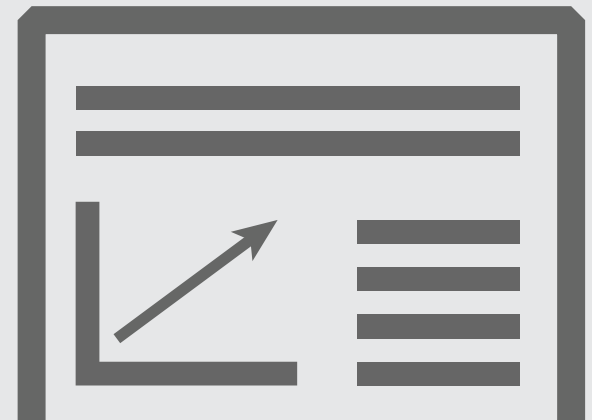


Industry Report

Hedge Fund Exposure & Tail Risk

Data Through October 2016

Release Date: January 4, 2017



Summary

This report analyzes an asset-weighted portfolio of the 30 largest reporting hedge funds to determine what market exposures, risk factors, and performance expectations this institutional portfolio would create for an investor. Understanding the current market exposures, risk factors, and performance expectations of these funds, especially if a crisis were to occur during the following month, offers a way to gauge the positioning of the broader hedge fund industry.

The same analysis is produced for portfolios constructed of the 10 largest macro, long short equity, and fixed income/credit hedge funds.

Highlights

- In the event of another Brexit-like event – in which the GBP depreciated 11.3% versus the USD from Thursday, June 23rd to Monday, June 27th – all four portfolios appear well insulated.
- Exposure positioning for the 30 largest hedge fund portfolio is likely to act as a hedge against a steepening yield curve and rising inflation following US Presidential election results.
- Large macro funds' aggregate, asset-weighted positioning favors European equities, (in general) rising inflation in the US, and a depreciating EUR versus USD

Introduction

The 30 largest reporting hedge funds represent 15.45% of our estimated total industry assets at the end of Q3 2016. Understanding the current market exposures, risk factors, and performance expectations of these funds, especially if a crisis were to occur, offers a way to gauge the positioning of the broader hedge fund industry.

We utilize eVestment’s [RiskPlus](#) product (developed in partnership with BISAM) which incorporates returns-based analysis and a fat-tailed methodology, to create a forward-looking, asset-weighted, pro forma portfolio of these 30 hedge funds. To put it simply, if an institutional investor were to purchase a basket of the largest hedge funds, the output of this analysis would quantify their market exposures and risks.

The 30 hedge funds in our analysis reported \$467.49 billion in assets under management (AUM) at the end of Q3 2016; individual fund AUM ranged from \$6.56 billion to \$66.00 billion; average fund AUM was \$15.58 billion and the median \$9.90 billion.

This report examines the 30-fund asset-weighted portfolio’s market exposures, anticipated volatility from these exposures, expected risk and return characteristics, and performance expectations if historical crises were to reoccur, along with outlooks during customized market panic settings.

We also perform the analysis on three portfolios comprised of the 10 largest reporting hedge funds within their respective strategy segments:

- *Top 10 Macro*
\$187.69 billion combined AUM
- *Top 10 Long Short Equity (LSEQ)*
\$80.79 billion combined AUM
- *Top 10 Fixed Income/Credit (FIC)*
\$51.39 billion combined AUM

Several multivariate factor models, constructed specifically for each group, were used in the analysis. Itemized descriptions of these factors are found at the end of the report.

Top-Level Portfolio Risk and Return Characteristics

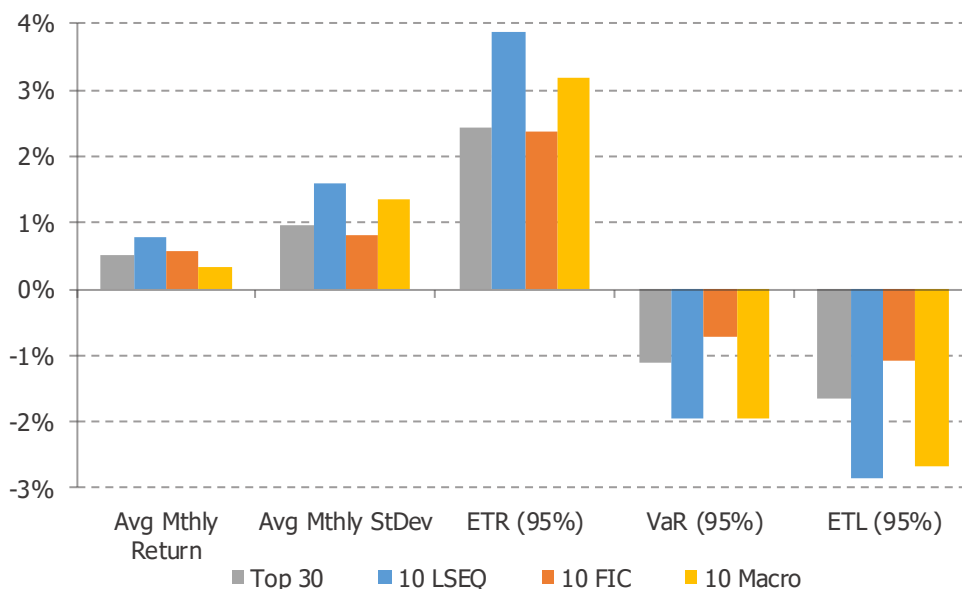
We begin with broad overviews of expected portfolio characteristics for the following month, noting that each asset-weighted portfolios’ results are shaped by custom factor models. Itemized descriptions of the factors are found at the end of the report.

- Expected volatilities for the current portfolios are lower relative to the portfolios in our prior report.
- Based on VaR and ETL statistics, the current portfolios show less risk of extreme losses versus our prior portfolios.
- Correlation to markets was generally higher with our new portfolios. The long short equity segment’s factor model beta declined however; since our prior report, two of the ten funds in the LSEQ portfolio have been replaced, due to either AUM changes or lack of performance reporting.

Figures 1-2: Average Expected Portfolio Risk and Return Statistics for Next Month; confidence levels in parenthesis; factor model beta’s are indicative of the level of market attributable risk within portfolios as defined by the model

| Hedge Fund Group | Avg Mthly Return | Avg Mthly StDev | ETR* (95%) | VaR* (95%) | ETL* (95%) | Factor Model Beta |
|----------------------------|------------------|-----------------|------------|------------|------------|-------------------|
| Top 30 Largest | 0.51% | 0.95% | 2.42% | -1.11% | -1.65% | 81.28% |
| Top 10 Long Short Equity | 0.77% | 1.58% | 3.88% | -1.96% | -2.85% | 73.18% |
| Top 10 Fixed Income/Credit | 0.56% | 0.80% | 2.38% | -0.71% | -1.07% | 67.82% |
| Top 10 Macro | 0.33% | 1.36% | 3.20% | -1.94% | -2.66% | 77.02% |

*Expected Tail Return; Value at Risk; Expected Tail Loss



Historical Stress Tests

The four hedge fund portfolios, each using different factor models, are put under historical stress test scenarios. Expectations of portfolio gains/losses are determined by weighted betas – the funds’ relationships to market factors (beta) and our chosen fund allocations (weights based on AUM).

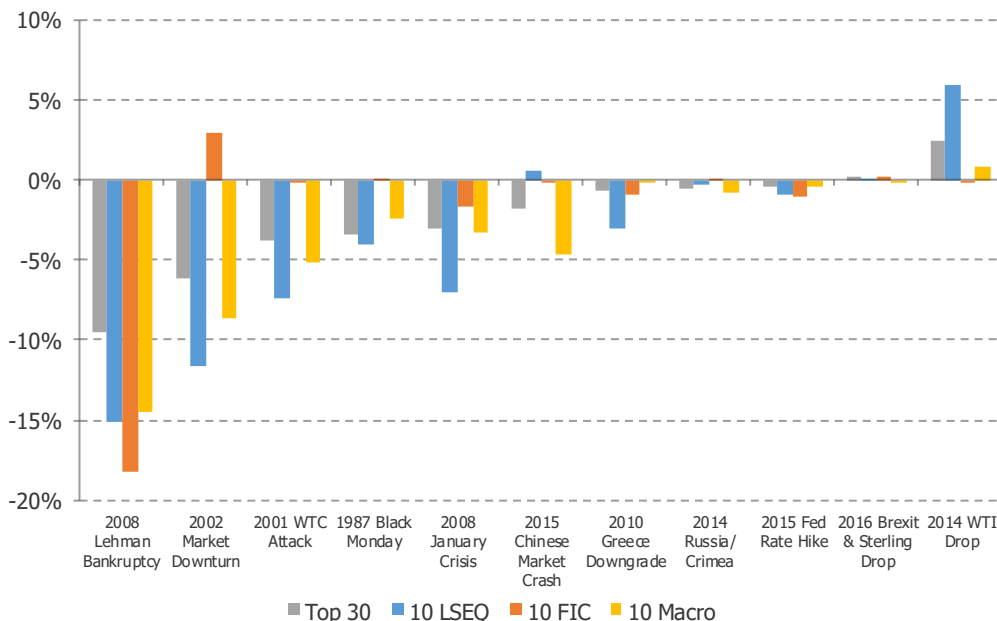
A repeat of market shocks similar to those during the *2008 Lehman Bankruptcy* period is forecast to have the largest negative impact across all four portfolios. The *Top 10 FIC* portfolio is susceptible to the largest portfolio decline, with an expected loss of -18.30% that hints at large credit funds’ exposure to instruments with similar characteristics to those hard hit during the crisis (further explored on page 7).

Of the 10 funds in the *Top 10 FIC* portfolio, the stress test results show only one fund expecting to fare well during a repeat of Q4 2008 market conditions. This sole fund is also slated to do well under the four scenarios in *figure 4* in which the overall FIC portfolio is forecast to produce positive results. Nevertheless, the FIC portfolio is the most robust to financial shocks, ex-Lehman Bankruptcy, showing only one other crisis period in which it is slated to post losses below -1.67%.

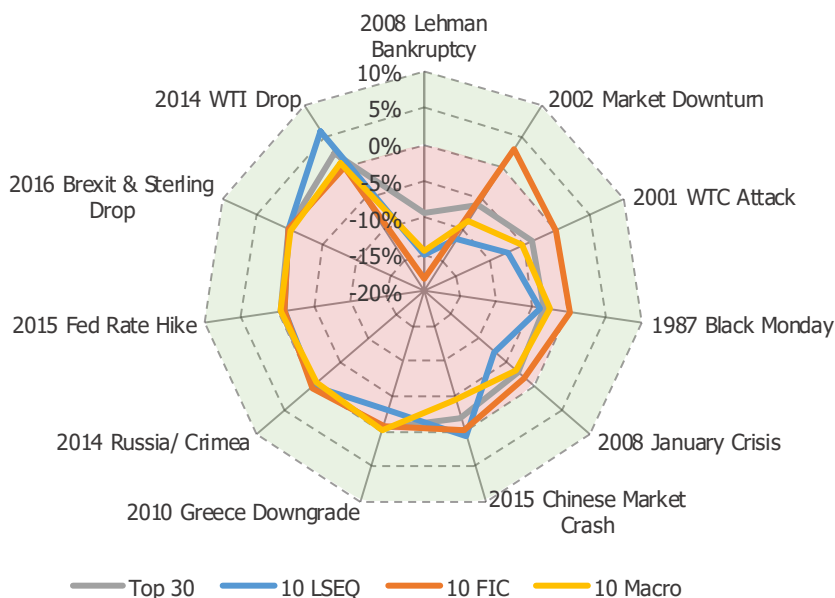
Large declines in oil prices should be of little concern to all four portfolios, and quite constructive for the *Top 10 LSEQ* portfolio. A repeat of the market conditions in 4Q14, in which the price of WTI dropped 44% in roughly 3 months, is projected to give this LSEQ portfolio a 5.95% boost.

In the event of another Brexit-like event – in which the GBP depreciated 11.3% versus the USD from Thursday, June 23rd to Monday, June 27th – all four portfolios also appear well insulated. A repeat of similar market conditions which occurred during the 2015 Chinese market crash and subsequent CNY devaluation bodes most poorly for the *Top 10 Macro* portfolio. An expected loss of -4.59% is heavily influenced by the asset-weighted setup of our analysis (i.e. the two largest funds are projecting 2 of the 3 lowest return expectations in the scenario).

Figures 3 – 5: Stress test results



| Historical Scenario | Drawdown Period | Top 30 | 10 LSEQ | 10 FIC | 10 Macro |
|-----------------------------|--------------------|--------|---------|---------|----------|
| 2008 Lehman Bankruptcy | 9/2/08 - 11/20/08 | -9.46% | -15.12% | -18.30% | -14.51% |
| 2002 Market Downturn | 5/17/02 - 10/9/02 | -6.18% | -11.65% | 2.90% | -8.67% |
| 2001 WTC Attack | 8/2/01 - 9/21/01 | -3.75% | -7.40% | -0.09% | -5.13% |
| 1987 Black Monday | 10/1/87 - 10/26/87 | -3.39% | -3.97% | 0.11% | -2.43% |
| 2008 January Crisis | 12/11/07 - 1/22/08 | -3.05% | -7.05% | -1.67% | -3.30% |
| 2015 Chinese Market Crash | 6/12/15 - 9/4/15 | -1.83% | 0.65% | -0.08% | -4.59% |
| 2010 Greece Downgrade | 4/27/10 - 6/14/10 | -0.60% | -3.01% | -0.87% | -0.08% |
| 2014 Russia/ Crimea | 2/21/14 - 3/18/14 | -0.51% | -0.33% | 0.07% | -0.78% |
| 2015 Fed Rate Hike | 12/16/15 - 1/22/16 | -0.40% | -0.90% | -1.04% | -0.46% |
| 2016 Brexit & Sterling Drop | 6/23/16 - 6/27/16 | 0.15% | 0.11% | 0.24% | -0.08% |
| 2014 WTI Drop | 9/26/14 - 12/29/14 | 2.42% | 5.95% | -0.06% | 0.90% |



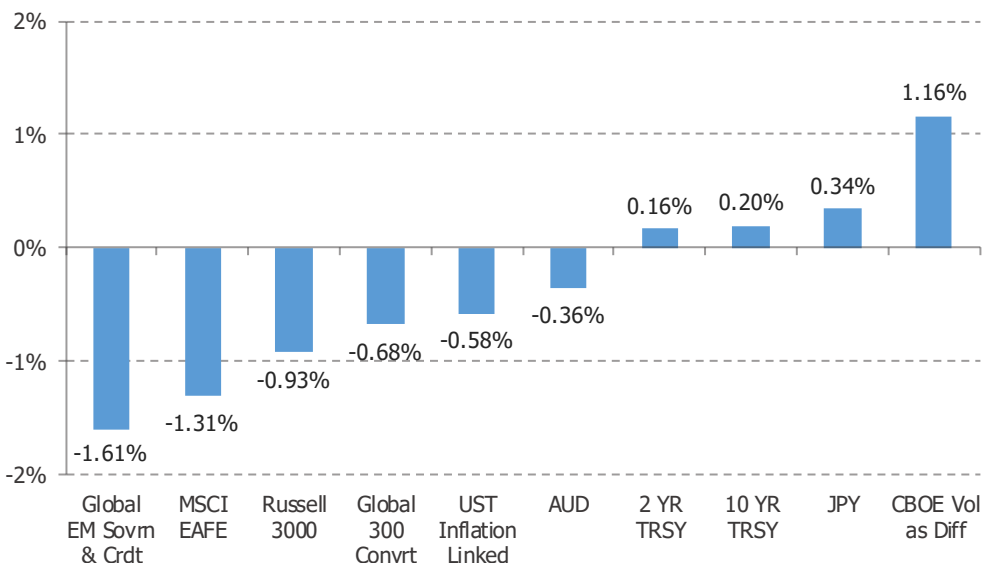
Top 30 Largest - Factor Exposures and Risks

- Equity exposure for the 30 largest hedge funds shows a clear preference for developed market securities. This exposure however, also acts as the leading driver of systematic risk (market beta) within the portfolio.
- Since our last report, exposure to developed market equities has flipped from more US-heavy to greater emphasis on EAFE.
- In the context of the overall factor model, the portfolio is positioned to benefit from depreciations of AUD, GBP, EUR, and JPY currencies relative to USD. However, under stress test scenarios significant AUD depreciation (two standard deviations below L10Y mean) is undesirable (*see figure 7*). Calculated stress tests results for each individual fund vary based upon the scenario, and the impact of such a large AUD depreciation on the two largest funds in our asset-weighted portfolio is notably more harmful for this factor.
- The portfolio's two largest volatility contributing fixed income factors—corporate convertibles and inflation-linked US debt—were also its main areas of exposure within this asset class. This positioning will likely act as a hedge against a steepening yield curve and rising inflation following US Presidential election results. Since 31-Oct-2016 through 15-Dec-2016, yields have risen across all UST maturities (between 15 bps and 72 bps, inclusive) and in Nov-2016 the all-items CPI index increased 1.7% YoY, the largest rise since Sept-2014. The hybrid feature of convertible securities – option of exchanging into equity, which tends to rise with rising rates – paired with inflation-protected US debt, should be advantageous for the portfolio going forward.
- Positive exposure to the *CBOE Volatility Index as Difference* factor is currently the most volatility diversifying element within the context of this factor model. If the factor were to decline by two standard deviations from its L10Y monthly mean over the course of the following month, the portfolio is set to reap 1.16% in gains. Conversely, if volatility were to increase to the same degree the portfolio is expected to lose -0.70%.

Figure 6: Portfolio Exposures and Factor Percentage Contribution to Risk (PCTR) for Top 30 Largest portfolio

| Custom Factor Model for Top 30 Largest Hedge Funds | Portfolio Exposure | Factor PCTR (St.Dev) |
|--|--------------------|----------------------|
| Specific Risk | | 18.72% |
| Total Systematic Risk | | 81.28% |
| Commodity Risk | | -0.08% |
| S&P GSCI Index | -0.59% | -0.08% |
| Equity Risk | | 50.15% |
| MSCI EAFE USD | 14.19% | 34.83% |
| MSCI EM USD | -0.73% | -1.63% |
| Russell 3000 | 9.01% | 16.95% |
| FX Risk | | 5.63% |
| Australian Dollar | 3.70% | -2.83% |
| British Pound Sterling | 3.23% | -1.01% |
| Euro | 13.16% | 0.91% |
| Japanese Yen | 10.43% | 8.56% |
| Fixed Income Risk | | 16.51% |
| CMBS Fixed Rate USD | -2.23% | -0.72% |
| Global 300 Convertible Index | 6.44% | 8.18% |
| Global EM Sovereign & Credit USD | 3.01% | 2.55% |
| Global High Yield USD | 2.44% | 2.34% |
| Mortgage Master USD | 2.11% | 0.41% |
| U.S. Corp Master USD | 0.19% | 0.12% |
| U.S. Treasuries Inflation-Linked USD | 6.47% | 3.63% |
| Interest Rate Risk | | 12.08% |
| 10-Year Treasury Constant Maturity Rate | -2.77% | 5.95% |
| 2-Year Treasury Constant Maturity Rate | -1.08% | 6.13% |
| Size Risk | | -0.03% |
| MSCI Small Minus Large World USD | 0.90% | -0.03% |
| Style Risk | | 0.30% |
| MSCI Value Minus Growth World USD | -1.05% | 0.30% |
| Volatility Risk | | -3.27% |
| CBOE Volatility Index as Difference USD | -2.19% | -3.27% |

Figure 7: Expected portfolio returns after shocking down the top 10 volatility contributing and diversifying factors by two deviations from their L10Y monthly means



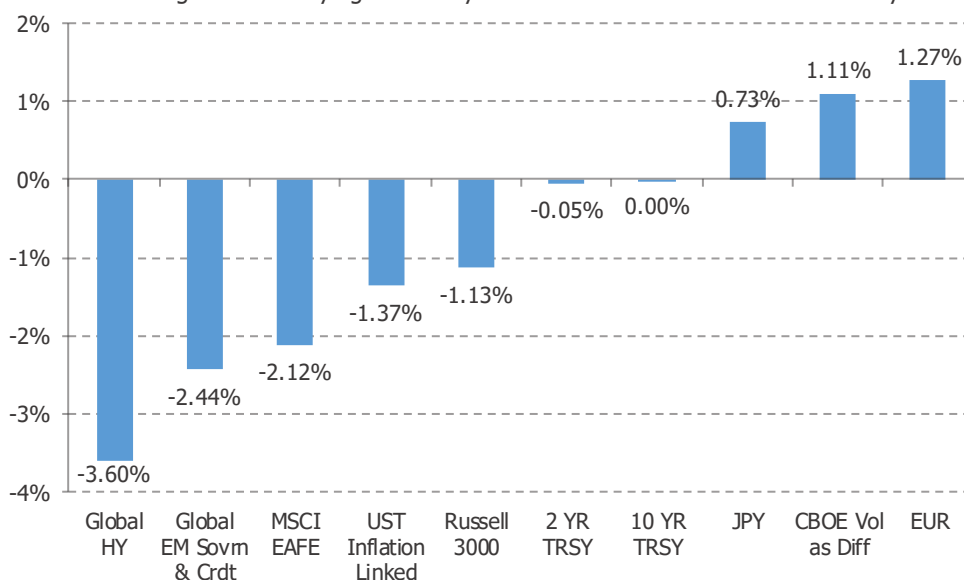
Top 10 Macro - Factor Exposures and Risks

- Large macro funds' aggregate, asset-weighted positioning favors European equities, (in general) rising inflation in the US, and a depreciating EUR versus USD.
- Simulating a two-standard deviation depreciation of the EUR/USD relationship results in meaningful portfolio gains of 1.27% during the following month. Positive exposure to FX factors indicates that the portfolio is positioned to reap benefits when a currency depreciates relative to the USD in the context of the overall model. In Nov-2016 the EUR depreciated ~3.60%, or roughly half of its two-standard deviation figure over L10Y.
- In a complete break from our prior analysis, this portfolio's overall position in below investment grade global corporate debt reversed, swinging from bearish to bullish (-16.28% to 13.95%); our second largest-weighted macro fund was the primary driver of this shift. While exposure to global high yield corporates may offer benefits in a rising rate environment, any significant declines in the value of these instruments would not bode well for the portfolio based on stress test results, which shock the *Global High Yield* factor separately and then calculate the values of the remaining factors conditionally on this individual factor.
- At the end of Oct-2016 the macro portfolio was positioned to benefit from falling 2-year and 10-year US interest rates. YTD through this period, there were four month-over-month declines by each maturity, but at the end of Nov-2016 both rates increased substantially: 2-year from 0.86% to 1.11% and 10-year from 1.84% to 2.37%.
- The lack of commodity market risk is notable and suggests the portfolio may have been insulated from commodities' volatility in the wake of the US Presidential election, which included heavy fiscal stimulus rhetoric. The portfolio's relatively large bullish posturing towards industrial metals was likely beneficial, as agriculture and precious metals declined, while energy and especially industrial metals rose.

Figure 8: Portfolio Exposures and Factor Percentage Contribution to Risk (PCTR) for *Top 10 Macro* portfolio

| Custom Factor Model for Top 10 Macro | Portfolio Exposure | Factor PCTR (St.Dev) |
|---|--------------------|----------------------|
| Specific Risk | | 22.98% |
| Total Systematic Risk | | 77.02% |
| Commodity Risk | | 1.80% |
| S&P GSCI Agriculture Index | -0.56% | -0.05% |
| S&P GSCI Energy Index | 0.00% | 0.00% |
| S&P GSCI Industrial Metals Index | 2.56% | 1.24% |
| S&P GSCI Precious Metals Index | 0.86% | 0.61% |
| Equity Risk | | 34.83% |
| MSCI EAFE USD | 20.51% | 29.15% |
| MSCI EM USD | 0.25% | 0.40% |
| Russell 3000 | 5.47% | 5.28% |
| FX Risk | | 6.00% |
| Australian Dollar | 1.57% | -1.03% |
| British Pound Sterling | 1.51% | -0.19% |
| Euro | 32.22% | 5.67% |
| Japanese Yen | 9.93% | 1.55% |
| Fixed Income Risk | | 23.25% |
| Global 300 Convertible Index | 0.00% | 0.00% |
| Global EM Sovereign & Credit USD | 5.64% | 3.54% |
| Global High Yield USD | 13.95% | 9.20% |
| U.S. Corp Master USD | -1.13% | -0.57% |
| U.S. Treasuries Inflation-Linked USD | 20.45% | 11.08% |
| Interest Rate Risk | | 13.74% |
| 10-Year Treasury Constant Maturity Rate | -2.33% | 5.32% |
| 2-Year Treasury Constant Maturity Rate | -1.70% | 8.43% |
| Volatility Risk | | -2.59% |
| CBOE Volatility Index as Difference USD | 2.12% | -2.59% |

Figure 9: Expected portfolio returns after shocking down the top 10 volatility contributing and diversifying factors by two deviations from their L10Y monthly means



Top 10 Long Short Equity - Factor Exposures and Risks

Based on the same factor model, but with two different constituents from our last report, the *Top 10 LSEQ* portfolio's direct exposure to US equities via the *Russell 3000* factor has dropped considerably. Indirectly, exposure to the US remains via its link to the developed market MSCI World sectors.

Following the US Presidential election, the equity sectors listed in *figure 10* ended Nov-2016 with their highest performance dispersion since Nov-2014. The difference between the top and bottom sectors' gross returns was 13.93 for the month; the top 3 performers were financials (portfolio positioned long), energy (short), and industrials (long), while the bottom three were utilities (slight long), consumer staples (long), and telecom services (slight short).

In addition to our two deviation stress tests listed in *figure 11*, we also ran portfolio stress tests with similar values of actual MSCI World sector returns for the month of Nov-2016. Results indicate mixed outcomes based on the conditionally calculated stress results, with the portfolio faring best under the rise in industrials in global developed markets:

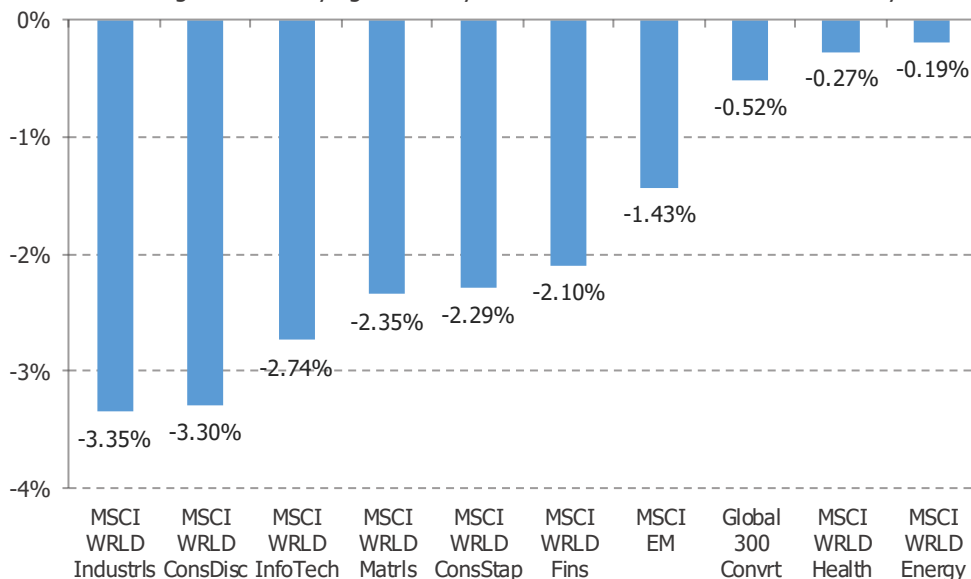
| MSCI World Sectors | Nov-2016 Gross | Stress Test Results |
|--------------------|----------------|---------------------|
| Industrials | 3.72% | 1.44% |
| Financials | 7.82% | 1.35% |
| Cons Discr | 2.07% | 0.78% |
| Materials | 2.04% | 0.43% |
| Energy | 5.73% | 0.25% |
| Healthcare | 0.14% | 0.12% |
| Info Tech | -0.49% | 0.10% |
| Telecom | -2.64% | -0.30% |
| Utilities | -6.10% | -0.88% |
| Cons Stpls | -5.05% | -1.88% |

The portfolio adjusted its preference for size, switching positions to favor smaller caps instead of large in developed global markets; partiality towards growth stocks continued and increased.

Figure 10: Portfolio Exposures and Factor Percentage Contribution to Risk (PCTR) for *Top 10 LSEQ* portfolio

| Custom Factor Model for Top 10 Long Short Equity | Portfolio Exposure | Factor PCTR (St.Dev) |
|--|--------------------|----------------------|
| Specific Risk | | 26.82% |
| Total Systematic Risk | | 73.18% |
| Commodity Risk | | 0.16% |
| S&P GSCI Index | -3.69% | 0.16% |
| Broad Equity Risk | | 1.12% |
| MSCI AC Asia Pacific USD | 2.10% | 2.70% |
| MSCI EM USD | -3.65% | -4.47% |
| Russell 3000 | 2.19% | 2.89% |
| Fixed Income Risk | | 4.70% |
| Global 300 Convertible Index | 9.05% | 7.09% |
| Global Broad Mrkt Corp AAA Rated USD | -1.11% | -0.24% |
| Global High Yield USD | -4.52% | -2.14% |
| Interest Rate Risk | | 0.00% |
| 10-Year Treasury Constant Maturity Rate | 0.01% | 0.00% |
| Equity Sector Risk | | 69.39% |
| MSCI WRLD/Consumer Discr USD | 16.93% | 29.08% |
| MSCI WRLD/Consumer Staples USD | 29.42% | 36.48% |
| MSCI WRLD/Energy USD | -5.26% | -4.18% |
| MSCI WRLD/Financials USD | 7.34% | 12.29% |
| MSCI WRLD/Health Care USD | -11.92% | -14.31% |
| MSCI WRLD/Industrials USD | 8.14% | 11.17% |
| MSCI WRLD/Information Tech USD | 3.32% | 5.34% |
| MSCI WRLD/Materials USD | -5.09% | -6.15% |
| MSCI WRLD/Telecom Svc USD | -0.97% | -0.98% |
| MSCI WRLD/Utilities USD | 0.73% | 0.64% |
| Size Risk | | -0.02% |
| MSCI Small Minus Large World USD | 5.25% | -0.02% |
| Style Risk | | 1.27% |
| MSCI Value Minus Growth World USD | -7.57% | 1.27% |
| Volatility Risk | | -3.45% |
| CBOE Volatility Index as Difference USD | 2.15% | -3.45% |

Figure 11: Expected portfolio returns after shocking down the top 10 volatility contributing and diversifying factors by two deviations from their L10Y monthly means



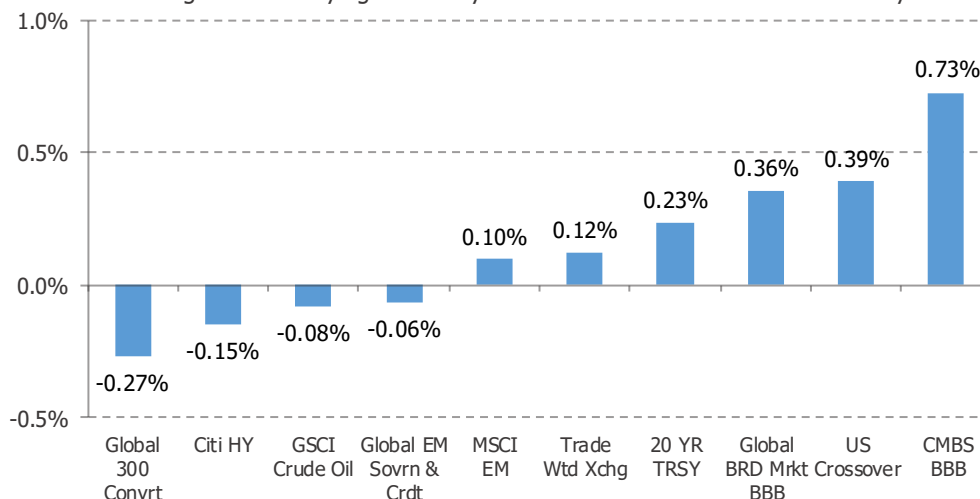
Top 10 Fixed Income/Credit - Factor Exposures and Risks

- A "risk-on" mentality in certain market segments became manifest in the *Top 10 FIC* portfolio. Highly bullish posturing in lower-graded US CMBS was paired with large bearishness in the investment grade segment; a similar scenario played out between the lower and higher-graded global corporate fixed income securities. Positive exposures to these lower-rated products were by far the largest volatility contributing elements within the portfolio.
- Positive exposure towards other factors shows the portfolio may be hedging the risk associated with lower-rated instruments to a certain extent. Exposure to investment-grade ABS and the US Dollar (via *Trade Weighted Exchange Index: Broad*) were the portfolio's third and fourth largest bullish positions. The former stance produced barely any portfolio volatility while the latter led to an -8.91% reduction.
- While the portfolio assumed more volatility from exposure to lower graded global corporates, the negative posturing towards the middle-tiered BBB/BB US corporates lessened volatility by -10.18%.
- If the *CMBS Fixed Rate BBB* or *Global Broad Mrkt Corp BBB* factors were to experience declines of two standard deviations below their L10Y monthly means over the course of the following month, the expectations are for positive gains. When a specific factor is shocked downward, the returns of other factors are calculated conditionally on this factor, given historical correlations. In this case, falling US CMBS and global corporates are correlated with positive returns for interest rates, volatility, and USD factors. The result is that the positive returns of these factors plus our asset-weighted portfolio setup (the two largest funds are slated for positive gains, as are 6 of the 10 under both shock scenarios), work to offset the direct impact of declining returns for these two factors.

Figure 12: Portfolio Exposures and Factor Percentage Contribution to Risk (PCTR) for *Top 10 FIC* portfolio

| Custom Factor Model for Top 10 Fixed Income/Credit | Portfolio Exposure | Factor PCTR (St.Dev) |
|--|--------------------|----------------------|
| Specific Risk | | 32.18% |
| Total Systematic Risk | | 67.82% |
| Commodity Risk | | 3.64% |
| S&P GSCI Crude Oil USD | 0.49% | 1.82% |
| S&P GSCI Index | 0.67% | 1.81% |
| Equity Risk | | -3.08% |
| MSCI EM USD | -1.15% | -3.07% |
| Russell 3000 | 0.00% | 0.00% |
| Russell 3000 Moving Average Strategy USD | 0.54% | -0.01% |
| FX Risk | | -8.91% |
| Trade Weighted Exchange Index: Broad | 12.39% | -8.91% |
| Fixed Income Risk | | 67.94% |
| ABS Master Fixed Rate USD | 21.49% | 0.72% |
| CMBS Fixed Rate AAA Rated USD | -20.21% | -1.67% |
| CMBS Fixed Rate BBB Rated USD | 38.34% | 38.57% |
| Citigroup High-Yield Market Index | 7.29% | 8.09% |
| Citigroup World Government Bond Index | -7.30% | 0.39% |
| Global 300 Convertible Index | 5.76% | 8.54% |
| Global Broad Mrkt Corp AAA Rated USD | -4.21% | -1.17% |
| Global Broad Mrkt Corp BBB Rated USD | 26.18% | 22.54% |
| Global EM Sovereign & Credit USD | 1.42% | 2.05% |
| Mortgage Master USD | -1.12% | 0.05% |
| US Crossover Corp USD | -15.79% | -10.18% |
| Interest Rate Risk | | 7.11% |
| 20-Year Treasury Constant Maturity Rate | 2.19% | 7.26% |
| 3-Month Treasury Constant Maturity Rate | -0.10% | -0.15% |
| 3-Year Treasury Constant Maturity Rate | 0.00% | 0.00% |
| Size Risk | | |
| MSCI Small Minus Large US USD | 0.00% | 0.00% |
| Style Risk | | 1.21% |
| MSCI Value Minus Growth US USD | -4.33% | 1.21% |
| Volatility Risk | | -0.09% |
| CBOE Volatility Index as Difference USD | 0.06% | -0.09% |

Figure 13: Expected portfolio returns after shocking down the top 10 volatility contributing and diversifying factors by two deviations from their L10Y monthly means



Addendum

RiskPlus Setup

RiskPlus incorporates fat-tailed distributions for 50,000 Monte Carlo risk and return simulations. The product uses a skewed Student's t distribution with four properties: location (mean), scale (volatility), parameter describing fatness of tails (kurtosis/degrees of freedom), and asymmetry parameter (skewness). The fat-tailed model is adaptive and does not impose fat tails where they do not exist, but is flexible enough to capture a normal distribution if it happens to be characteristic of a given risk factor. In other words, the model will not overestimate the risk of that factor.

RiskPlus does not rely on standard correlations to account for dependency because of two main drawbacks: degree of correlation is being measured at the center of the distribution not at the tails, and with correlation being a symmetric measure, it is unable to account for correlation increases (decreases) in volatile (calm) markets. Therefore, RiskPlus utilizes a Skewed-t Copula to model this dynamism. The Copula can capture the dependency in the tails and model any relationship asymmetry between funds and their risk factors. Benefits of standard correlation are not lost because the Copula can model correlation in the center of the distribution during normal market conditions.

The Reports

We use custom portfolios with custom factor models, pre-defined historical stress tests, and custom scenario stress tests based on each portfolios' top 10 risk contributing/diversifying factors. We use an exponentially weighted moving average (decay factor set at 0.94) for correlations, which assumes earlier observations to have less impact on covariance than more recent. Our confidence level is set at 95%, the risk-free rate at 1%, and the date range from Nov-2011 to Oct-2016 (5 years).

Interpreting Results

Portfolio exposures to the factors indicate what should generally happen to the underlying performance of the portfolio based on the movement in each factor (e.g. all else held constant, an X% return in the Y factor should yield a Z return in the portfolio. Portfolio exposures are weighted betas determined by a stepwise regression of the hedge funds; therefore, a large exposure to one factor may only be the result of a few funds.

For the majority of factors, a positive exposure value implies a long position from the combined funds and a negative value a short. Exceptions include FX and Fama-French factors (Size & Style). A positive exposure value in FX indicates that the portfolio should reap the benefits when a currency depreciates relative to the USD, while a negative exposure value implies the portfolio should benefit when a currency appreciates relative to the USD; a positive exposure value in Size and/or Style indicates a heavier weighted exposure to the first variable (small caps and/or value stocks) and a negative value a heavier weighted exposure to the second variable (large caps and/or growth stocks).

Portfolio exposure, however, explains sensitivity and not risk. The portfolio's risk, as defined by volatility, can be decomposed by taking each of the individual regressed factors' marginal contributions to risk (Factor MCTR)—which denote by how much volatility is expected to increase or decrease if exposure to a given factor were to rise by 1%—and multiplying these by their respective weights and then dividing by the portfolio's standard deviation (this only applies to the systematic risk components). This outputs each factors' percentage contribution to risk (Factor PCTR) within the context of the overall portfolio.

In addition to pre-defined historical stress tests, we use the portfolio's ten largest risk contributing and/or risk diversifying factors (in absolute terms) and shock each in an effort to assess how the portfolio is expected to perform during crises which would result in returns that are two standard deviations below their L10Y means. We stress one factor at a time, with the returns of the remaining factors calculated conditionally on this value, using an exponentially weighted moving average (EWMA) to smooth the mean and correlation estimates.

Terms and Concepts

Mean Return: the expected portfolio return, on average, over the next month.

Volatility: the monthly portfolio standard deviation expectation over the next month. Volatility is not necessarily a negative trait.

VaR (95%): stands for Value at Risk, it is the threshold of loss over a given horizon. If the portfolio experiences a loss, there is a 95% chance that it will not lose more than this figure during the next month.

ETL (95%): Expected Tail Loss, the average of returns that exceed VaR.

ETR (95%): Expected Tail Return, it uses the same calculation as ETL, but refers to the positive side of the return distribution.

Factor Descriptions on Next Page

Learn More

There are many additional elements in RiskPlus that we do not make use of in this report. We exclude the highly-detailed, fund-level results because we cannot disclose the names nor the unique characteristics of these in our portfolios. RiskPlus users such as allocators however, would be able to see how each individual fund interacts with the factor model to help with risk budgeting. For more information please visit: [eVestment RiskPlus](#)



| Factor Name | Type | Daily Start Date | Monthly Start Date | Description |
|---|---------------|------------------|--------------------|--|
| 10-Year Treasury Constant Maturity Rate | Interest Rate | 1/3/1969 | 1/1/1969 | This index published by the Federal Reserve Board based on the average yield of a range of Treasury securities, all adjusted to the equivalent of a 10-year maturity. |
| 20-Year Treasury Constant Maturity Rate | Interest Rate | 10/5/1993 | 9/30/1993 | This index published by the Federal Reserve Board based on the average yield of a range of Treasury securities, all adjusted to the equivalent of a 20-year maturity. |
| 2-Year Treasury Constant Maturity Rate | Interest Rate | 6/2/1976 | 5/31/1976 | This index published by the Federal Reserve Board based on the average yield of a range of Treasury securities, all adjusted to the equivalent of a 2-year maturity. |
| 3-Month Treasury Constant Maturity Rate | Interest Rate | 1/5/1982 | 1/3/1982 | This index published by the Federal Reserve Board based on the average yield of a range of Treasury securities, all adjusted to the equivalent of a 3-month maturity. |
| 3-Year Treasury Constant Maturity Rate | Interest Rate | 1/3/1969 | 1/1/1969 | This index published by the Federal Reserve Board based on the average yield of a range of Treasury securities, all adjusted to the equivalent of a 3-year maturity. |
| ABS Master Fixed Rate USD | Fixed Income | 1/3/1991 | 12/30/1990 | The BofA Merrill Lynch US Fixed Rate Asset Backed Securities Index tracks the performance of US dollar denominated investment grade fixed rate asset backed securities publicly issued in the US domestic market. |
| Australian Dollar | FX | 1/2/1980 | 12/30/1969 | This Index tracks the performance of the Australian dollar spot currency relative to the USD. |
| British Pound Sterling | FX | 1/1/1980 | 12/30/1969 | This Index tracks the performance of the British Pound spot currency relative to the USD. |
| CBOE Volatility Index as Difference USD | Volatility | 1/3/1990 | 1/1/1990 | This factor is designed for use when volatility modeling assumptions require changes in the VIX index levels to be computed as simple difference rather than as percentage or logarithmic value. A positive relationship indicates the manager is long volatility. |
| Citigroup High-Yield Market Index | Fixed Income | 11/2/2000 | 10/31/2000 | This index measures the performance of below investment grade debt issued by corporations domiciled in the United States or Canada. It includes cash-pay and deferred-interest securities. All bonds are publicly placed, have a fixed coupon, and are non-convertible. |
| Citigroup World Government Bond Index | Fixed Income | 1/5/1993 | 1/3/1993 | The World Government Bond Index includes the 23 government bond markets of Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Malaysia, Mexico, the Netherlands, Norway, Poland, Portugal, Singapore, Spain, Sweden, Switzerland, the United Kingdom, and the United States. |
| CMBS Fixed Rate AAA Rated USD | Fixed Income | 1/6/1998 | 12/30/1997 | The BofA Merrill Lynch US Fixed Rate CMBS Index tracks the performance of US dollar denominated investment grade fixed rate commercial mortgage backed securities publicly issued in the US domestic market. |
| CMBS Fixed Rate BBB Rated USD | Fixed Income | 1/6/1998 | 12/30/1997 | The BofA Merrill Lynch BBB US Fixed Rate CMBS Index is a subset of The BofA Merrill Lynch US Fixed Rate CMBS Index including all securities rated BBB1 through BBB3, inclusive. |
| CMBS Fixed Rate USD | Fixed Income | 1/6/1998 | 12/30/1997 | The BofA Merrill Lynch US Fixed Rate CMBS Index tracks the performance of US dollar denominated investment grade fixed rate commercial mortgage backed securities publicly issued in the US domestic market. |
| Euro | FX | 1/1/1999 | 12/30/1998 | This Index tracks the performance of the Euro spot currency relative to the USD. |
| Global 300 Convertible Index | Fixed Income | 1/1/1999 | 12/30/1998 | The BofA Merrill Lynch Global 300 Convertible Index is a global convertible index composed of companies representative of the market structure of countries in North America, Europe and the Asia/Pacific region. |
| Global Broad Mkt Corp AAA Rated USD | Fixed Income | 1/3/1997 | 12/30/1996 | The BofA Merrill Lynch AAA Global Corporate Index is a subset of The BofA Merrill Lynch Global Corporate Index including all securities rated AAA. |
| Global Broad Mkt Corp BBB Rated USD | Fixed Income | 1/3/1997 | 12/30/1996 | The BofA Merrill Lynch BBB Global Corporate Index is a subset of The BofA Merrill Lynch Global Corporate Index including all securities rated BBB1 through BBB3, inclusive. |
| Global EM Sovereign & Credit USD | Fixed Income | 1/5/1999 | 12/30/1998 | The BofA Merrill Lynch Global Emerging Markets Sovereign & Credit Index tracks the performance of USD and EUR denominated emerging market debt, including sovereign, quasi-government and corporate securities. |
| Global High Yield USD | Fixed Income | 1/5/1998 | 12/30/1997 | The BofA Merrill Lynch Global High Yield Index tracks the performance of USD, CAD, GBP and EUR denominated below investment grade corporate debt publicly issued in the major domestic or Eurobond markets. |
| Japanese Yen | FX | 1/1/1980 | 12/30/1969 | This Index tracks the performance of the Japanese Yen spot currency relative to other spot currencies. |
| Mortgage Master USD | Fixed Income | 4/4/1989 | 12/30/1975 | The BofA Merrill Lynch US Mortgage Backed Securities Index tracks the performance of US dollar denominated fixed rate and hybrid residential mortgage pass-through securities publicly issued by US agencies in the US domestic market. |
| MSCI AC Asia Pacific USD | Equity | 1/2/2001 | 12/30/1987 | This index measures the equity market performance of the developed and emerging markets in the Pacific region. It consists of the following 12 developed and emerging market countries: Australia, China, Hong Kong, Indonesia, Japan, Korea, Malaysia, New Zealand, Philippines, Singapore, Taiwan, and Thailand. |
| MSCI EAFE USD | Equity | 1/2/2001 | 12/30/1969 | The MSCI EAFE Index is designed to measure the equity market performance of developed markets, excluding the US & Canada. This index consists of the following 22 developed market country indices: Australia, Austria, Belgium, Denmark, Finland, France, Germany, Greece, Hong Kong, Ireland, Israel, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, and the United Kingdom. |
| MSCI EM USD | Equity | 1/2/2001 | 12/30/1987 | The MSCI Emerging Markets Index is a free float-adjusted market capitalization index that is designed to measure equity market performance of emerging markets. |
| MSCI Small Minus Large US USD | Size | 6/2/1992 | 5/28/1992 | This factor accounts for the spread in returns between small and large sized firms, based on the company's market capitalization in the specified region. |
| MSCI Small Minus Large World USD | Size | 1/2/2001 | 12/30/1998 | This factor accounts for the spread in returns between small and large sized firms, based on the company's market capitalization in the specified region. |
| MSCI Value Minus Growth US USD | Style | 6/2/1992 | 5/28/1992 | This factor accounts for the spread in returns between value and growth stocks in the specified region. |
| MSCI Value Minus Growth World USD | Style | 1/2/2001 | 12/30/1974 | This factor accounts for the spread in returns between value and growth stocks in the specified region. |
| MSCI World Consumer Discr USD | Sector | 1/4/2000 | 12/29/1994 | A sub-index of the MSCI World Index, the MSCI World/Consumer Discretionary Index is based on the Global Industry Classification Standard (GICS) and represents the performance of consumer discretionary stocks of developed countries. |
| MSCI World Consumer Staples USD | Sector | 1/4/2000 | 12/29/1994 | A sub-index of the MSCI World Index, the MSCI World/Consumer Staples Index is based on the Global Industry Classification Standard (GICS) and represents the performance of consumer staples stocks of developed countries. |
| MSCI World Energy USD | Sector | 1/4/2000 | 12/29/1994 | A sub-index of the MSCI World Index, the MSCI World/Energy Index is based on the Global Industry Classification Standard (GICS) and represents the performance of energy stocks of developed countries. |
| MSCI World Financials USD | Sector | 1/4/2000 | 12/29/1994 | A sub-index of the MSCI World Index, the MSCI World/Financials Index is based on the Global Industry Classification Standard (GICS) and represents the performance of financial stocks of developed countries. |
| MSCI World Health Care USD | Sector | 1/4/2000 | 12/29/1994 | A sub-index of the MSCI World Index, the MSCI World/Health Care Index is based on the Global Industry Classification Standard (GICS) and represents the performance of health care stocks of developed countries. |
| MSCI World Industrials USD | Sector | 1/4/2000 | 12/29/1994 | A sub-index of the MSCI World Index, the MSCI World/Industrials Index is based on the Global Industry Classification Standard (GICS) and represents the performance of industrials stocks of developed countries. |
| MSCI World Information Tech USD | Sector | 1/4/2000 | 12/29/1994 | A sub-index of the MSCI World Index, the MSCI World/Information Technology Index is based on the Global Industry Classification Standard (GICS) and represents the performance of information technology stocks of developed countries. |
| MSCI World Materials USD | Sector | 1/4/2000 | 12/29/1994 | A sub-index of the MSCI World Index, the MSCI World/Materials Index is based on the Global Industry Classification Standard (GICS) and represents the performance of materials stocks of developed countries. |
| MSCI World Telecom Svc USD | Sector | 1/4/2000 | 12/29/1994 | A sub-index of the MSCI World Index, the MSCI World/Telecom Index is based on the Global Industry Classification Standard (GICS) and represents the performance of telecom stocks of developed countries. |
| MSCI World Utilities USD | Sector | 1/4/2000 | 12/29/1994 | A sub-index of the MSCI World Index, the MSCI World/Utilities Index is based on the Global Industry Classification Standard (GICS) and represents the performance of utilities stocks of developed countries. |



| Factor Name | Type | Daily Start Date | Monthly Start Date | Description |
|--|--------------|------------------|--------------------|--|
| Russell 3000 | Equity | 1/3/1979 | 12/28/1978 | The Russell 3000 Index measures the performance of the largest 3000 U.S. companies representing approximately 98% of the investable U.S. equity market. |
| Russell 3000 Moving Average Strategy US Equity | | 1/3/1980 | 1/1/1980 | This factor is based on a strategy that buys the Russell 3000 if it is above its 12-month moving average level of sells if it is below. This is a momentum based factor for the broad US equities market. |
| S&P GSCI Agriculture Index | Commodity | 4/25/1995 | 4/19/1995 | A sub-index of the S&P GSCI, this factor provides investors with a reliable and publicly available benchmark for investment performance in the agricultural commodity markets. |
| S&P GSCI Crude Oil USD | Commodity | 1/8/1987 | 1/6/1987 | A sub-index of the S&P GSCI, this factor provides investors with a reliable and publicly available benchmark for investment performance in the crude oil commodity markets. |
| S&P GSCI Energy Index | Commodity | 1/11/1983 | 12/30/1982 | A sub-index of the S&P GSCI, this factor provides investors with a reliable and publicly available benchmark for investment performance in the energy commodity markets. |
| S&P GSCI Index | Commodity | 1/6/1970 | 12/30/1969 | This index measures the general price movements and inflation in the world economy. It is calculated primarily on a world production-weighted basis and is comprised of the principal physical commodities that are the subject of active, liquid futures markets. |
| S&P GSCI Industrial Metals Index | Commodity | 1/10/1977 | 12/29/1976 | A sub-index of the S&P GSCI, this factor provides investors with a reliable and publicly available benchmark for investment performance in the industrial metals commodity markets. |
| S&P GSCI Precious Metals Index | Commodity | 1/9/1973 | 12/28/1972 | A sub-index of the S&P GSCI, this factor provides investors with a reliable and publicly available benchmark for investment performance in the precious metals commodity markets. |
| Trade Weighted Exchange Index: Broad | FX | 1/5/1995 | 1/3/1995 | A weighted average of the foreign exchange value of the U.S. dollar against the currencies of a broad group of major U.S. trading partners. Broad currency index includes the Euro Area, Canada, Japan, Mexico, China, United Kingdom, Taiwan, Korea, Singapore, Hong Kong, Malaysia, Brazil, Switzerland, Thailand, Philippines, Australia, Indonesia, India, Israel, Saudi Arabia, Russia, Sweden, Argentina, Venezuela, Chile and Colombia. |
| U.S. Corp Master USD | Fixed Income | 11/4/1986 | 12/30/1972 | The BofA Merrill Lynch US Corporate Index tracks the performance of US dollar denominated investment grade corporate debt publicly issued in the US domestic market. |
| U.S. Treasuries Inflation-Linked USD | Fixed Income | 3/3/1997 | 2/27/1997 | The BofA Merrill Lynch US Inflation-Linked Treasury Index tracks the performance of US dollar denominated inflation linked sovereign debt publicly issued by the US government in its domestic market. |
| US Crossover Corp USD | Fixed Income | 1/4/1989 | 12/30/1988 | The BofA Merrill Lynch US Crossover Corporate Index tracks the performance of US dollar denominated BBB and BB corporate debt publicly issued in the US domestic market. |

Company Description

eVestment provides a flexible suite of easy-to-use, cloud-based solutions to help global investors and their consultants select investment managers, enable asset managers to successfully market their funds worldwide and assist clients to identify and capitalize on global investment trends.

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