9853	0.04723
d6 * S&P 500	0.37147	0.04934	7.5283	7.32E-14
d7 * S&P 500	0.14075	0.04934	2.8525	0.00438
d8 * S&P 500	0.17983	0.04934	3.6445	0.00027
d9 * S&P 500	0.21003	0.04935	4.2563	0.00002
d10 * S&P 500	0.79827	0.04934	16.1779	7.51E-56
d11 * S&P 500	0.46185	0.04934	9.3600	1.83E-20
d12 * S&P 500	0.06100	0.04934	1.2362	0.21652
d13 * S&P 500	-0.09009	0.07188	-1.2534	0.21020

Regression Statistics	
R^2	0.232
Adjusted R^2	0.222
Standard Error	0.020
Observations	1,170
F-Stat	24.904

Appendix 3 Statistic Result with Equal-weighted Method: January 1997 to December 2016

Regression with Data between January 1997 and December 2016 with Equal-weighted Index

Variables	Coefficients	Standard Error	*t*-Stat	p-Value
Intercept	0.01059	0.00075	14.1267	1.60E-44
AUM	-5.53E-12	1.09E-12	-5.0625	4.27E-07
Fund Type	-0.00020	0.00095	-0.2143	0.83030
d1 Convertible Arbitrage	-0.00265	0.00172	-1.5384	0.12402
d2 Credit Focus	-0.00007	0.00172	-0.0383	0.96943
d3 Dedicated Short Bias	-0.00430	0.00375	-1.1455	0.25207
d4 Emerging Market	-0.00101	0.00172	-0.5875	0.55691
d5 Equity Market Neutral	-0.00256	0.00172	-1.4834	0.13803
d6 Event Driven	-0.00383	0.00171	-2.2382	0.02525
d7 Fixed Income Arbitrage	-0.00167	0.00174	-0.9581	0.33806
d8 Fund of Funds	-0.00335	0.00172	-1.9514	0.05106
d9 Global Macro	0.00245	0.00178	1.3748	0.16926
d10 Long Bias	-0.00148	0.00181	-0.8174	0.41376
d11 Long/Short	-0.00072	0.00172	-0.4173	0.67644
d12 Managed Futures	0.00107	0.00170	0.6282	0.52992
d13 Option Arbitrage	-0.00061	0.00316	-0.1920	0.84776
d1 * S&P 500	0.27724	0.03561	7.7844	8.33E-15
d2 * S&P 500	0.13521	0.03628	3.7273	0.00020
d3 * S&P 500	-0.27657	0.11776	-2.3485	0.01889
d4 * S&P 500	0.65172	0.03557	18.3224	8.41E-73
d5 * S&P 500	0.19796	0.03557	5.5654	2.74E-08
d6 * S&P 500	0.29975	0.03557	8.4271	4.50E-17
d7 * S&P 500	0.07402	0.03557	2.0810	0.03748
d8 * S&P 500	0.15852	0.03579	4.4295	9.63E-06
d9 * S&P 500	0.26522	0.03557	7.4563	1.03E-13
d10 * S&P 500	0.69585	0.03876	17.9528	4.76E-70
d11 * S&P 500	0.40769	0.03557	11.4616	4.56E-30
d12 * S&P 500	-0.09574	0.03557	-2.6916	0.00713
d13 * S&P 500	-0.09008	0.08889	-1.0134	0.31092

Regression Statistics	
R^2	0.170
Adjusted R^2	0.166
Standard Error	0.024
Observations	2,719
F-Stat	39.598

Appendix 4 Statistic Result with AUM-weighted Method: January 1997 to December 2008

Regression with Data between January 1997 and December 2008 with AUM-weighted Index

Variables	Coefficients	Standard Error	*t*-Stat	p-Value
Intercept	0.01157	0.00121	9.5603	2.32E-21
AUM	-9.08E-12	2.24E-12	-4.0456	0.00005
Fund Type	-0.00211	0.00157	-1.3416	0.17982
d1 Convertible Arbitrage	-0.00211	0.00281	-0.7517	0.45226
d2 Credit Focus	-0.00023	0.00284	-0.0821	0.93454
d3 Dedicated Short Bias	N/A	N/A	N/A	N/A
d4 Emerging Market	-0.00013	0.00282	-0.0476	0.96203
d5 Equity Market Neutral	-0.00272	0.00282	-0.9631	0.33558
d6 Event Driven	-0.00411	0.00279	-1.4702	0.14161
d7 Fixed Income Arbitrage	-0.00076	0.00289	-0.2648	0.79118
d8 Fund of Funds	0.00002	0.00286	0.0067	0.99463
d9 Global Macro	0.00101	0.00279	0.3618	0.71754
d10 Long Bias	0.00198	0.00306	0.6495	0.51605
d11 Long/Short	0.00231	0.00281	0.8226	0.41078
d12 Managed Futures	0.00231	0.00278	0.8297	0.40679
d13 Option Arbitrage	N/A	N/A	N/A	N/A
d1 * S&P 500	0.16559	0.05585	2.9649	0.00305
d2 * S&P 500	0.11218	0.05775	1.9425	0.05217
d3 * S&P 500	N/A	N/A	N/A	N/A
d4 * S&P 500	0.63112	0.05584	11.3019	4.77E-29
d5 * S&P 500	0.06484	0.05584	1.1612	0.24566
d6 * S&P 500	0.15486	0.05585	2.7728	0.00559
d7 * S&P 500	0.13707	0.05585	2.4542	0.01417
d8 * S&P 500	0.06238	0.05642	1.1056	0.26900
d9 * S&P 500	0.06194	0.05597	1.1067	0.26852
d10 * S&P 500	0.75231	0.06470	11.6269	1.30E-30
d11 * S&P 500	0.39242	0.05585	7.0269	2.59E-12
d12 * S&P 500	-0.16453	0.05585	-2.9461	0.00324
d13 * S&P 500	N/A	N/A	N/A	N/A

Regression Statistics	
R^2	0.110
Adjusted R^2	0.103
Standard Error	0.031
Observations	1,550
F-Stat	15.823

Appendix 5 Statistic Result with AUM-weighted Method: January 2009 to December 2016

Regression with Data between January 2009 and December 2016 with AUM-weighted Index

Variables	Coefficients	Standard Error	*t*-Stat	p-Value
Intercept	0.00671	0.00102	6.5575	6.73E-11
AUM	-9.15E-13	1.38E-12	-0.6651	0.50604
Fund Type	0.00170	0.00119	1.4325	0.15214
d1 Convertible Arbitrage	-0.00099	0.00213	-0.4641	0.64259
d2 Credit Focus	0.00048	0.00211	0.2258	0.82135
d3 Dedicated Short Bias	-0.00171	0.00299	-0.5716	0.56767
d4 Emerging Market	-0.00188	0.00213	-0.8837	0.37694
d5 Equity Market Neutral	-0.00407	0.00213	-1.9116	0.05605
d6 Event Driven	-0.00296	0.00214	-1.3848	0.16625
d7 Fixed Income Arbitrage	-0.00203	0.00214	-0.9488	0.34283
d8 Fund of Funds	-0.00526	0.00211	-2.4978	0.01257
d9 Global Macro	0.00119	0.00259	0.4602	0.64541
d10 Long Bias	-0.00087	0.00220	-0.3984	0.69035
d11 Long/Short	-0.00420	0.00213	-1.9741	0.04849
d12 Managed Futures	-0.00478	0.00212	-2.2587	0.02399
d13 Option Arbitrage	-0.00095	0.00251	-0.3792	0.70458
d1 * S&P 500	0.15111	0.04704	3.2127	0.00133
d2 * S&P 500	0.05189	0.04704	1.1032	0.27008
d3 * S&P 500	-0.22125	0.09077	-2.4374	0.01487
d4 * S&P 500	0.53670	0.04704	11.4104	2.23E-29
d5 * S&P 500	0.08683	0.04704	1.8460	0.06502
d6 * S&P 500	0.39562	0.04704	8.4110	7.02E-17
d7 * S&P 500	0.21451	0.04704	4.5605	5.37E-06
d8 * S&P 500	0.16601	0.04704	3.5295	0.00042
d9 * S&P 500	0.11041	0.04704	2.3473	0.01900
d10 * S&P 500	0.61351	0.04704	13.0434	1.42E-37
d11 * S&P 500	0.39275	0.04704	8.3500	1.16E-16
d12 * S&P 500	0.03388	0.04704	0.7203	0.47141
d13 * S&P 500	-0.07606	0.06852	-1.1100	0.26710

Regression Statistics	
R^2	0.189
Adjusted R^2	0.179
Standard Error	0.019
Observations	1,170
F-Stat	19.197

Appendix 6 Statistic Result with AUM-weighted Method: January 1997 to December 2016

Regression with Data between January 1997 and December 2016 with AUM-weighted Index

Variables	Coefficients	Standard Error	*t*-Stat	p-Value
Intercept	0.00979	0.00081	12.0380	5.89E-33
AUM	-5.03E-12	1.19E-12	-4.2405	0.00002
Fund Type	-0.00091	0.00104	-0.8756	0.38129
d1 Convertible Arbitrage	-0.00154	0.00187	-0.8263	0.40868
d2 Credit Focus	-0.00004	0.00187	-0.0207	0.98351
d3 Dedicated Short Bias	-0.00429	0.00407	-1.0528	0.29249
d4 Emerging Market	-0.00083	0.00187	-0.4436	0.65737
d5 Equity Market Neutral	-0.00314	0.00187	-1.6776	0.09348
d6 Event Driven	-0.00322	0.00186	-1.7330	0.08314
d7 Fixed Income Arbitrage	-0.00156	0.00189	-0.8261	0.40879
d8 Fund of Funds	-0.00235	0.00187	-1.2619	0.20704
d9 Global Macro	0.00275	0.00194	1.4171	0.15650
d10 Long Bias	0.00004	0.00197	0.0188	0.98497
d11 Long/Short	-0.00013	0.00187	-0.0714	0.94306
d12 Managed Futures	-0.00033	0.00185	-0.1801	0.85710
d13 Option Arbitrage	-0.00129	0.00343	-0.3766	0.70652
d1 * S&P 500	0.16316	0.03862	4.2249	2.43E-05
d2 * S&P 500	0.08920	0.03938	2.2648	0.02357
d3 * S&P 500	-0.22281	0.12785	-1.7427	0.08144
d4 * S&P 500	0.59613	0.03862	15.4371	1.21E-52
d5 * S&P 500	0.07035	0.03862	1.8218	0.06854
d6 * S&P 500	0.23801	0.03862	6.1632	7.65E-10
d7 * S&P 500	0.16370	0.03862	4.2391	0.00002
d8 * S&P 500	0.09623	0.03885	2.4765	0.01330
d9 * S&P 500	0.08622	0.03862	2.2326	0.02562
d10 * S&P 500	0.68179	0.04208	16.2019	1.09E-57
d11 * S&P 500	0.38742	0.03862	10.0324	1.76E-23
d12 * S&P 500	-0.10339	0.03862	-2.6772	0.00745
d13 * S&P 500	-0.07605	0.09651	-0.7879	0.43076

Regression Statistics	
R^2	0.121
Adjusted R^2	0.116
Standard Error	0.026
Observations	2,720
F-Stat	26.528

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