

Hedge Fund Education Series

Part 3: Asset Characteristics of *Hedge Funds*

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As discussed in part 1 of this series, hedge funds are considered an alternative asset class, in contrast with traditional investments such as stock and bonds. One of the reasons to view hedge funds in a somewhat different light than "bread and butter" asset classes is the differing asset characteristics that hedge funds exhibit. This installment of the hedge fund series focuses on these performance characteristics, providing insights into returns and correlations, but also drilling into additional distributional aspects such as skewness and kurtosis (fat tails).

Returns

The main reason why some hedge funds have attracted so much capital and investor interest has been their track record of attractive absolute returns. Although claims of superior performance by a few managers are cited in the financial press, the question of whether the industry as a whole performs well is still open.

One can think of hedge fund returns as a combination of exposure to macro factors (economic exposure or 'beta'), fund-level elements (fees structure, trade implementation capabilities) as well as manager skill (or 'alpha') in processing security or market specific information.¹

The excess returns that some hedge funds exhibit are a result of certain trading advantages. These advantages can include cheaper trading costs (due to large volumes and turnover), better market access, superior information processing abilities, as well as other structural and statutory benefits. These trading advantages are not new within financial markets. In fact they have existed for decades. However, prior to the emergence of hedge funds, they were in the exclusive domain of large financial institutions that

UBS Financial Services Inc. (UBS FS) is pleased to provide you with information about alternative investments. There are a few points we would like to raise with you at the outset.

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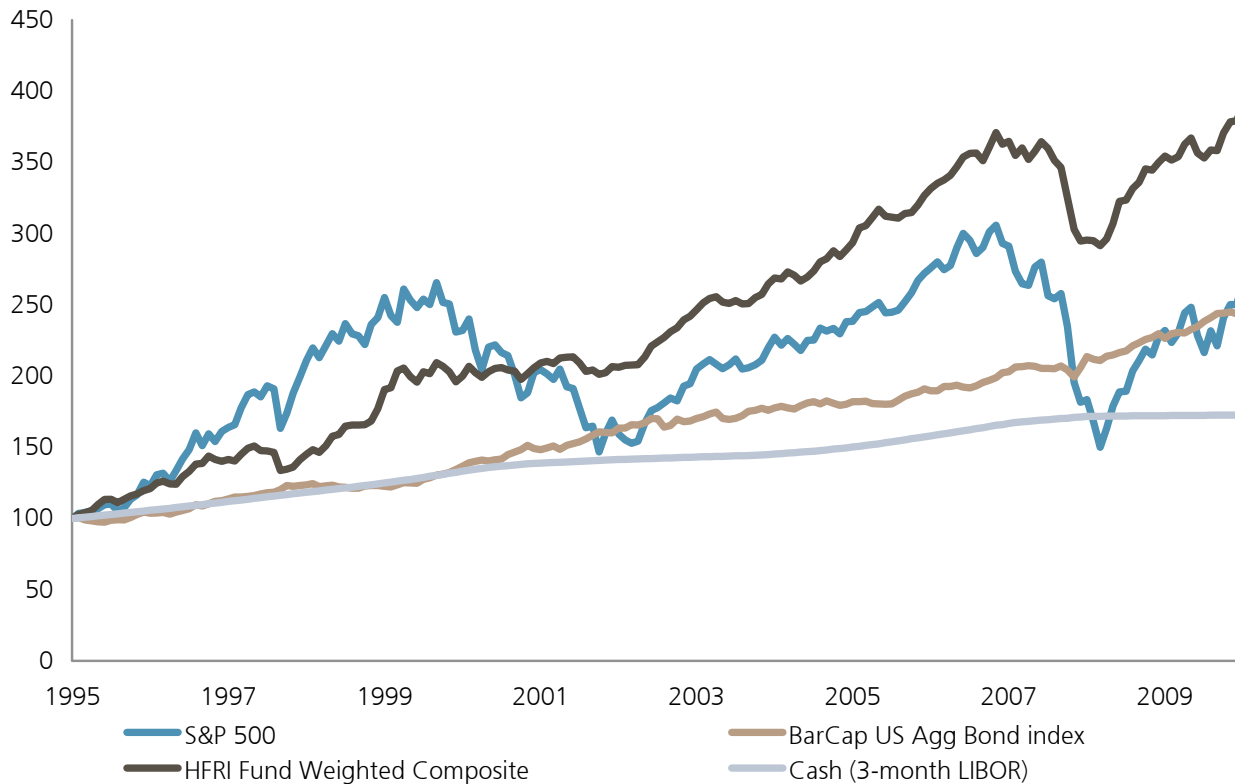
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traditionally supplied liquidity and speculative capital to the market place. Another driver of inherent excess returns is that most of the specialized activities conducted within hedge funds require a substantial

research infrastructure. It is, in most cases, uneconomic for traditional mutual funds to build similar research and trade execution capabilities given the substantially lower fees they charge relative to hedge funds.

Figure 1: Hedge Fund Performance Versus Other Asset Classes (from 12/31/1995 to 12/31/2010)

Total return indices since 1995 (=100)



Source: Bloomberg. **Past performance is not indicative of future results.** Indexes are for illustrative purposes only. Indexes are not available for direct investment. Please see the endnotes for important disclosure about indexes.

According to Hedge Fund Research, Hedge Funds, as an aggregate industry, have generated around 12% annual returns over the last 20 years. Unlike in traditional investment managers, such as those active in the large cap equity space, there is huge dispersion of returns between hedge funds that perform well and those that do not. The performance of individual hedge funds may therefore be very different from the overall hedge fund index.

In addition to wide differences in performance, there is another important consideration - the difference in volatilities between an individual fund and the index. Because the correlation of returns among hedge funds included within a strategy index is often low, diversification across the index constituent's results in volatility well below that of the average hedge fund. Therefore, an investment in a single hedge fund might well generate significantly different results, and in particular higher volatility, than the index portfolio performance would suggest.

Biases in Interpreting 'Benchmark' Returns

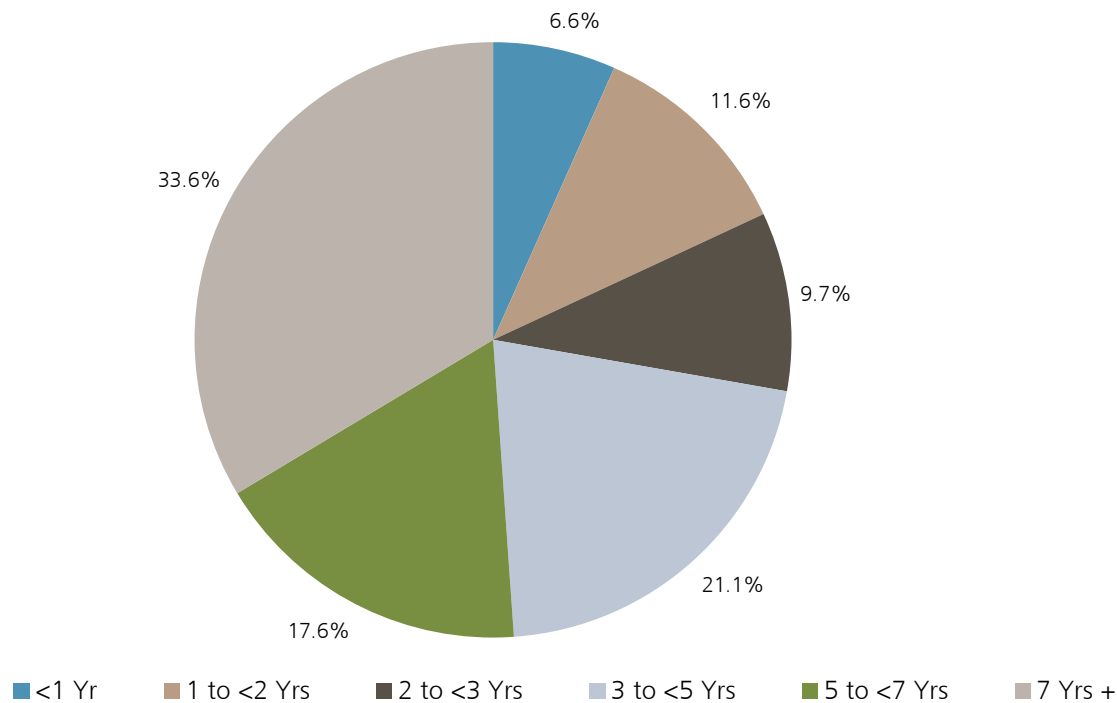
Another caveat in observing the numbers in Figure 1 is that hedge fund industry returns vary widely depending upon which commercial database one considers. Hedge Fund Research (HFR) and Eureka Hedge are popular industry databases (there are around 6 more) and there is little consensus between them. Moreover, all hedge fund databases are biased to some extent, which distorts the picture on true performance. Some common biases are worth highlighting:

Selection bias/reporting bias – Since hedge funds self report their returns data, there is a risk that reporting hedge funds may not be representative of all existing hedge funds. For instance, it has been argued that among funds that are raising capital, those with significant excess returns or good performance are likely to report their results to data base vendors for

marketing purposes. Funds that have not performed well have no incentive to report their returns. This selection bias intuitively leads to an overestimate of true returns in the industry. Conversely, successful hedge fund managers who are not raising capital have no incentive to report returns to database vendors, as this would only improve the benchmarks against which they are compared. This bias works in the opposite direction leading to an underestimation of true returns.

Survivorship bias – Hedge funds, because of poor performance frequently close down when they are unable to recover losses and meet hurdle rates of returns described as "the high water mark". Database vendors do not account for funds that go out of business because of poor performance. They report on funds that are in business and are reporting returns. This bias leads industry returns to be overstated.

Figure 2: Around 50% of hedge funds have been in existence for less than 5 years
 Estimated Fund Age, Q3 2010



Source: HFR Industry Reports, © HFR, Inc., www.hedgefundresearch.com

Instant History Bias – Many hedge funds start off small, often with in-house or proprietary capital, and build a track record of success. Those that succeed in creating good performance go on to market themselves to outside investors while the poor performers fold up. Once they are able to raise capital from external investors, managers begin reporting their returns to database vendors who back fill performance numbers creating an instant history bias. This too leads to overestimating returns.

Stale Pricing Bias – Hedge funds often invest in illiquid and complex securities that are hard to mark-to-market as they may be thinly traded or because a market for them may temporarily just not exist. For valuation purposes, in such cases, managers may either use the last reported transaction price or an estimate of the current market price which may be a lagging indicator of real value. The result of stale pricing is serial correlation reported returns over time, which reduces reported volatility. This is more pronounced in

illiquid strategies such as convertible arbitrage and in distressed debt given the longer time lapse in marking-to-market illiquid securities in those areas. By underestimating true volatility, hedge fund benchmark indices over-estimate risk adjusted returns.

The cumulative effect of these biases is not known with certainty, though attempts to estimate them have been made in academia.

Performance Persistence

While there is definite evidence of superior performance over long periods of time, for most individual strategies the results are not stable over shorter periods of time. In other words there is very little persistence in performance for best and worst performing strategies, and at best very weak evidence for middle deciles.

Figure 3: Returns by Strategy Type

HFRI Indices Annual Investment Returns

1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
S&P 500 28.58%	HFRI Emerging Markets 55.86%	HFRI ED: Merger Arb 18.02%	HFRI RV: ConvertArb 13.37%	BarCap US Agg 10.25%	HFRI Emerging Markets 39.36%	HFRI ED: Distressed Markets 18.89%	HFRI Emerging Markets 21.04%	HFRI Emerging Markets 24.26%	HFRI Emerging Markets 24.92%	BarCap US Agg 5.24%	HFRI RV: ConvertArb 60.17%	S&P 500 15.06%
HFRI Equity Hedge 15.98%	HFRI Equity Hedge 44.22%	HFRI EH: Eq Mkt Ntrl 14.56%	HFRI ED: Distressed Markets 13.28%	HFRI RV: ConvertArb 9.05%	HFRI ED: Distressed Markets 29.56%	HFRI ED: Distressed Markets 18.42%	HFRI Equity Hedge 10.60%	HFRI ED: Distressed Markets 15.94%	HFRI Macro 11.11%	HFRI Macro 4.83%	HFRI Emerging Markets 40.25%	HFRI RV: ConvertArb 13.07%
BarCap US Agg 8.69%	HFRI Fund Wghtd Comp 31.29%	HFRI RV: ConvertArb 14.50%	HFRI Event- Driven 12.18%	HFRI Macro 7.44%	S&P 500 28.68%	HFRI Event- Driven 15.01%	HFRI Fund Wghtd Comp 9.30%	S&P 500 15.79%	HFRI Equity Hedge 10.48%	HFRI ED: Merger Arb -5.37%	HFRI ED: Distressed Markets 28.14%	HFRI Emerging Markets 11.96%
HFRI EH: Eq Mkt Ntrl 8.30%	HFRI FOF Composite 26.47%	HFRI Relative Value 13.41%	HFRI Emerging Markets 10.36%	HFRI Relative Value 5.44%	HFRI Event- Driven 25.33%	S&P 500 10.88%	HFRI ED: Distressed Markets 8.27%	HFRI Event- Driven 15.33%	HFRI FOF Composite 10.25%	HFRI EH: Eq Mkt Ntrl -5.92%	S&P 500 26.46%	HFRI Relative Value 11.73%
HFRI RV: ConvertArb 7.77%	HFRI Event- Driven 24.33%	BarCap US Agg 11.63%	HFRI Relative Value 8.92%	HFRI ED: Distressed Markets 5.28%	HFRI Macro 21.42%	HFRI Fund Wghtd Comp 9.03%	HFRI FOF Composite 7.49%	HFRI ED: Merger Arb 14.24%	HFRI Fund Wghtd Comp 9.96%	HFRI Relative Value -18.04%	HFRI Relative Value 25.81%	HFRI Event- Driven 11.53%
HFRI ED: Merger Arb 7.23%	S&P 500 21.04%	HFRI Equity Hedge 9.09%	BarCap US Agg 8.44%	HFRI Emerging Markets 3.70%	HFRI Equity Hedge 20.54%	HFRI Equity Hedge 7.68%	HFRI Event- Driven 7.29%	HFRI Fund Wghtd Comp 12.89%	HFRI Relative Value 8.94%	HFRI Fund Wghtd Comp -19.03%	HFRI Event- Driven 25.04%	HFRI ED: Distressed Markets 11.26%
HFRI Macro 6.19%	HFRI Macro 17.62%	HFRI Event- Driven 6.74%	HFRI Macro 6.87%	HFRI FOF Composite 1.02%	HFRI Fund Wghtd Comp 19.55%	HFRI FOF Composite 6.86%	HFRI Macro 6.79%	HFRI Relative Value 12.37%	HFRI ED: Merger Arb 7.05%	HFRI FOF Composite -21.37%	HFRI Equity Hedge 24.57%	HFRI Equity Hedge 10.58%
HFRI Relative Value 2.81%	HFRI ED: Distressed Markets 16.94%	HFRI Fund Wghtd Comp 4.98%	HFRI EH: Eq Mkt Ntrl 6.71%	HFRI EH: Eq Mkt Ntrl 0.98%	HFRI FOF Composite 11.61%	HFRI Relative Value 5.58%	HFRI ED: Merger Arb 6.25%	HFRI RV: ConvertArb 12.17%	BarCap US Agg 6.97%	HFRI Event- Driven -21.82%	HFRI Fund Wghtd Comp 19.98%	HFRI Fund Wghtd Comp 10.49%
HFRI Fund Wghtd Comp 2.62%	HFRI Relative Value 14.73%	HFRI FOF Composite 4.07%	HFRI Fund Wghtd Comp 4.62%	HFRI ED: Merger Arb -0.87%	HFRI RV: ConvertArb 9.93%	HFRI Macro 4.63%	HFRI EH: Eq Mkt Ntrl 6.22%	HFRI Equity Hedge 11.71%	HFRI Event- Driven 6.61%	HFRI ED: Distressed- 25.20%	HFRI ED: Merger Arb 11.65%	HFRI Macro 8.61%
HFRI Event- Driven 1.70%	HFRI RV: ConvertArb 14.41%	HFRI ED: 2.78%	HFRI FOF Composite 2.80%	HFRI Fund Wghtd Comp -1.45%	HFRI EH: Eq Mkt Ntrl 2.44%	BarCap US Agg 4.34%	HFRI Relative Value 6.02%	HFRI FOF Composite 10.39%	S&P 500 5.49%	HFRI Equity Hedge -26.65%	HFRI FOF Composite 11.47%	BarCap US Agg 6.54%
HFRI ED: Distressed -4.23%	HFRI ED: Merger Arb 14.34%	HFRI Macro 1.97%	HFRI ED: Merger Arb 2.76%	HFRI Event- Driven -4.30%	HFRI Relative Value 9.72%	HFRI EH: Eq Mkt Ntrl 4.15%	S&P 500 4.91%	HFRI Macro 8.15%	HFRI RV: ConvertArb 5.33%	HFRI RV: ConvertArb- 33.73%	BarCap US Agg 5.93%	HFRI FOF Composite 5.60%
HFRI FOF Composite -5.11%	HFRI EH: Eq Mkt Ntrl 7.09%	S&P 500 -9.10%	HFRI Equity Hedge 0.40%	HFRI Equity Hedge -4.71%	HFRI ED: Merger Arb 7.47%	HFRI ED: Merger Arb 4.08%	BarCap US Agg 2.43%	HFRI EH: Eq Mkt Ntrl 7.32%	HFRI EH: Eq Mkt Ntrl 5.29%	S&P 500 -37.00%	HFRI Macro 4.34%	HFRI ED: Merger Arb 4.60%
HFRI Emerging Markets -32.96%	BarCap US Agg -0.82%	HFRI Emerging Markets -10.71%	S&P 500 -11.89%	S&P 500 -22.10%	BarCap US Agg 4.10%	HFRI RV: ConvertArb 1.18%	HFRI RV: ConvertArb- 1.86%	BarCap US Agg 4.33%	HFRI ED: Distressed Markets 5.08%	HFRI Emerging Markets -37.26%	HFRI EH: Eq Mkt Ntrl 1.43%	HFRI EH: Eq Mkt Ntrl 3.16%

Source: HFR Industry Reports, © HFR, Inc., www.hedgefundresearch.com. **Past performance is not indicative of future results.** Indexes are for illustrative purposes only. Indexes are not available for direct investment. Please see the endnotes for important disclosure about indexes.

After analyzing the data in Figure 3 to determine the strategy transition matrix for the period, we find that there is just a 33% probability that a strategy that was in the top quartile in a given year would remain in the top quartile in the next year. Moreover, the standard deviation within top and bottom deciles is the greatest of all, indicating more dispersion of returns within the best and worst performing strategies. This is described in Figure 4. This highlights the importance of strategy selection.

Figure 4: Strategy Transition Matrix Highlights Importance of Strategy Selection

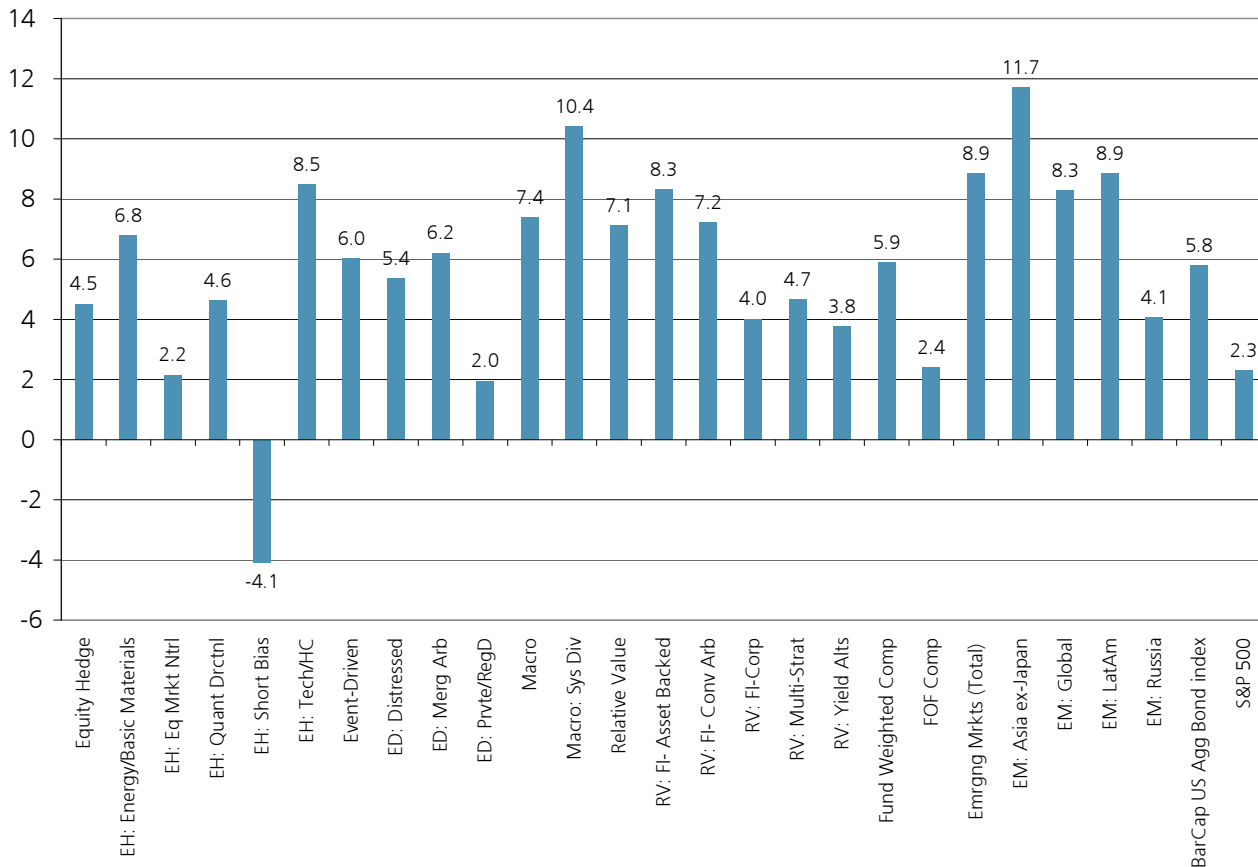
Percentage of strategies that were in quartile X (column heading) and in quartile Y (row heading) in the following month

	Top quarter	Second quarter	Third quarter	Fourth quarter
Top quarter	37%	23%	18%	22%
Second quarter	23%	30%	28%	20%
Third quarter	16%	29%	34%	21%
Fourth quarter	24%	18%	21%	37%

Source: UBS WMR, HFR Industry Reports, © HFR, Inc., www.hedgefundresearch.com, from December 1989 to July 2010

Figure 5: Hedge Fund Performance: Last 5 Years (from 12/31/2005 to 12/31/2010)

Annualized, in %



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Correlations

As seen in Figure 6, there is a variety of strategies that display relatively low correlation coefficients (less than 0.5) with stocks and bonds, as well as amongst each other. Therefore, carefully combining these strategies can contribute to creating a more stable portfolio. We note that some hedge fund strategies, especially those that are equity market-based, do exhibit a higher positive correlation with the stock market. However there are others such as convertible arbitrage and

equity market neutral which are less correlated. Within fixed income strategies, the degree correlation with the bond market is generally low. Interestingly, and this is dependent on the time period studied, with the exception of equity market neutral, most hedge fund strategies tend to be more highly correlated to each other than one would expect - perhaps reflecting exposure to the same set of systematic underlying factors.

Figure 6: Long-term Correlations
Correlation of monthly returns since 1996

	S&P 500	BarCap US Agg	Fund Weighted Comp	FOF Comp	Equity Hedge	EH: Energy/Basic Materials	EH: Eq Mkt Ntrl	EH: Quant Drctnl	EH: Short Bias	EH: Tech/HC	Event-Driven	ED: Distressed	ED: Merg Arb	ED: Prvte/RegD	Macro	Macro Sys Div	Relative Value	RV: Fl- Asset Backed	RV: Fl ConvArb	RV: Fl-Corp	RV: Multi-Strat	RV: Yield Alts	Emergng Mirkts (Total)	EM: Asia ex-Japan	EM: Global	EM: LatAm	EM: Russia
S&P 500	1																										
BarCap US Agg	0.01	1																									
Fund Weighted Comp	0.75	-0.02	1																								
FOF Comp	0.60	0.01	0.93	1																							
Equity Hedge	0.75	-0.03	0.97	0.88	1																						
EH: Energy/Basic Materials	0.47	0.06	0.61	0.57	0.61	1																					
EH: Eq Mkt Ntrl	0.23	0.04	0.43	0.50	0.46	0.38	1																				
EH: Quant Drctnl	0.79	-0.07	0.93	0.80	0.92	0.53	0.30	1																			
EH: Short Bias	-0.71	0.09	-0.79	-0.63	-0.81	-0.35	-0.14	-0.88	1																		
EH: Tech/HC	0.62	-0.04	0.83	0.70	0.84	0.33	0.24	0.87	-0.84	1																	
Event-Driven	0.73	-0.05	0.92	0.86	0.87	0.59	0.43	0.85	-0.67	0.67	1																
ED: Distressed	0.56	-0.06	0.79	0.81	0.72	0.52	0.37	0.66	-0.52	0.50	0.88	1															
ED: Merg Arb	0.58	0.00	0.70	0.64	0.67	0.50	0.45	0.63	-0.43	0.49	0.77	0.59	1														
ED: Prvte/RegD	0.34	-0.12	0.50	0.49	0.52	0.24	0.31	0.47	-0.37	0.49	0.46	0.39	0.36	1													
Macro	0.33	0.16	0.65	0.71	0.58	0.36	0.36	0.55	-0.41	0.52	0.51	0.41	0.32	0.31	1												
Macro Sys Div	0.43	-0.04	0.58	0.50	0.56	0.36	0.27	0.61	-0.50	0.59	0.41	0.23	0.34	0.35	0.63	1											
Relative Value	0.57	0.07	0.75	0.76	0.71	0.56	0.41	0.59	-0.43	0.44	0.81	0.82	0.70	0.33	0.30	0.14	1										
RV: Fl- Asset Backed	0.14	0.05	0.25	0.34	0.20	0.13	0.15	0.16	-0.10	0.10	0.33	0.43	0.10	0.04	0.15	-0.13	0.39	1									
RV: Fl ConvArb	0.46	0.16	0.60	0.61	0.59	0.50	0.29	0.42	-0.31	0.31	0.66	0.70	0.53	0.25	0.20	0.03	0.88	0.36	1								
RV: Fl-Corp	0.56	0.00	0.70	0.70	0.63	0.47	0.29	0.57	-0.44	0.40	0.80	0.86	0.56	0.30	0.29	0.10	0.85	0.52	0.76	1							
RV: Multi-Strat	0.53	0.12	0.74	0.77	0.69	0.53	0.37	0.57	-0.44	0.43	0.79	0.81	0.52	0.31	0.41	0.13	0.86	0.62	0.84	0.87	1						
RV: Yield Alts	0.51	0.01	0.61	0.60	0.56	0.46	0.38	0.51	-0.36	0.32	0.67	0.63	0.53	0.25	0.36	0.17	0.65	0.34	0.51	0.63	0.64	1					
Emergng Mirkts (Total)	0.66	-0.04	0.88	0.86	0.79	0.53	0.27	0.78	-0.63	0.63	0.81	0.75	0.57	0.36	0.57	0.41	0.67	0.28	0.54	0.69	0.69	0.58	1				
EM: Asia ex-Japan	0.62	-0.06	0.80	0.75	0.74	0.45	0.16	0.75	-0.61	0.61	0.72	0.62	0.50	0.32	0.54	0.45	0.56	0.22	0.49	0.58	0.59	0.47	0.87	1			
EM: Global	0.63	-0.04	0.88	0.87	0.77	0.52	0.30	0.76	-0.64	0.63	0.81	0.77	0.59	0.35	0.58	0.39	0.69	0.30	0.53	0.71	0.69	0.58	0.96	0.78	1		
EM: LatAm	0.63	0.00	0.77	0.71	0.68	0.45	0.19	0.70	-0.58	0.60	0.70	0.61	0.48	0.30	0.45	0.41	0.54	0.24	0.45	0.57	0.59	0.53	0.85	0.70	0.79	1	
EM: Russia	0.52	-0.04	0.74	0.76	0.65	0.48	0.31	0.62	-0.46	0.47	0.68	0.67	0.49	0.35	0.45	0.27	0.60	0.23	0.47	0.62	0.61	0.51	0.89	0.66	0.87	0.66	1

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Hedge fund strategies do not have stable correlations to broader market movements and neither do they have predictable short term correlations to each other. Having said this, there are certain strategies that provide valuable diversification during periods of general market stress. As Figure 7 indicates, the equity market neutral strategy was just 13% correlated with the S&P 500 during the financial crisis. The Fund of Funds market defensive index (not shown above) was in fact negatively correlated with the S&P 500 – something rather remarkable given that correlations converged across almost all asset classes. Likewise, the Macro index was slightly negatively correlated with the S&P 500 during the financial crisis.

Figure 7: Correlations during Financial Crisis
 Correlation of monthly returns: July 2007 to March 2009

	S&P 500	BarCap US Agg	Fund Weighted Comp	FOF Comp	Equity Hedge	EH: Energy/Basic Mater	EH: Eq Mkt Ntrl	EH: Quant Drctnl	EH: Short Bias	EH: Tech/HC	Event-Driven	ED: Distressed	ED: Merg Arb	ED: Pvtte/RegD	Macro	Macro Sys Div	Relative Value	RV: FI-Asset Backed	RV: FI ConvArb	RV: FI-Corp	RV: Multi-Strat	RV: Yield Alts	Emrgng Mkts (Total)	EM: Asia ex-Japan	EM: Global	EM: LatAm	EM: Russia
S&P 500	1																										
BarCap US Agg	0.41	1																									
Fund Weighted Comp	0.72	0.27	1																								
FOF Comp	0.56	0.16	0.96	1																							
Equity Hedge	0.79	0.29	0.99	0.94	1																						
EH: Energy/Basic Materials	0.63	0.32	0.96	0.94	0.95	1																					
EH: Eq Mkt Ntrl	0.13	-0.17	0.59	0.70	0.55	0.64	1																				
EH: Quant Drctnl	0.85	0.28	0.95	0.85	0.96	0.86	0.48	1																			
EH: Short Bias	-0.92	-0.28	-0.73	-0.56	-0.78	-0.61	-0.07	-0.85	1																		
EH: Tech/HC	0.76	0.18	0.90	0.85	0.91	0.78	0.40	0.92	-0.80	1																	
Event-Driven	0.75	0.21	0.96	0.93	0.95	0.93	0.53	0.92	-0.76	0.89	1																
ED: Distressed	0.61	0.01	0.87	0.90	0.85	0.86	0.60	0.79	-0.59	0.78	0.95	1															
ED: Merg Arb	0.75	0.33	0.87	0.79	0.89	0.81	0.35	0.89	-0.83	0.90	0.84	0.67	1														
ED: Pvtte/RegD	0.55	0.05	0.62	0.62	0.61	0.66	0.41	0.55	-0.44	0.41	0.71	0.81	0.40	1													
Macro	-0.06	0.02	0.44	0.49	0.36	0.42	0.60	0.35	0.05	0.27	0.25	0.19	0.25	0.02	1												
Macro Sys Div	-0.21	-0.13	0.16	0.19	0.08	0.11	0.39	0.15	0.14	0.10	0.01	-0.04	0.08	-0.16	0.90	1											
Relative Value	0.65	0.29	0.91	0.91	0.89	0.91	0.45	0.80	-0.66	0.80	0.95	0.92	0.78	0.71	0.16	-0.12	1										
RV: FI-Asset Backed	0.41	-0.14	0.53	0.53	0.51	0.47	0.19	0.48	-0.53	0.60	0.65	0.69	0.44	0.38	-0.01	-0.09	0.67	1									
RV: FI ConvArb	0.60	0.42	0.84	0.83	0.83	0.88	0.35	0.71	-0.62	0.72	0.88	0.81	0.77	0.63	0.09	-0.20	0.97	0.59	1								
RV: FI-Corp	0.68	0.13	0.82	0.80	0.81	0.80	0.41	0.76	-0.71	0.75	0.91	0.91	0.71	0.76	0.04	-0.15	0.93	0.72	0.85	1							
RV: Multi-Strat	0.59	0.32	0.90	0.90	0.88	0.92	0.47	0.77	-0.63	0.76	0.93	0.87	0.78	0.67	0.21	-0.07	0.98	0.63	0.98	0.90	1						
RV: Yield Alts	0.49	-0.06	0.77	0.79	0.75	0.73	0.40	0.65	-0.55	0.72	0.82	0.86	0.66	0.64	0.18	-0.04	0.85	0.79	0.78	0.77	0.81	1					
Emrgng Mkts (Total)	0.73	0.33	0.97	0.92	0.97	0.93	0.53	0.91	-0.69	0.84	0.91	0.82	0.83	0.63	0.37	0.05	0.87	0.41	0.83	0.76	0.86	0.68	1				
EM: Asia ex-Japan	0.68	0.36	0.88	0.82	0.90	0.79	0.37	0.86	-0.69	0.85	0.78	0.63	0.83	0.40	0.37	0.09	0.74	0.29	0.72	0.60	0.73	0.57	0.93	1			
EM: Global	0.71	0.29	0.97	0.93	0.96	0.94	0.55	0.89	-0.67	0.82	0.94	0.87	0.79	0.69	0.36	0.04	0.90	0.48	0.85	0.80	0.89	0.74	0.99	0.89	1		
EM: LatAm	0.64	0.31	0.96	0.94	0.94	0.96	0.61	0.87	-0.63	0.79	0.93	0.86	0.80	0.66	0.41	0.11	0.91	0.47	0.88	0.82	0.93	0.73	0.95	0.84	0.95	1	
EM: Russia	0.71	0.28	0.90	0.87	0.91	0.92	0.60	0.84	-0.61	0.72	0.89	0.84	0.71	0.72	0.30	-0.02	0.83	0.39	0.78	0.76	0.82	0.63	0.94	0.76	0.95	0.89	1

Source: HFR Industry Reports, © HFR, Inc., www.hedgefundresearch.com. **Past performance is not indicative of future results.** Indexes are for illustrative purposes only. Indexes are not available for direct investment. Please see the endnotes for important disclosure about indexes.

Distributional Properties

A concern in hedge fund performance evaluation has been the non-standard distributional properties of their returns. Hedge fund returns offer relatively high means and low variances, but they also tend to expose investors to skewness and kurtosis which are undesirable properties. The historical returns for stocks are typically close to “normally” distributed, exhibiting

a bell-shaped curve. By contrast, hedge fund strategies typically exhibit asymmetric distributions and higher probability of extreme outcomes. In order to interpret the numbers in Figure 8, we need to understand the concepts of “skewness” and “kurtosis”. These are statistical measures that describe the distribution of returns earned from an investment in an asset class and are particularly relevant to hedge fund.

Figure 8: Distribution Properties

Based on monthly annualized returns since 12/31/1995 through 12/31/2010

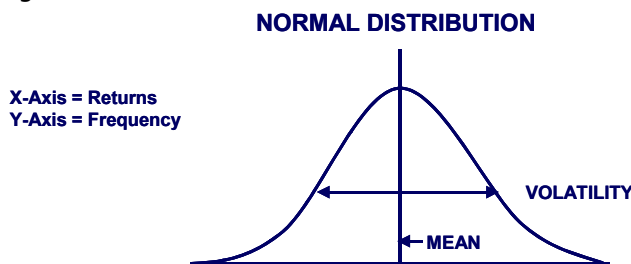
	Mean	Standard Deviation	Skewness	Kurtosis
Fund Weighted Composite	9.4	26.0	-0.7	2.6
Fund of Fund Composite	6.3	21.9	-0.7	3.9
Equity Hedge	10.8	33.6	-0.2	2.0
EH: Energy/Basic Materials	17.5	63.8	0.1	1.9
EH: Equity Market Neutral	5.7	11.1	-0.1	1.7
EH: Quant Directional	10.5	47.2	-0.4	0.6
EH: Short Bias	1.4	67.3	0.3	2.7
EH: Tech/HC	12.6	62.9	0.5	2.7
Event-Driven	10.4	24.7	-1.4	4.4
ED: Distressed	9.7	22.6	-1.6	6.0
ED: Merger Arbitrage	7.9	13.2	-1.7	6.3
ED: Private Issue / Regulated	11.3	24.5	0.7	1.7
Macro	8.9	22.3	0.4	0.7
Macro Systematic Diversified	11.4	27.4	0.2	-0.4
Relative Value	8.5	15.8	-3.0	16.3
RV: FI- Asset Backed	8.5	15.7	-3.3	20.3
RV: FI Convertible Arbitrage	8.7	26.4	-3.0	25.0
RV: FI-Corporate	6.2	21.1	-2.3	10.9
RV: Multi-Strategy	6.8	16.4	-2.6	13.5
RV: Yield Alternatives	7.9	26.2	-1.1	3.5
Emerging Markets (Total)	11.7	50.9	-1.1	4.5
EM: Asia ex-Japan	9.4	46.4	-0.1	0.4
EM: Global	9.9	47.3	-2.3	14.6
EM: LatAm	11.0	57.1	-0.3	2.1
EM: Russia	20.6	92.4	-0.8	5.3

Source: Bloomberg, HFR Industry Reports, © HFR, Inc., www.hedgefundresearch.com. **Past performance is not indicative of future results.** Indexes are for illustrative purposes only. Indexes are not available for direct investment. Please see the endnotes for important disclosure about indexes.

Skewness

A normal (bell-shaped) distribution of returns has no skewness because it is a symmetric distribution as depicted in Figure 9. Many traditional asset class returns have very little skewness i.e. their returns tend to be symmetrically clustered around a certain expected value or mean return.

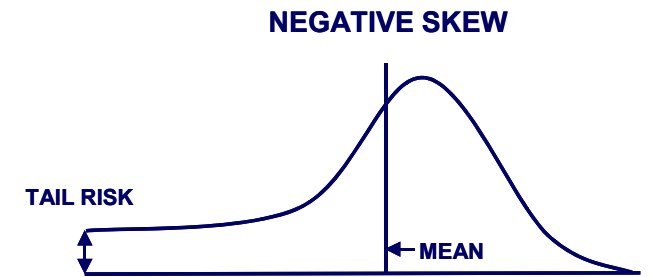
Figure 9: Normal Distribution



Source: UBS Alternative Investments

Hedge fund strategies, however exhibit, skewed returns. Skewness is a measure of the shape of a distribution. It indicates the degree of asymmetry in a distribution (a range of returns). Skewed distributions have more values to one side of the peak or most likely value — one tail is longer than the other. A skewness of 0 indicates a symmetric distribution, while a negative skewness means the distribution is skewed to the left. Positive skewness indicates a skew to the right. A normal distribution has a skewness equal to 0. A negative skew as seen in Figure 10 indicates that the mean of the distribution is to the left of (less than) the median of the distribution.

Figure 10: Negative Skewness in Returns



Source: UBS Alternative Investments

This means that there are more frequent large return observations to the left of the distribution (negative returns) and there are more small and mid-range positive return observations to the right of the distribution. In other words, large negative outlying returns occur more frequently than large positive outlying returns, indicating a bias to the downside. This is an undesirable property.

Strategies that have historically exhibited negative skew indicate that there is a higher probability of a significant loss taking place. This is especially true for the convertible arbitrage, risk arbitrage, and distressed securities indices.

A positive skew indicates the reverse of a negative skew. It indicates that the mean of the distribution is to the right of the median and that there are more frequent large positive returns than there are large negative returns. A positive skew demonstrates a bias to the upside, which is a good thing. Hedge fund strategies that are generally positively skewed include long/short equity and global macro.

Kurtosis

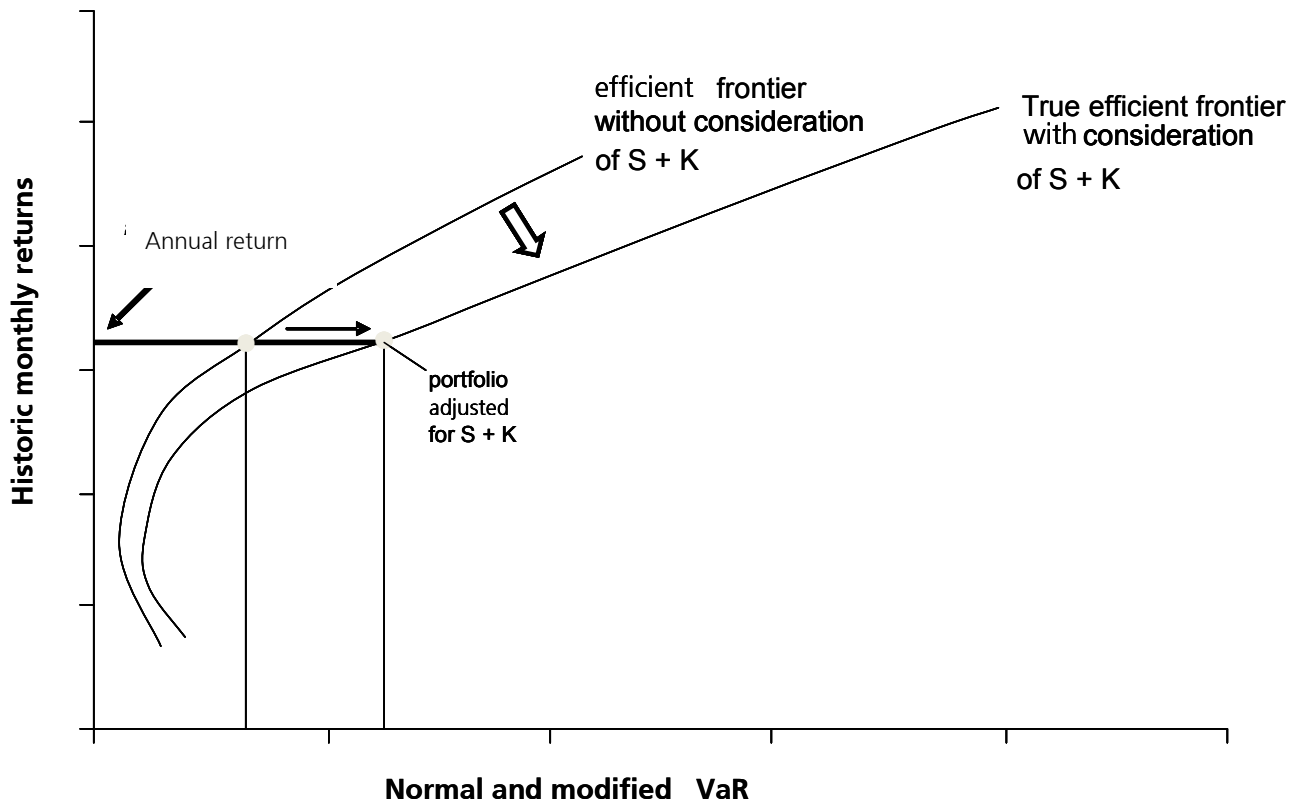
Kurtosis is measured relative to a normal, bell-shaped distribution. A positive value for kurtosis indicates a fatter distribution with greater dispersion around the mean with "fatter" than normal tails. It implies a higher probability of extreme outcomes (or large surprises) than would be expected for a normal distribution, regardless of the direction of such

deviations. Conversely, a negative value indicates a more compact distribution of returns values with "thinner" than normal tails.

When an asset exhibits non-zero skewness and kurtosis, not taking account of this will lead to an incomplete assessment of risk. To illustrate this we extend mean variance analysis,³ replacing variance by a broader risk concept such as VaR (Value at risk).⁴ If as in figure 11 we plot an efficient frontier in Mean – VaR space, ignoring skewness and kurtosis, this will lead to underestimating true risk. The points on the efficient frontier without skewness and kurtosis have a higher expected return at each level of risk (VaR) as compared to the points on the True efficient frontier with skewness and kurtosis.

Figure 11: The Effects of Skewness and Kurtosis Shift the Estimated Efficient Frontier to the Bottom-Left

Skewness (S) and Kurtosis (K)



Source: UBS Alternative Investments, stylized illustration

Conclusion

Acknowledging the special distributional properties of hedge fund returns is essential to investing in the asset class. In particular, hedge fund returns are non-normally distributed and exhibit negative skewness and positive excess kurtosis. Some strategies such as credit and distressed securities have the highest degree of non normality.

For instance, credit risk distributions are generally exposed to significant downside risk. This risk is embodied in the form of credit events such as downgrades, defaults, and bankruptcies - the return distribution for high-yield debt is distinctly non-normal and has a negative skew value. This indicates that the distribution of returns associated with credit-risky high yield debt assets have larger negative returns than they do large positive returns; there is a bias to the downside. In addition, they have a positive value of kurtosis. This indicates that credit risk assets are exposed to large negative outlier events.

Hedge funds' non-normal return distributions have implications for performance measurement. Together, a negative skew value and a large kurtosis value indicate significant, albeit rare, downside risk. The Sharpe Ratio,² a very standard performance measurement for traditional assets, is unsuitable for hedge fund performance evaluation since it only looks at the mean and standard deviation. The Sharpe Ratio will systematically overstate true hedge fund performance relative to that of the standard market indices. Neglecting hedge funds', skewness and kurtosis properties, and using the Sharpe Ratio alone will, in many cases, overstate true risk adjusted performance.

End Notes

¹ Hedge funds use many public and private available sources of market information, including but not limited to: major news sources, screen-based news and trading systems, trade publications, Wall Street research, information from lawyers, bankers, accountants and other professionals, and information from the fund manager's proprietary network of relationships.

² The Sharpe Ratio is the average return, less the risk-free return, divided by the standard deviation of return. The ratio measures the relationship of reward to risk in an investment strategy. When returns are normally distributed as in a bell curve (traditional) the higher the ratio the safer the strategy.

³ Mean variance analysis is a tool of portfolio selection that constructs a portfolio of securities by focusing on the resulting mean expected return and the expected variance of the portfolio. Portfolios are represented in a mean-variance plane. The efficient frontier line represents the set of portfolios with the highest expected return for each given risk level (or lowest risk for each given return level). Those portfolios are called "efficient" portfolios.

⁴ VaR (Value at Risk) is a probabilistic technique for estimating the "maximum" loss that might arise on a portfolio of risk positions given historical volatilities of underlying rates and prices and their correlations. "Maximum" in this context is never the worst possible loss but only the worst loss within a given level of confidence, often a 99% worst case.

Appendix

The use of indexes is for illustrative purposes only. Some indexes are unmanaged, are not available for direct investment and are not subject to management fees and other fees and expenses. Information about the index is derived from sources that we believe to be reliable, but we have not independently verified them and we do not warrant as to its accuracy or completeness.

Fund Weighted Composite A global, equal-weighted index of over 2,000 single-manager funds that report to HFR Database. Constituent funds report monthly net of all fees performance in US Dollar and have a minimum of \$50 million under management or a 12-month track record of active performance. The Index does not include Funds of Hedge Funds.

Fund of Fund Composite Invests with multiple managers through funds or managed accounts. The strategy designs a diversified portfolio of managers with the objective of significantly lowering the risk (volatility) of investing with an individual manager. The Fund of Funds manager has discretion in choosing which strategies to invest in for the portfolio. A manager may allocate funds to numerous managers within a single strategy, or with numerous managers in multiple strategies. The minimum investment in a Fund of Funds may be lower than an investment in an individual hedge fund or managed account. The investor has the advantage of diversification among managers and styles with significantly less capital than investing with separate managers.

Equity Hedge Maintains positions both long and short in primarily equity and equity derivative securities. A wide variety of investment processes can be employed to arrive at an investment decision, including both quantitative and fundamental techniques; strategies can be broadly diversified or narrowly focused on specific sectors and can range broadly in terms of levels of net exposure, leverage employed, holding period, concentrations of market capitalizations and valuation ranges of typical portfolios. Typically maintain at least 50% exposure to, and may in some cases be entirely invested in, equities, both long and short.

EH: Energy/Basic Materials Designed to identify opportunities in securities in specific niche areas of the market in which the Manager maintains a level of expertise which exceeds that of a market generalist in identify companies engaged in the production and procurement of inputs to industrial processes, and implicitly sensitive to the direction of price trends as determined by shifts in supply and demand factors, and implicitly sensitive to the direction of broader economic trends. Typically maintains a primary focus in this area or expect to maintain in excess of 50% of portfolio exposure to these sectors over a various market cycles.

EH: Equity Market Neutral Employs sophisticated quantitative techniques of analyzing price data to ascertain information about future price movement and relationships between securities, select securities for purchase and sale. These can include both Factor-based and Statistical Arbitrage/Trading strategies. Factor-based investment strategies include strategies in which the investment thesis is predicated on the systematic analysis of common relationships between securities. In many but not all cases, portfolios are constructed to be neutral to one or multiple variables, such as broader equity markets in dollar or beta terms, and leverage is frequently employed to enhance the return profile of the positions identified. Statistical Arbitrage/Trading strategies consist of strategies in which the investment thesis is predicated on exploiting pricing anomalies which may occur as a function of expected mean reversion inherent in security prices; high frequency techniques may be employed and trading strategies may also be employed on the basis on technical analysis or opportunistically to exploit new information the investment manager believes has not been fully, completely or accurately discounted into current security prices. Typically maintains characteristic net equity market exposure no greater than 10% long or short.

EH: Quantitative Directional Employs sophisticated quantitative analysis of price, other technical and fundamental data to ascertain relationships among securities and to select securities for purchase and sale. These can include both Factor-based and Statistical Arbitrage/Trading strategies. Factor-based investment strategies include strategies in which the investment thesis is predicated on the systematic analysis of common relationships between securities. Statistical Arbitrage/Trading strategies consist of strategies in which the investment thesis is predicated on exploiting pricing anomalies which may occur as a function of expected mean reversion inherent in security prices; high frequency techniques may be employed and trading strategies may also be employed on the basis on technical analysis or opportunistically to exploit new information the investment manager believes has not been fully, completely or accurately discounted into current security prices. Typically maintains varying levels of net long or short equity market exposure over various market cycles.

EH: Short Bias Employs analytical techniques in which the investment thesis is predicated on assessment of the valuation characteristics on the underlying companies with the goal of identifying overvalued companies. Short Biased strategies may vary the investment level or the level of short exposure over market cycles, but the primary distinguishing characteristic is that the manager maintains consistent short exposure and expects to outperform traditional equity managers in declining equity markets. Investment theses may be fundamental or technical in nature and manager has a particular focus, above that of a market generalist, on identification of overvalued companies and would expect to maintain a net short equity position over various market cycles.

EH: Technology/Healthcare Designed to identify opportunities in securities in specific niche areas of the market in which the

Manager maintain a level of expertise which exceeds that of a market generalist in identifying opportunities in companies engaged in all development, production and application of technology, biotechnology and as related to production of pharmaceuticals and healthcare industry. Though some diversity exists as an across sub-strategy, strategies implicitly exhibit some characteristic sensitivity to broader growth trends, or in the case of the latter, developments specific to the healthcare industry. Typically maintains a primary focus in this area or expects to maintain in excess of 50% of portfolio exposure to these sectors over a various market cycles.

Event-Driven Maintains positions in companies currently or prospectively involved in corporate transactions of a wide variety including but not limited to mergers, restructurings, financial distress, tender offers, shareholder buybacks, debt exchanges, security issuance or other capital structure adjustments. Security types can range from most senior in the capital structure to most junior or subordinated, and frequently involve additional derivative securities. Includes a combination of sensitivities to equity markets, credit markets and idiosyncratic, company specific developments. Investment theses are typically predicated on fundamental characteristics (as opposed to quantitative), with the realization of the thesis predicated on a specific development exogenous to the existing capital structure.

ED: Distressed Focused on corporate fixed income instruments, primarily on corporate credit instruments of companies trading at significant discounts to their value at issuance or obliged (par value) at maturity as a result of either formal bankruptcy proceeding or financial market perception of near term proceedings. Managers are typically actively involved with the management of these companies, frequently involved on creditors' committees in negotiating the exchange of securities for alternative obligations, either swaps of debt, equity or hybrid securities. Employ fundamental credit processes focused on valuation and asset coverage of securities of distressed firms; in most cases portfolio exposures are concentrated in instruments which are publicly traded, in some cases actively and in others under reduced liquidity but in general for which a reasonable public market exists. In contrast to Special Situations, Distressed Strategies employ primarily debt (greater than 60%) but also may maintain related equity exposure.

ED: Merger Arbitrage Primarily focuses on opportunities in equity and equity related instruments of companies which are currently engaged in a corporate transaction. Merger Arbitrage involves primarily announced transactions, typically with limited or no exposure to situations which pre-, post-date or situations in which no formal announcement is expected to occur. Opportunities are frequently presented in cross border, collared and international transactions which incorporate multiple geographic regulatory institutions, with typically involve minimal exposure to corporate credits. Typically has over 75% of positions in announced transactions over a given market cycle.

ED: Private Issue/ Regulation D Employs an investment process primarily focused on opportunities in equity and equity related instruments of companies which are primarily private and illiquid in nature. These most frequently involve realizing an investment premium for holding private obligations or securities for which a reasonably liquid market does not readily exist until such time as a catalyst such as new security issuance or emergence from bankruptcy proceedings occurs. Employs fundamental valuation processes focused on asset coverage of securities of issuer firms, and would expect over a given market cycle to maintain greater than 50% of the portfolio in private securities, including Reg D or PIPE transactions.

Macro Trades a broad range of strategies in which the investment process is predicated on movements in underlying economic variables and the impact these have on equity, fixed income, hard currency and commodity markets. Employs a variety of techniques, both discretionary and systematic analysis, combinations of top down and bottom up theses, quantitative and fundamental approaches and long and short term holding periods. Although some strategies employ RV techniques, Macro strategies are distinct from RV strategies in that the primary investment thesis is predicated on predicted or future movements in the underlying instruments, rather than realization of a valuation discrepancy between securities. In a similar way, while both Macro and equity hedge managers may hold equity securities, the overriding investment thesis is predicated on the impact movements in underlying macroeconomic variables may have on security prices, as opposes to EH, in which the fundamental characteristics on the company are the most significant and integral to investment thesis.

Macro Systematic Diversified Has investment processes typically as function of mathematical, algorithmic and technical models, with little or no influence of individuals over the portfolio positioning. Designed to identify opportunities in markets exhibiting trending or momentum characteristics across individual instruments or asset classes. Typically employs quantitative processes which focus on statistically robust or technical patterns in the return series of the asset, and typically focus on highly liquid instruments and maintain shorter holding periods than either discretionary or mean reverting strategies. Although some strategies seek to employ counter trend models, strategies benefit most from an environment characterized by persistent, discernable trending behavior. Typically expects to have no greater than 35% of portfolio in either dedicated currency or commodity exposures over a given market cycle.

Relative Value Maintains positions in which the investment thesis is predicated on realization of a valuation discrepancy in the relationship between multiple securities. Employs a variety of fundamental and quantitative techniques to establish investment theses, and security types range broadly across equity, fixed income, derivative or other security types. Fixed income strategies are typically quantitatively driven to measure the existing relationship between instruments and, in some cases, identify attractive positions in which the risk adjusted spread between these instruments represents an attractive opportunity for the investment

manager. RV position may be involved in corporate transactions also, but as opposed to ED exposures, the investment thesis is predicated on realization of a pricing discrepancy between related securities, as opposed to the outcome of the corporate transaction.

RV: Fixed Income-Asset Backed Includes strategies in which the investment thesis is predicated on realization of a spread between related instruments in which one or multiple components of the spread is a fixed income instrument backed physical collateral or other financial obligations (loans, mortgages, credit cards) other than those of a specific corporation. Designed to isolate attractive opportunities between a variety of fixed income instruments specifically securitized by collateral commitments which frequently include loans, pools and portfolios of loans, receivables, real estate, mortgage, machinery or other tangible financial commitments. Investment thesis may be predicated on an attractive spread given the nature and quality of the collateral, the liquidity characteristics of the underlying instruments and on issuance and trends in collateralized fixed income instruments, broadly speaking. In many cases, investment managers hedge, limit or offset interest rate exposure in the interest of isolating the risk of the position to strictly the yield disparity of the instrument relative to the lower risk instruments.

RV: Fixed Income-Convertible Arbitrage Includes strategies in which the investment thesis is predicated on realization of a spread between related instruments in which one or multiple components of the spread is a convertible fixed income instrument. Designed to isolate attractive opportunities between the price of a convertible security and the price of a non-convertible security, typically of the same issuer. Maintains characteristic sensitivities to credit quality the issuer, implied and realized volatility of the underlying instruments, levels of interest rates and the valuation of the issuer's equity, among other more general market and idiosyncratic sensitivities.

RV: Fixed Income-Corporate Includes strategies in which the investment thesis is predicated on realization of a spread between related instruments in which one or multiple components of the spread is a corporate fixed income instrument. Designed to isolate attractive opportunities between a variety of fixed income instruments, typically realizing an attractive spread between multiple corporate bonds or between a corporate and risk free government bond. Typically involves more general market hedges which may vary in the degree to which they limit fixed income market exposure. This differs from Event Driven: Credit Arbitrage, which typically involves arbitrage positions with little or no net credit market exposure, but are predicated on specific, anticipated idiosyncratic developments.

RV: Multi-Strategy Employs an investment thesis is predicated on realization of a spread between related yield instruments in which one or multiple components of the spread contains a fixed income, derivative, equity, real estate, MLP or combination of these or other instruments. Strategies are typically quantitatively driven to measure the existing relationship between instruments and, in some cases, identify attractive positions in which the risk adjusted spread between these instruments represents an attractive opportunity for the investment manager. In many cases these strategies may exist as distinct strategies across which a vehicle which allocates directly, or may exist as related strategies over which a single individual or decision making process manages. Not intended to provide broadest-based mass market investors appeal, but are most frequently distinguished from other arbitrage strategies in that they expect to maintain >30% of portfolio exposure in 2 or more strategies meaningfully distinct from each other that are expected to respond to diverse market influences.

RV: Yield Alternatives Employs an investment thesis which is predicated on realization of a valuation differential between related instruments in which one or multiple components of the spread contains exposure to Energy Infrastructure most typically achieved through investment in Master Limited Partnerships, Utilities or Power Generation. Strategies are typically fundamentally driven to measure the existing relationship between instruments and identify positions in which the risk adjusted spread between these instruments represents an attractive opportunity for the investment manager. In contrast to Equity Hedge strategies, the investment thesis is predicated on the yield differential realized from the securities as opposed to directional price appreciation of the underlying securities, and strategies typically contain greater than 50% of portfolio exposure to Energy Infrastructure positions.

Emerging Markets (Total) Funds invest, primarily long, in securities of companies or the sovereign debt of developing or 'emerging' countries. Regions include Africa, Asia ex-Japan, Latin America, the Middle East and Russia/Eastern Europe. Funds will shift their weightings among these regions according to market conditions and manager perspectives.

Emerging Markets: Asia ex-Japan Funds focus greater than 50% of their investments in the Asia ex-Japan region, which includes China, Korea, Australia, India, Hong Kong and Singapore.

Emerging Markets: Global Funds will shift their weightings among a variety of emerging markets regions according to market conditions and manager perspectives.

Emerging Markets: Latin America Funds focus greater than 50% of their investments in the Latin American region, which includes Mexico, Central and South America, as well as the nations of the Caribbean.

Emerging Markets: Russia Funds focus greater than 50% of their investments in the Russian/Eastern European region, including Turkey.

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Standard & Poor's 500 Index A commonly recognized, market capitalization weighted index of 500 widely held equity securities, designed to measure broad U.S. equity performance. Covers 500 industrial, utility, transportation and financial companies of the U.S. markets (mostly NYSE issues). Individuals cannot invest directly in any index.

Barclays Capital Aggregate Bond Index Composed of all bonds from the Barclays Government/Corporate Bond Index, Mortgage-Backed Securities Index and the Asset-Backed Securities Index. Total return comprises price appreciation/depreciation and income as a percentage of the original investment. Indexes are rebalanced monthly by market capitalization. Individuals cannot invest directly in any index.

London Interbank Offered Rate (LIBOR) Total return on cash assuming that funds are investment at the 1-month London Interbank offer rate.

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