Alternatives Perspectives

Neuberger Berman Alternative Investment Management

As we end the year and look into 2020, risk assets are trading near all-time highs at a time when the global economy is facing a number of potential headwinds, including slowing economic growth, trade tensions, uncertainty surrounding Federal Reserve policy and political turmoil in Europe. Although it is difficult to predict the timing and magnitude of market moves, we believe investors will be well served with investments in alternatives strategies that can either potentially take advantage of market stress or generate returns independent of market direction. In this compendium, we identify strategies that we believe can be key elements of a portfolio in the current and coming market environment.

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Alternatives Perspectives

While global equity and bond markets got off to a torrid start in the first half of 2019, investor concerns about the market valuations combined with select macroeconomic risks have resulted in episodic bouts of volatility. Still, risk assets are trading near all-time highs at a time when the global economy is facing a number of potential headwinds, including slowing economic growth, trade tensions, uncertainty surrounding Federal Reserve policy and political turmoil in Europe. Although it is difficult to predict the timing and magnitude of market moves, we believe investors will be well served with investments in hedge fund strategies that can either capitalize on market stress or generate returns independent of market direction.

In this compendium, we identify strategies that we believe can be key elements of a portfolio in the current and coming market environment. Distressed credit investing is an example of a strategy poised to exploit market stress, where we believe the opportunity set has been building, particularly in the U.S., as a result of credit market growth since the global financial crisis and more recent signs of credit deterioration. We also discuss a series of mainly quantitative "uncorrelated" strategies that can maximize both risk/return and correlation benefits when placed together in a portfolio. Two areas that have attracted alternative capital in recent years are asset-based lending and insurance-linked securities. Although greater competition in the asset-based lending space has led to more aggressive underwriting, there are pockets in off-the-run lending strategies where funding gaps remain wide and there is potential to generate higher yields while maintaining structural downside protection. Meanwhile, insurance-linked securities are a newer asset class that requires specialized underwriting, has high barriers to entry, and generates returns from purely idiosyncratic sources; this profile makes the asset class attractive for hedge funds with expertise in the space to invest as a means of diversifying away broader market risk.

We hope you find this publication useful as you assess portfolio strategy in the coming months. Please contact your Neuberger Berman representative with any questions or feedback.

Articles

U.S. Distressed Credit: An Expanding Opportunity

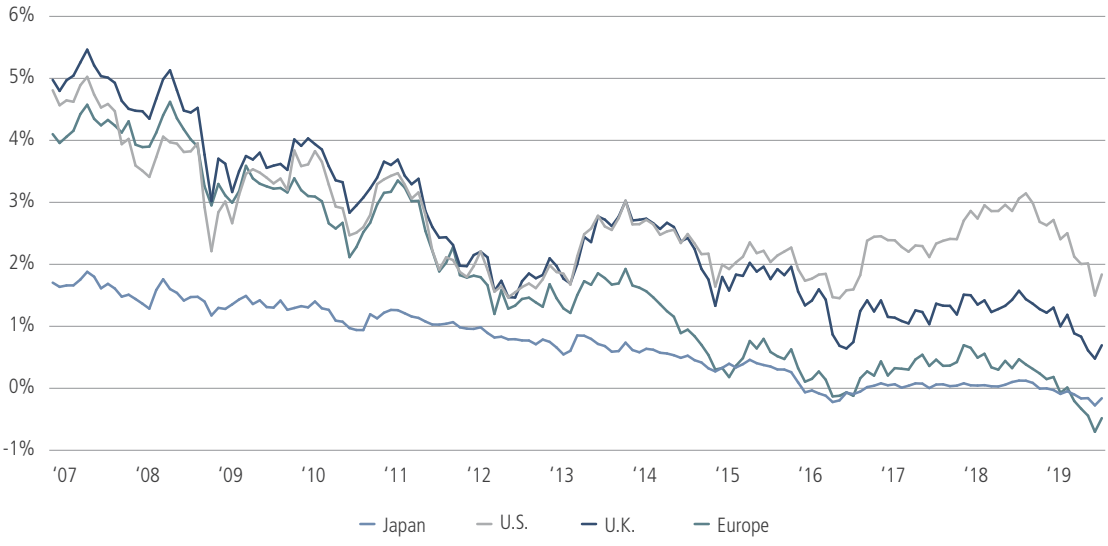
Economic pressures, "fallen angels" and volatility could provide openings to alert managers in the distressed credit space.

Credit and equity markets have clearly enjoyed a strong run in the more than 10 years since the global financial crisis. They have benefited from loose fiscal policy as governments have both increased spending and implemented tax cuts, but more notably, from loose monetary policy as a number of central banks globally have implemented various degrees of quantitative easing (QE) and cut interest rates. These initiatives have helped to support asset prices while giving corporations both easy and cheap access to financing for growth. However, as we move further along in the economic cycle, central banks have either stopped or reversed these policies at a time when economies are experiencing slowing growth and companies are facing a significant wall of debt maturities. While the default rate remains low on a historical basis, and the U.S. supply of stressed and distressed credit has been more limited as a percentage of the overall market for a number of years now, we believe a combination of slowing global growth, the end of QE and secular headwinds in certain parts of the market have the potential to drive a ripe opportunity set for hedge fund managers who focus on distressed corporate credit. It is also worth noting that despite the low default rate, the volume of stressed and distressed credit has continued to be healthy given the significant growth and sheer size of the high yield and leveraged loan markets today.

Global Financial Crisis and Response

In response to the global financial crisis, a number of nations sought to aggressively stimulate their domestic economies. While the Bank of Japan has implemented zero interest rate policy (ZIRP) since the 1990s, the U.S. Federal Reserve initiated the policy in 2009 and the European Central Bank decreased its target main refinancing operations (MRO) rate to a low of 1%.[1] These banks maintained low target rates for a number of years, which led to both lower short- and long-term interest rates, as can be seen in Figure 1.

FIGURE 1: 10-YEAR GOVERNMENT BOND YIELDS

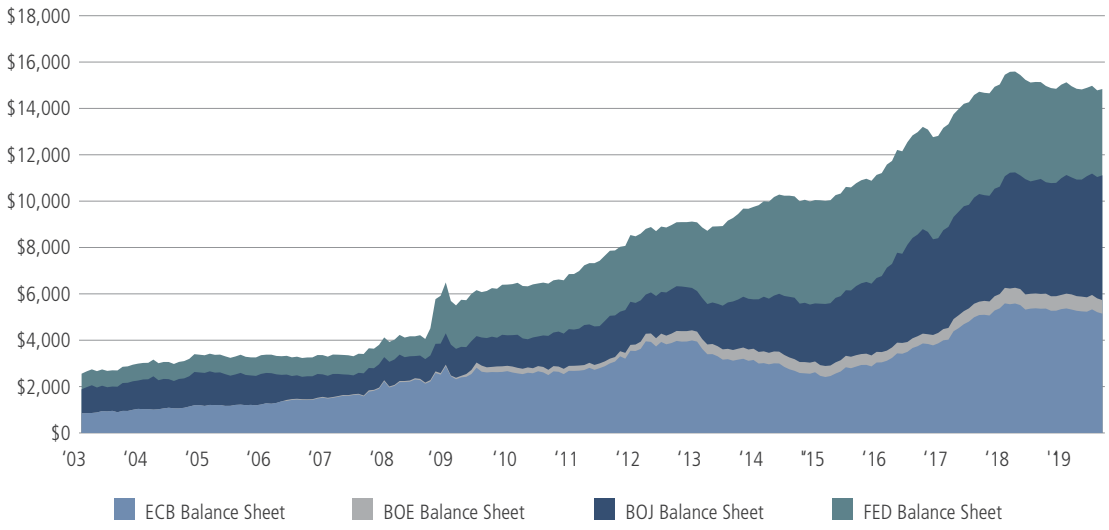


Source: Bloomberg, data through September 16, 2019.

In conjunction with interest rate policy, central banks globally initiated QE in efforts to further stimulate the economy. With QE, central banks have purchased securities from their member banks without constraints to effectively increase the money supply by providing additional funds for banks to lend. In Figure 2, we can see the significant rise in balance sheet assets across the four largest central banks to over $15 trillion in 2018.

[1] Source: Bloomberg.

FIGURE 2: CENTRAL BANK BALANCE SHEETS
($ Billions)

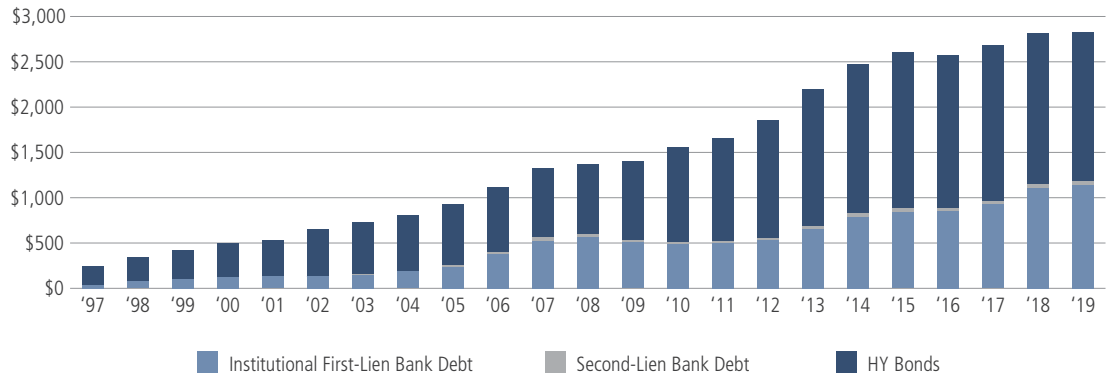


Source: Bloomberg, data through August 31, 2019.

Corporate Credit Market Growth

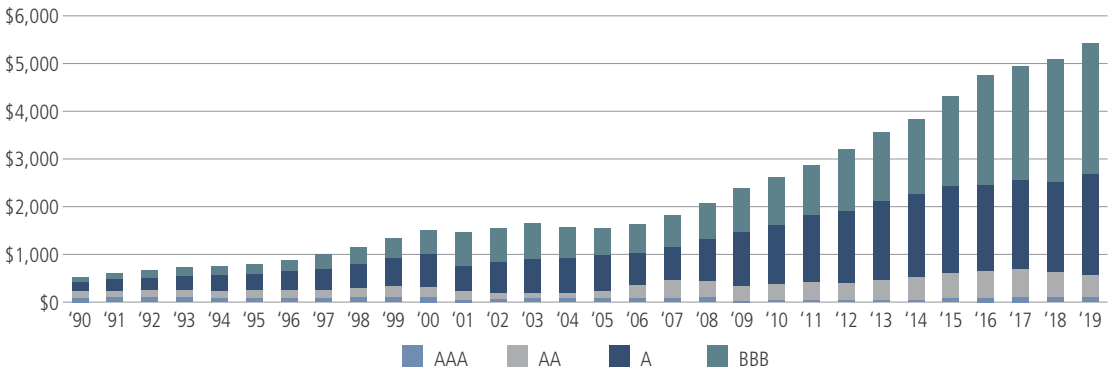
The combination of additional lending capacity and demand from debtors due to low interest rates has led to over $20 trillion of money creation and significant growth in the size of the U.S. debt markets. While banks have had an increased ability to lend, low government bond yields have forced investors looking for yield to search elsewhere, with many making considerable allocations to corporate bonds. As a result, the U.S. has experienced explosive growth in both the leveraged loan and corporate bond markets, as seen in Figure 3.

FIGURE 3: TOTAL LEVERAGED DEBT OUTSTANDING
($ Billions)



Source: MS Research, S&P LCD, Bloomberg Finance LP, data through August 31, 2019.

FIGURE 4: INVESTMENT-GRADE DEBT OUTSTANDING
($ Billions)



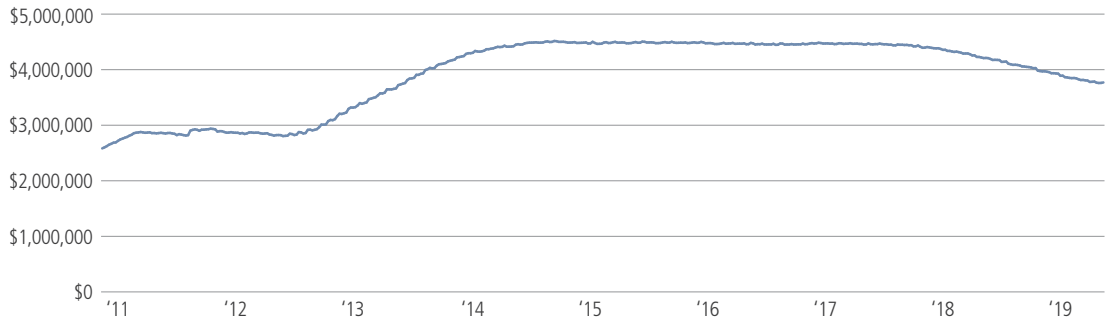
Source: FTSE Fixed Income LLC, data through August 31, 2019. Index par amounts by rating.

Even if credit default rates remain as low as they are today and have been over the last several years, the sheer amount of debt outstanding alone should provide a greater volume of opportunities for hedge fund managers to exploit.

Quantitative Tightening

As the global economy has progressed toward the later stages of its expansion, central banks have worked to counteract the impact of low interest rate policy and QE through quantitative tightening (QT) in an effort to restore more normal financial market conditions and as a proactive measure ahead of a possible recession. As a result, a number of central banks, including the Fed, have either slowed the pace of their security purchases, stopped them altogether or sold down parts of their balance sheets. The extent to which QT has occurred and is expected to continue over the short term is illustrated in Figure 5.

FIGURE 5: U.S. FEDERAL RESERVE BALANCE SHEET RUNOFF
($ Millions)

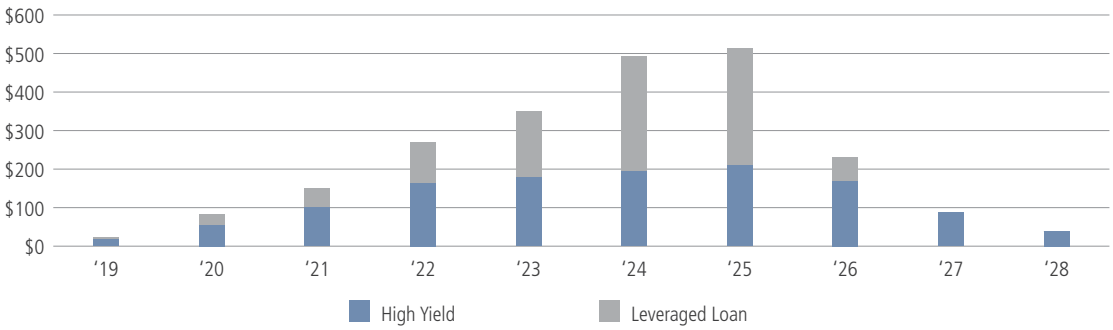


Source: Federal Reserve, data through September 11, 2019.

The Approaching Maturity Wall

While issuance has declined of late, the surge in debt issuance since the crisis has built up a large wall of maturities to come due over the next several years. In recent years, maturities were able to be pushed out as the placid debt markets allowed companies to refinance—even troubled ones. In Figure 6 below we can see this wall of debt coming due in the next several years.

FIGURE 6: BONDS REACHING MATURITY
($ Billions)



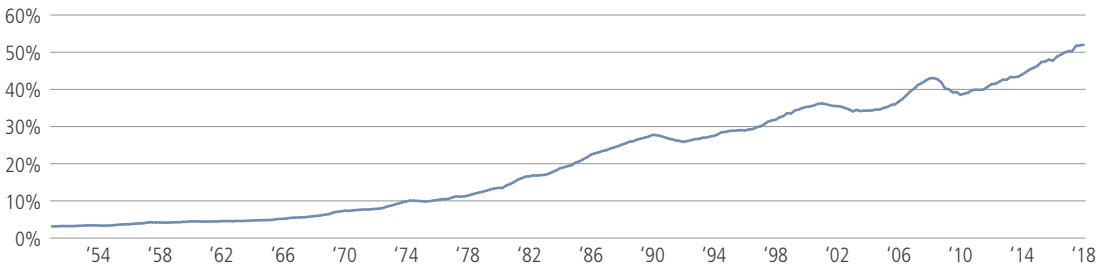
Source: Bloomberg, GSGIR, as of January 11, 2019.

The gap between recent issuance and this wave of maturities has potentially increased the risk that corporations will not be able to refinance. In a world where corporate earnings are robust and economic growth prospects remain strong, companies may be able to manage this mismatch. However, there are a number of signs that this could prove difficult as we enter the later stages of the economic cycle. Additionally, certain sectors, such as retail, energy and health care, are facing further headwinds in the form of secular decline, commodity market volatility or regulatory changes that may make refinancing even more challenging.

Leverage Levels

While the debt markets have nearly doubled in size since the crisis, U.S. GDP has increased only 35% over the same period.[2] Meanwhile, the amount of U.S. corporate debt outstanding as a percentage of GDP has risen to record highs, as seen in Figure 7.

FIGURE 7: CORPORATE DEBT AS PERCENTAGE OF GDP

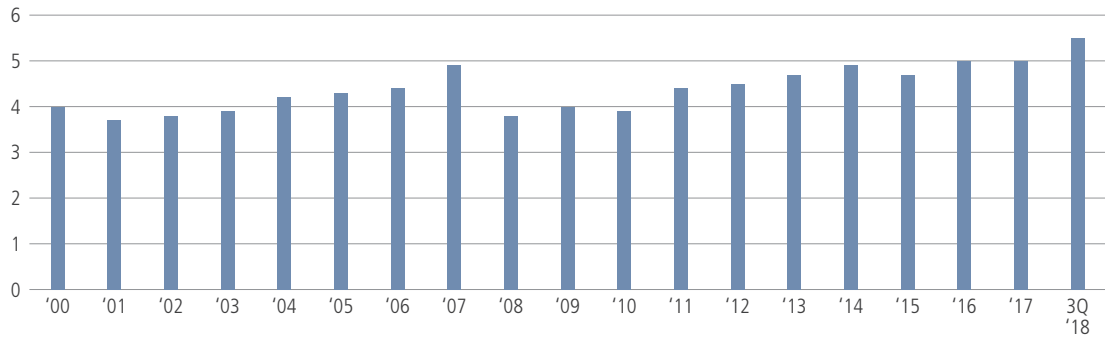


Source: Federal Reserve Bank of St. Louis. Data through October 1, 2018.

[2] Source: BofA Merrill Lynch Global Research, S&P LCD and the World Bank, as of September 30, 2018.

The result of this growth in debt outstanding as a proportion of GDP is increased leverage in the debt markets, which is above levels last seen just prior to the most recent economic recession. In Figures 8 and 9, we can see the extent to which leverage levels have elevated within the corporate bond (high yield and investment grade) and leveraged loan markets.

FIGURE 8: AVERAGE DEBT MULTIPLES OF HIGHLY LEVERAGED LOANS



Source: S&P Global Market Intelligence, data through Q3 2018.

FIGURE 9: HIGH YIELD NET LEVERAGE

Source: MS Research, Bloomberg Finance LP, S&P Capital IQ. Data through March 31, 2019.

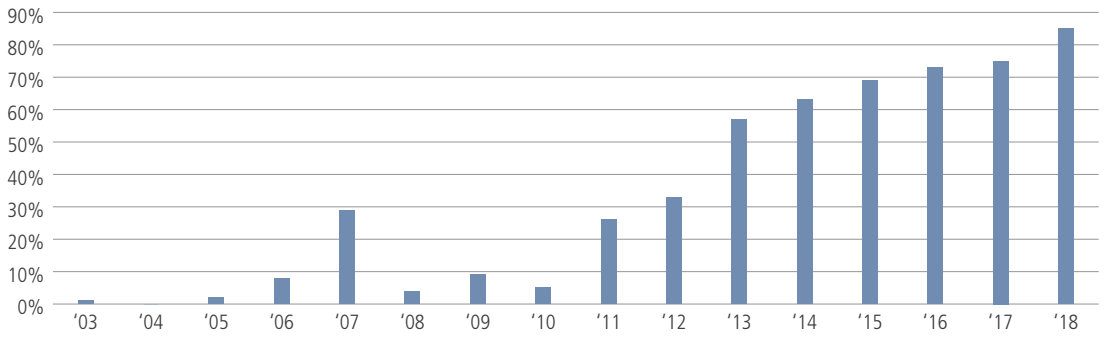
In the investment grade market, the combination of low interest rates pushing companies toward the debt markets for financing and investors searching for higher yields has given way to an influx of BBB rated bonds, the lowest rated debt that can still be considered investment grade. Whereas only 27% of the U.S. investment grade index consisted of BBB bonds in 2003, their share has spiked to over 50% today.[3] At the same time, net leverage for BBBs has risen to levels higher than in 2007, just prior to the crisis. These numbers suggest that companies may be under more pressure than they were entering the most recent recession. Should the economy come under pressure or markets continue to experience volatility, it is possible that a portion of the BBB universe becomes high yield ("fallen angels"), further increasing the universe of stressed and distressed opportunities for hedge funds to exploit. In fact, the reality that some or many of these BBBs will be downgraded has already led to trading opportunities for managers.

[3] Source: MS Research and FTSE Fixed Income LLC, as of April 1, 2019.

Structural Weakness

Not only are companies facing greater debt burdens, but the increasing lack of structural integrity in debt issues has increased the potential for companies to default. Covenants, which are legal agreements placed into debt contracts to force restrictions on bond issuers, are integral in protecting the interests of debtholders. They may limit companies' ability to surpass certain thresholds on financial metrics such as interest coverage or debt-to-equity, or deal with changes in ownership or potential M&A activity. The recent popularity of passive investment products, which in many cases are motivated by increasing their assets under management rather than by credit quality, has contributed to complacency in underwriting standards. Loan market investors have tolerated higher initial leverage in new deals and lower covenant quality in a race to gather assets. Today, CLOs and mutual funds account for the vast majority of new loan purchases,[4] and over 80% of loans can be deemed covenant-lite, up significantly from numbers seen in recent years, as illustrated in Figure 10.

FIGURE 10: COVENANT-LITE LOANS AS PERCENTAGE OF TOTAL LOAN ISSUANCE



Source: Credit Suisse, as of Q3 2018.

Corporate Weakness

With lighter covenants, companies have greater flexibility in terms of their financial and operational decisions, often at the expense of their creditors. In a world where leverage is rising and creditors are less protected, companies may be able to get by if they are able to generate enough cash flow. Although the U.S. economy remains solid, approximately 20% of the U.S. high yield market (ex-energy) is either in secular decline or has clear operational challenges, while 34% is expected to have a negative five-year adjusted net income growth rate.[5] For example, massive secular changes are occurring, largely due to technological disruption and the "FAANG effect." In media/telecom, traditional cable, for example, is being unseated by online players such as Amazon and Netflix. This directly impacts viewership and consequently ad revenues and spending. These companies will have to find other ways to grow or risk becoming obsolete. In retail, as mall traffic declines, stores close and consumers move online, businesses are being forced to adapt, and at a more rapid pace than many may have anticipated. These industries are highly vulnerable if recent credit market trends continue, particularly in the event of a broader economic slowdown. From an investment perspective, these industries may provide some of the most compelling opportunities for distressed hedge fund managers to profit, understanding that credit selection and fundamental work will be paramount.

[4] Source: "The Big Weakness in the Buyout Funding Chain," *The Wall Street Journal,* August 7, 2018.
[5] Source: MS Research, Bloomberg, FTSE Fixed Income.

Trading Liquidity

The opportunity for distressed hedge fund managers has the potential to be driven not only by the health of the credit markets or certain sectors, but also by the relative lack of liquidity in the market. Whereas banks could previously engage in proprietary trading and provide trading liquidity to markets, post-crisis regulations mandated by the Dodd-Frank Act have made these activities more cumbersome by increasing the cost to hold these assets on bank balance sheets. The result can be seen in Figure 11.

FIGURE 11: DEALER INVENTORIES (CORPORATE CREDIT AND ABS)
($ Millions)

Source: MS Research, Federal Reserve Bank of New York. Data through September 4, 2019.

The lack of dealer inventory has led to decreased trading liquidity in the credit markets and, in turn, a propensity for investors to forego security selection in favor of passive ETFs and other index products that can deliver broad market exposure quickly and efficiently.[6] These products' trading is dictated almost purely by technical factors without concern for credit quality. Most mutual funds and ETFs have rules-based mandates, often becoming forced sellers of a security that is downgraded, defaults or drops below a certain price. When these funds are forced to sell, the lack of dealer activity creates considerable gap risk as the market comes to lack natural buyers. In this case, skilled hedge funds often have the ability to exploit the situation with the option to buy into credits at more attractive levels than the risk would suggest. In the case of default or bankruptcy, hedge funds often have the ability not only to invest at cheap levels, but also to use their legal and financial engineering expertise to drive restructurings; in these cases, funds can typically earn additional returns due to their role in the restructuring.

Conclusion

A variety of factors point toward a more interesting environment to come for hedge funds in corporate credit. Opportunity can arise from a number of scenarios, including (1) a high number of "fallen angels," (2) broader economic pressure, (3) secular decline and (4) periods of volatility or illiquidity. Even if none of these scenarios plays out, the sheer size of the credit markets means that, at current default rates, there is plenty to do, particularly for managers able to invest across the spectrum in terms of size, geography, sector and quality.

[6] Source: Citi Global Investor Sales, "From Diversified Asset Classes to Factor-Driven Index Portfolios & the Re-Packaging of Active Investment Skills – Overview of Key Findings from the 2016 Industry Evolution Survey," October 2016.

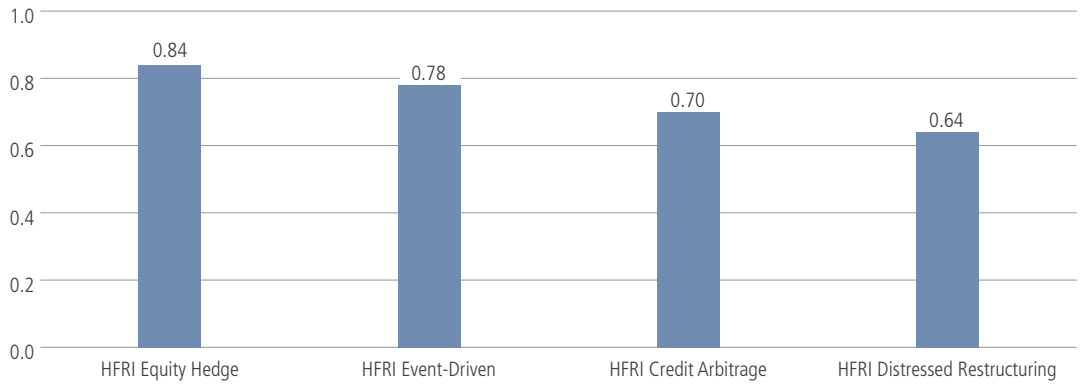
Uncorrelated: Accessing a Potent Diversifier

The asset allocation benefits of uncorrelated strategies are well known, but overcoming obstacles to entry requires an informed approach.

In our view, the addition of uncorrelated trading strategies to a traditional mix of equities and fixed income is likely to have a diversifying effect, and consequently to improve the expected risk-adjusted returns of the overall portfolio. While this is widely acknowledged, there are a number of obstacles to making an effective allocation to strategies that have demonstrated little to no persistent correlation—and have no rationale for doing so—to broad equity and fixed income markets over the long term. We will expand on the most pertinent of these below, and suggest techniques and solutions for overcoming these barriers. In so doing, the addition of an uncorrelated strategies line item as a diversifier to a traditional portfolio becomes a more realistic and attractive choice for investors looking to reduce the size of portfolio drawdowns and deliver better risk-adjusted returns.

Uncorrelated strategies can be identified as trading strategies that demonstrate no meaningful correlation to equity and fixed income markets, and typically other uncorrelated strategy categories, over the longer term. Hedged strategies such as event-driven, equity long/short and credit long/short typically do not meet this criterion; most run with a persistent long bias or demonstrate significant sensitivity during adverse periods for broad markets. This is evidenced by the long-term correlation between these strategies and global equity markets: Based on monthly data from January 2000, the correlations to global equities of the event-driven, equity long/short and credit long/short strategy indices are 0.78, 0.84 and 0.70, respectively (see display).

FIGURE 1: CORRELATION OF MSCI WORLD TO SELECTED HEDGE FUND STRATEGY INDICES



Source: Neuberger Berman analysis, Hedge Fund Research, Bloomberg. Monthly correlation of MSCI World Gross Local Index (Bloomberg: GDDLWI) to HFRI Equity Hedge Index, HFRI Event-Driven Index, HFRI Credit Arbitrage Index and HFRI Distressed Restructuring Index. Data is monthly and from January 2000 (or individual index inception if later) to March 2019. The benchmark performance is presented for illustrative purposes only to show general trends in the market for the relevant periods shown. The investment objectives and strategies of each fund in the benchmark may be different than the investment objectives and strategies of hedge funds and may have different risk and reward profiles. A variety of factors may cause this comparison to be an inaccurate benchmark for any particular fund and the benchmarks do not necessarily represent the actual investment strategy of a fund. It should not be assumed that any correlations to the benchmark based on historical returns would persist in the future.

Even more constrained and market-neutral equity trading strategies, such as merger arbitrage, have demonstrated a similar correlation profile over time. These strategies can indeed be potential strong return generators, and offer returns generated in large part from idiosyncratic, non-market-related alpha sources, but tend to be significantly affected by market moves over short- and medium-term periods. Consequently, their usefulness in diversifying a traditional long bond and equity portfolio is undermined. Within the hedge fund universe, those strategies that can genuinely claim to be uncorrelated are broadly categorized as follows:

- **Equity Market Neutral:** Diversified portfolios of long and short single-stock positions designed to be market-neutral on either a dollar- or beta-adjusted basis, or both. Positioning can be driven by either fundamental or technical data inputs, and looks to exploit either idiosyncratic stock price movements or broader equity factors such as quality and earnings momentum.

- **Statistical Arbitrage:** Diversified market-neutral, single-stock equity portfolios, typically trading long and short in either pairs of related stocks (e.g., two stocks in the same industry or country that show high levels of correlation to each other) or between clusters of related stocks. The approach of trading long and short pairs generally creates strictly market-neutral portfolios. Positioning is typically driven by price-based technical movements and is more mean reversionary by nature.

- **Short-Term Trading:** Directional and relative-value long and short trading in liquid future and forward contracts across the four main asset classes of equities, fixed income, currencies and commodities, with an overall average turnover of the book of fewer than 10 trading days. Positioning can be driven by either fundamental or technical data inputs. Portfolios can be directionally long or short asset classes at different points of time, though typically without persistence over the medium term, nor any bias to being long or short in any contract or asset class.

- **Trend Following:** Systematic trading strategy primarily driven by different measures of price momentum over varying time horizons. Trading spans the universe of liquid future and forward contracts across asset classes. As with Short-Term Trading, portfolios will be directionally long and short in individual contracts and asset classes, though with no bias to either direction built into the models.

- **Global Macro:** Broad strategy definition encompassing multiple trading approaches across liquid markets. Investment processes can be either fully discretionary or systematic, or a hybrid of the two, and trading either relative value or directional. Portfolios vary between more concentrated, thematic approaches driven by a smaller number of factors, and much more diversified books driven by more bottom-up considerations. This category can be further subdivided into Discretionary Global Macro and Systematic Global Macro groups of managers.

- **Volatility Arbitrage:** Strategies endeavor to exploit relative-value mispricings among liquid options contracts, profiting by going long relatively underpriced contracts and short overpriced contracts. There are many different approaches to trading in the space, though a hybrid of systematic and discretionary investment processes is common.

- **Other:** This is a catch-all category that includes any strategy that can be considered uncorrelated but does not fit into any of the above categories. This can include less-liquid strategies, for example those that trade in markets such as insurance-linked securities and litigation finance. Additionally, a number of strategies combine different elements of more than one strategy category; for example, a multi-strategy CTA strategy will likely contain elements of Short-Term Trading, Trend Following and Global Macro.

Implementation Hurdles for Uncorrelated Strategies

The remainder of this piece will focus on the issues inherent in gaining exposure to uncorrelated strategies, the solutions that mitigate and overcome these difficulties, and the resultant effect on a traditional portfolio of long equities and bonds.

Single-Strategy Performance: As discussed, several broad categories of uncorrelated strategies can be used as portfolio diversifiers. In line with other, more correlated strategy approaches across the broader universe, these strategies can be prone to prolonged periods of underperformance. An example is medium-term Trend Following, which, despite a healthy positive information ratio over the long term, can go through long periods of flat or negative performance. This strategy broadly performed very strongly in years such as 2008 and 2014, but was flattish overall, with significant drawdowns over the 2009 – 2013 period.[1] Holding such a strategy as a single line item through what may be a prolonged drawdown can prove difficult for investors who have tended to remove exposure toward the end of difficult periods and, as a result, do not benefit from the subsequent strong positive performance when it comes. A more robust approach is to construct a diversified exposure to a number of uncorrelated strategies across styles and strategy groups. This has the effect of reducing both the likelihood and magnitude of prolonged drawdowns when one or a number of these strategies are going through periods of more challenging performance, and of improving expected risk-adjusted return.

[1] Source: SG Trend Index.

The above does not take into account the challenge of selecting managers from within each uncorrelated strategy grouping that will be representative of overall peer-group performance, with the aim to consistently select top-quartile managers for each strategy allocation. To maximize the likelihood of success in this regard, it is necessary to make use of a specialized research team with the ability to qualitatively and quantitatively select managers that they expect to outperform alternative allocations within strategy groups. Furthermore, the ability to structure attractive terms with underlying managers is improved by being able to offer investment mandates of sufficient size.

The table below compares, for each constituent strategy index and for a simple equal-weighted pro forma, the maximum drawdown and ratio of maximum drawdown to annualized volatility. Across strategies, the maximum drawdowns are all of a magnitude well over one standard deviation of annualized volatility, with Trend Following the lowest and Equity Market Neutral/Statistical Arbitrage the highest, with a ratio of over 3:1. A single allocation to these strategy indices would be very difficult to hold through the worst period of underperformance. By creating a pro forma portfolio that has an equal allocation across strategy groups, the effect has been to mitigate the most extreme of these drawdowns, as measured by the ratio of the maximum drawdown over annualized volatility, to a more manageable ratio of under two times the standard deviation. The pro forma figure represents hypothetical performance from the start of 2005 through to March 2019, a period of over 14 years covering all phases of the market cycle.[2]

FIGURE 2: DRAWDOWN AND VOLATILITY STATISTICS FOR CONSTITUENT STRATEGY INDICES

Strategy	Maximum Drawdown	Maximum Drawdown/ Annualized Volatility
Global Macro	-8.02%	-1.59
Short-Term Trading	-16.37%	-3.09
Trend Following	-20.69%	-1.48
Equity Market Neutral	-9.15%	-3.33
Statistical Arbitrage	-9.15%	-3.33
Volatility Arbitrage	-15.37%	-2.94
Pro Forma	**-6.64%**	**-1.85**

Source: Neuberger Berman analysis, Hedge Fund Research, Societe Generale. Strategy indices used are as follows: HFRI Macro Index (Global Macro), SG Short Term Traders Index (Short Term Trading), SG Trend Index (Trend Following), HFRI Equity Market Neutral Index (used for both Equity Market Neutral and Statistical Arbitrage) and HFRX Relative Value Volatility Index (Volatility Arbitrage). All data is monthly and from January 2000 to March 2019, or from strategy index inception if later. The inception of the HFRX Relative Value Volatility Index was in January 2004, the inception of the HFRX Macro Systematic Diversified CTA Index was in January 2005, and the inception of the SG Short Term Traders Index was in January 2008. Pro Forma is an equal-weighted allocation across the six strategies noted in the table, using the HFRI Equity Market Neutral Index for both the Equity Market Neutral and Statistical Arbitrage strategy categories. Pro Forma is from January 2005, which is the first month where four of the five strategy indices were live, to March 2019. No fee or volatility adjustments have been made to the underlying strategy indices. Please see important index disclosures at the end of this presentation.

Optimizing for Fees: The six uncorrelated strategy categories (excluding the "Other" category) discussed have historically been strategies where an investor is only able to gain access at traditional hedge fund fees, exemplified by a 2% management fee and 20% incentive fee. The fee burden of investing is therefore significant, and potentially prohibitive for an investor looking to add diversification to a long equity and fixed income portfolio. The fee burden can have a significant effect on the long-term information ratio of a particular strategy. It is therefore of vital importance for an investor to be able to gain the most fee-efficient access to these strategies. This is especially true for strategies that are prone to individual periods of prolonged underperformance. Through long-term networks and relationships in the space, combined with the ability to commit to managers larger sums of capital, select investors are able to access these strategies fully at much more preferential fee schedules. A fee schedule solely based on incentive fees represents a purer alignment of investor and manager, significantly cuts the fixed cost of investing in these strategies and improves the information ratio of the underlying strategies. The table below demonstrates the improvement in information ratio for each strategy index when a reduction in management fees of 1.5% per annum is applied.[3] While there is difficulty in establishing the weighted-average fee schedules for strategy indices and the changes to them over time, this 1.5%

[2] See Figure 2 for disclosures.

[3] See Figure 2 for information on strategy indices used. A benchmark return of 0% has been used for information-ratio calculations, so the ratio is effectively annualized return/annualized volatility.

reduction is likely conservative given that the flagship fees for the majority of the managers in these peer groups remain at full hedge fund levels. The average improvement in information ratio is +0.35, which represents a significant gain in performance directly from a re-evaluation of the fee schedule needed to access these strategy types.

FIGURE 3: IMPROVEMENT IN INFORMATION RATIO AFTER REDUCTION IN ANNUAL MANAGEMENT FEE OF 1.5%

Strategy	Data Inception	Improvement in Information Ratio
Global Macro	January 2000	+0.31
Short-Term Trading	January 2008	+0.28
Trend Following	January 2000	+0.11
Equity Market Neutral	January 2000	+0.56
Statistical Arbitrage	January 2000	+0.56
Volatility Arbitrage	January 2004	+0.30

See Figure 2 for relevant index disclosures.

Optimizing for Volatility: Investing directly in the commingled vehicles of uncorrelated hedge fund strategies is typically suboptimal when endeavoring to create diversified exposure across strategies. This is partly driven by the fact that the investor does not have any discretion over the volatility profile of each underlying investment. An equal capital allocation across managers will be unbalanced from a risk perspective because higher-volatility funds will contribute proportionately more to the overall risk allocation. While it is possible to allocate risk more effectively by allocating more capital to managers that run their strategies at lower volatility levels, this is a deeply inefficient use of capital.

A more efficient method of adding exposure to these managers is through the use of managed accounts. This gives the investor the ability to specify the target risk level for each account based on the manager's ex-ante risk target and ex-post realized volatility in live trading. In a portfolio context, this has the dual advantage of ensuring a more equitable risk allocation across underlying managers, and of increasing the overall expected return by increasing the volatility targets for each account relative to the manager's commingled vehicle, where appropriate. An investor in a commingled fund vehicle is essentially a passive taker of the level of volatility the strategy is run at, whereas in the managed account format the investor has the ability to increase target volatility to a predefined target level; for example, an investor could run a strategy with an annualized volatility of 5% in the commingled fund to a target volatility of 10% in a managed account. This adjustment, assuming that the expected information ratio of the strategy remains the same, increases the long-term expected return of the strategy by two times. This will bring the portfolio closer to achieving the goal of a more balanced risk allocation across a number of uncorrelated strategies, and through a more efficient process than weighting managers in inverse proportion to their volatility. Of course, there are a number of other risk-related considerations in addition to ensuring parity in annualized volatility across allocations. These include non-zero correlations between allocations, correlation to other external factors, the distribution profile of certain strategies, varying expected information ratios, and changing opportunity sets for strategies. A more equitable allocation of risk across a range of uncorrelated strategies is likely to increase both diversification and the expected risk-adjusted return.

The tables below provide an example of two portfolios investing in the same five underlying strategies: one through commingled fund investments with varying annualized volatilities, and the other through customized managed accounts where the annualized volatility of each strategy has been standardized. We observe that the portfolio structured through managed accounts is able to achieve a more equitable transfer of risk across the five strategies, a higher long-term expected return and a higher expected information ratio.

PORTFOLIO 1: INVESTMENTS THROUGH COMMINGLED FUNDS

	Annualized Volatility	Annualized Gross Return	Information Ratio
Fund A	2%	5%	2.50
Fund B	4%	5%	1.25
Fund C	6%	5%	0.83
Fund D	8%	5%	0.63
Fund E	10%	5%	0.50
Equal-Weighted Portfolio	**6%**	**5%**	**0.83**

Source: Neuberger Berman. Note, net returns to an investor would be lower.

PORTFOLIO 2: INVESTMENTS THROUGH MANAGED ACCOUNTS

	Annualized Volatility	Annualized Gross Return	Information Ratio
Managed Account A	6%	15%	2.50
Managed Account B	6%	7.5%	1.25
Managed Account C	6%	5.0%	0.83
Managed Account D	6%	3.8%	0.63
Managed Account E	6%	3.0%	0.50
Equal-Weighted Portfolio	**6%**	**6.9%**	**1.14**

Source: Neuberger Berman. Note, net returns to an investor would be lower.

Transparency and Control: As with both the uncorrelated and more correlated manager universe, an emphasis on high levels of transparency and control is crucial to the risk management of a portfolio. Investing through allocations to commingled vehicles is again suboptimal when assessed based on the transparency of underlying holdings and the ability to control adjustments to the allocations. The use of managed accounts is again preferable here; by structuring a portfolio in this way, the investor has full look-through transparency on all underlying holdings on a continual basis. This is highly additive to the risk management of the portfolio, allowing the investor to understand risk at both the individual subadvisor and overall portfolio level in a much more in-depth and efficient way. Managed-account investing also gives the investor full control over the assets, enabling adjustments to be made to portfolio allocations and volatility on a timelier basis than an investment into a commingled vehicle would provide. In the most extreme scenario, an allocation to an individual strategy could be rapidly reduced or liquidated almost immediately should the need arise.

Effect of an Allocation to Uncorrelated Strategies on a Traditional Portfolio

We have laid out and explained the key issues related to adding exposure to uncorrelated strategies as a diversifier to a traditional portfolio, and detailed the techniques by which these hurdles can be overcome. Given that this is possible, it remains necessary to demonstrate the benefit that a well-managed portfolio of uncorrelated strategies can have to the overall shape of a traditional long-only portfolio.

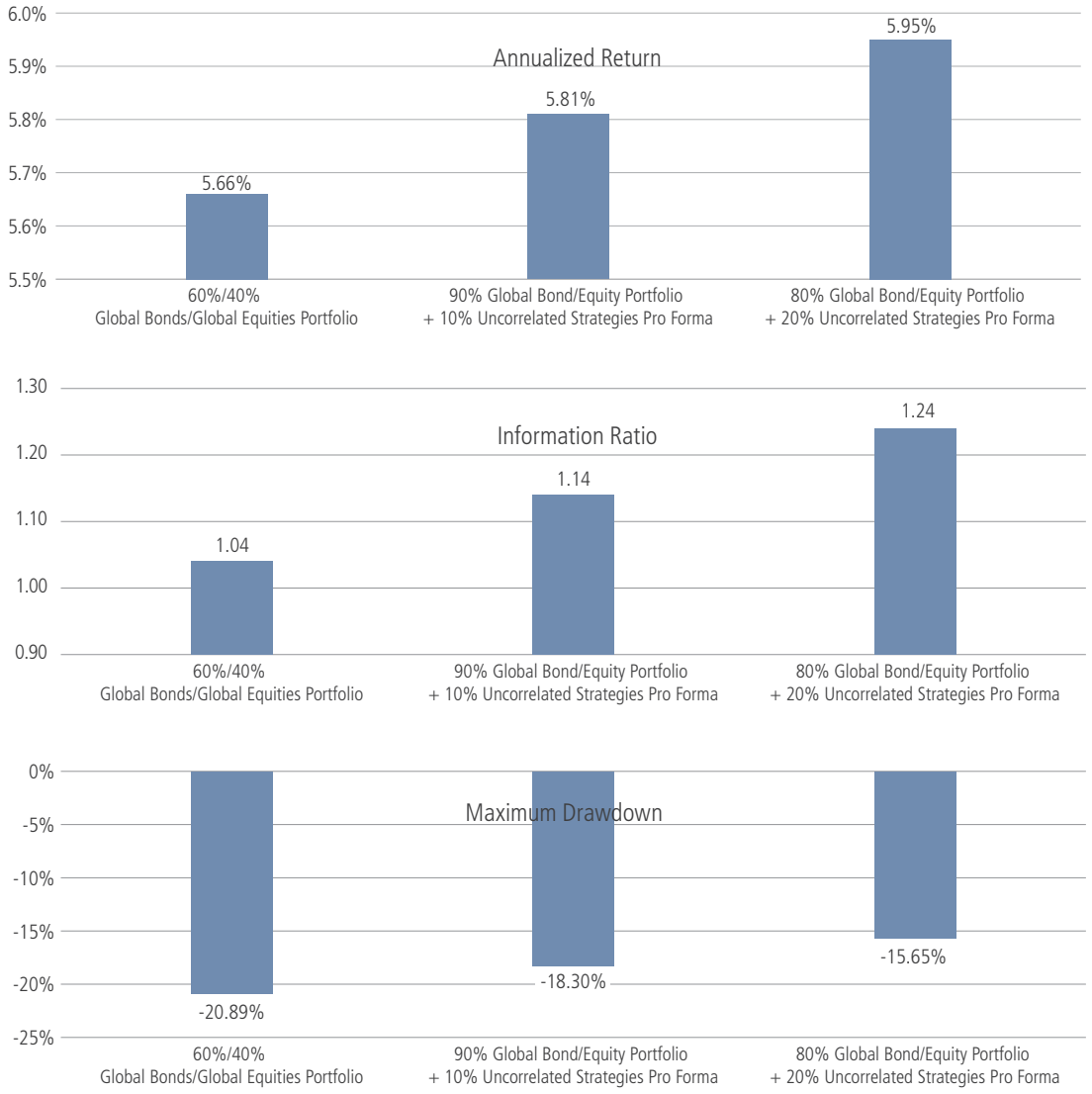
We have created a hypothetical pro forma return stream using individual strategy indices across Global Macro, Short-Term Trading, Trend Following, Equity Market Neutral, Statistical Arbitrage and Volatility Relative Value. These index return streams have been adjusted for fee optimization, reducing the management fee burden by 1.5% per annum to conservatively recreate a return stream for each strategy net of a 0% management fee and 20% performance fee. These return streams have then been optimized for volatility, scaling to a target annualized volatility of 10% for each underlying strategy. A limit of 2x the original strategy index volatility has been applied to one set of index returns. The resulting index returns have then been equal-weighted within a hypothetical pro forma portfolio of uncorrelated strategies.[4]

The analysis gives an indication of how an allocation to a portfolio of uncorrelated strategies managed in the ways discussed above can improve the profile of a long-only fixed income and equity portfolio. Starting with a simple

[4] Source: NB Analysis, Hedge Fund Research, Societe Generale. Strategy indices used are: HFRI Macro Index (Global Macro), SG Short Term Traders Index (Short Term Trading), SG Trend Index (Trend Following), HFRI Equity Market Neutral Index (used for both Equity Market Neutral & Statistical Arbitrage), and HFRX Relative Value Volatility Index (Volatility Arbitrage). Fee adjustment has been applied to monthly returns for each strategy index to the magnitude of (1.5%/12=) 0.125% per month. Volatility adjustment has been applied to scale up index returns to an annualized volatility of 10% based on returns from January 2000 to March 2019, or from index inception if later. For the HFRI Equity Market Neutral Index, index returns have been scaled up to an annualized volatility of 5.49%, which reflects a limit of 2x the original annualized volatility of the strategy index from January 2000 to March 2019. The hypothetical pro forma return stream runs from January 2005, which is the first month where four of the five strategy indices were live, to March 2019.

traditional portfolio constructed through a 60% allocation to the Bloomberg Barclays Global Aggregate Bond Index and a 40% allocation to the MSCI World Index, a modest allocation to an uncorrelated strategies portfolio can result in improved annualized return, risk-adjusted return (measured by the information ratio) and the maximum drawdown.

FIGURE 4: IMPACT OF ADDING UNCORRELATED STRATEGIES TO DIVERSIFIED PORTFOLIO



Source: Bloomberg. Indices used are the MSCI World Gross Local Index (Bloomberg: GDDLWI) and the Barclays Global Aggregate Bond Hedged Index (Bloomberg: LEGATRUH). **Past performance is not a guarantee of future returns.** Note, net returns to an investor would be lower.

By (a) solving for the issues inherent in allocating to a single uncorrelated manager by diversifying across uncorrelated strategy categories, (b) reducing the fee burden and improving risk-adjusted return by negotiating highly competitive incentive-fee-based agreements with underlying managers, (c) creating a managed account platform to optimize for differing volatility levels across underlying allocations, and (d) ensuring a high level of transparency and control by structuring through managed accounts, combined with a strong risk-management platform, the resulting single line item allocation to a range of uncorrelated strategies can prove increasingly useful for managers of traditional portfolios.

Asset-Based Lending: Finding Pockets of Entry

In an increasingly competitive environment, we see potential in "off-the-run" areas that offer defensive characteristics and return potential.

In the years following the global financial crisis, a significant funding void emerged in the private markets. The supply of middle-market credit by banks contracted due to onerous regulations that hindered their ability to participate in numerous lending areas in a capital-efficient manner. At the same time, demand by issuers increased as their appetite for new financings returned alongside the economic recovery. The supply/demand mismatch, in its earliest stages, created one of the most compelling value propositions we have observed in the last decade. In a market lacking many traditional financing options, alternative lenders could step in to provide flexible capital solutions to companies seeking certainty of execution while collecting a substantial yield boost relative to comparable risk in the public universe in exchange for illiquidity. This illiquidity premium became even more evident against a backdrop of diminished public bond warehousing by banks, which we believe made the liquidity tradeoff for private credit investments as low as it has been historically.

Today, we view the investment landscape for private credit through a different lens. While we believe credit disintermediation is a secular opportunity, not a cyclical one, the illiquidity premium has faced some downward cyclical pressure as an influx of alternative capital has moved in to correct the supply disruptions in various lending channels. As the market has matured, increased competition has led to a general deterioration in pricing and terms, particularly in the broadly syndicated cash-flow-based loan market. For instance, the percentage of leveraged loan deals completed with a debt multiple of EBITDA greater than 6x increased to 25% in 2018, its highest level since 2007.[1] With borrowers more susceptible to inherit excessive leverage through a decline in earnings or worsening of economic conditions, we expect credit stress to pick up going forward. Moreover, the dramatic increase in loan-only capital structures suggests that recoveries for loans with "senior" statuses could be much lower in the next credit downturn given the erosion of subordinated debt tiers. Last year, almost 80% of U.S. speculative-grade issuers obtained all of their financing from the syndicated loan market, which has taken the share of outstanding leveraged loans with zero debt subordination to a record 27%.[2] We are not alone in recognizing these risks as investors increasingly move into first-lien positions where seniority actually has some value given larger debt cushions beneath them. This seems like a prudent strategy to us: exchange some reward for less risk in a market where behavior has become more aggressive in terms of credit quality.

Still, not all areas of private credit are overheating. There are pockets of the market where funding gaps continue to be wide and, thus, we believe there are opportunities to move into more defensive positions without having to make a correspondingly large return tradeoff. Specifically, pricing is appreciably more attractive in off-the-run areas of asset-based lending (ABL), which we like not only for its higher yield potential, but also for its structural downside protections at this point of the late cycle. Aware that defaults could potentially increase, we prefer loans that (1) are proprietarily sourced for greater influence over terms and outcomes; (2) have first priority claims on controllable, high-quality assets that can be readily liquidated or at least provide a predictable cash flow for repayment; and (3) utilize structures that effectively transition credit risk from midsized enterprise borrowers to their higher-quality customers, but allow investors to get paid on the former. In this article, we discuss the importance of direct origination capabilities in an increasingly competitive environment, the mechanics of the *structural transfer of risk* in ABL, and where in the market it can be applied to drive attractive risk-reward opportunities, including accounts receivable financing in both the corporate and government sectors and commodity trade finance.

Exclusive Solutions

As competition to supply capital has broadly bid down return per unit of risk, we believe performance differentiation within private credit will be driven by the strength of participants' sourcing networks. We are focused on managers that have unique relationships to source direct-to-company opportunities in which they are the only financing option and can drive the entire lending process from origination to realization. By taking an active role, managers have the chance to customize a stronger package of terms (e.g., interest rate, Libor floors, call protection, seniority, primary

[1] Source: S&P Global, Leveraged Commentary & Data.
[2] Ibid.

and secondary collateral, personal and corporate guarantees, covenants), transaction fees (e.g., upfront, exit, undrawn) and upside kickers (e.g., warrants). If underwritten properly, we believe these enhancements can provide a significant edge over sponsored deals where the involvement of brokers and intermediaries leads to less control over structure and pricing. However, navigating direct-to-company transactions presents a variety of challenges. It requires proprietary relationships with operating companies to cultivate deal flow. It demands specialized resources to handle their structural, operational and legal nuances. It may call for the ability to act quickly and at scale to alleviate the urgent liquidity issues of stressed or distressed companies. Issuers can also falter and struggle after deal conception, necessitating a more hands-on approach for effective workout and restructuring outcomes. These added complexities are not easily digestible by traditional market participants, allowing specialist managers to seek higher returns for offering highly customized capital solutions to smaller borrowers that may not otherwise have access to financing.

Structural Transfer of Risk

We believe a direct origination strategy applied to ABLs has the potential to generate strong risk-adjusted performance given inherent structural protections. ABL is a type of senior-secured financing which is supported by defined collateral, ranging from short-term assets such as accounts receivable to long-term assets such as equipment, plants and property. The focus of this article is relatively shorter-duration opportunities, which we broadly define as assets that are typically self-liquidating in nature and often have definable repayment plans. In a typical ABL transaction, lenders have a direct claim on the assets being financed, which insulates them somewhat from the operating performance of the company. Since loans are more exposed to the collateral than the ongoing cash flow and enterprise value of the company, credit risk shifts from the borrower to the liquidation value of the assets or the counterparties behind them. As such, we believe there is a quasi-arbitrage opportunity to offer capital solutions to companies that have below-investment-grade profiles but have collateral with high-quality payors, as yields are based on the former, but true credit risk is based on the latter. However, the structural transfer of risk must be harnessed with tight controls on collateral and cash. Otherwise, the underlying credit risk (i.e., more exposure to the borrower) will be higher than it appears on the surface. In the sections below, we explore a variety of direct-to-company approaches that embrace this investment philosophy and provide illustrative examples of the bespoke structures being used to earn outsized yields relative to the risks undertaken.

Accounts Receivable Financing: Corporate Counterparties

Accounts receivable financing provides borrowers with an early payment of outstanding invoices to improve balance sheet positions and to optimize cash flow. Advances are made pursuant to a "borrowing base" that is established by specific receivables. Accounts receivable financing comes in various forms, but the most traditional is called factoring: An intermediary (the factor) purchases receivables from a company (the supplier) where money is owed by customers (the obligor). The factor typically purchases the invoices at a discount and earns a yield based on the ability to collect all the payments effectively, with further accretion if the recovery period is accelerated. If on a non-recourse basis, the credit risk is transferred from the supplier to the factor, the receivables no longer appear on the supplier's balance sheet and the early payment is booked as cash. However, the credit facilities we more commonly see from hedge funds are structured as revolving lines of credit or term loans (or revolvers that convert to term loans after a specified period) that are secured by a defined pool of receivables which determines the borrowing base. The amount advanced by the lender varies depending on the quality and performance of the collateral. This is known as the "advance rate," which is set as a percentage of the value of the eligible collateral and provides a margin of safety in the event the receivables underperform. While lenders analyze the financial condition of the borrower, as they would in cash-flow lending, repayment capacity is ultimately determined by dedicated cash flow from the conversion of receivables and not cash flow from operations. As a result, the underwriting process for receivables financing places more of an emphasis on the following factors:

- **Physical and Legal Controls:** Lenders must exert control over the collateral through well-protected structures to ensure loan repayment and the priority of its lien position. This can be achieved through off-balance-sheet, bankruptcy-remote vehicles that have a perfected security interest in the collateral and the cash proceeds thereof through deposit account control agreements. In this way, lenders can monitor the receivables and their cash flows continuously to reduce operational risk. Other potential legal protections include certificates that represent that

the company is solvent before drawing from the facility (otherwise, the loan will wind down) and true contribution opinions noting that title to the receivables has transferred to the lender to prevent incidences of fraud (e.g., using the same receivables as collateral to obtain financing from another lender).

- **Collateral Evaluation:** Lenders must have a firm grasp of what the collateral underlying the loan is worth to ensure that the realizable value is sufficient to cover the outstanding balance. This means underwriting the creditworthiness of obligees and monitoring any changes to their payment behavior over time. The collateral may also be independently verified to determine that it indeed exists and whether the consideration being received represents fair value.

Middle-market companies seek financing arrangements such as those just described above for a variety of reasons. A typical candidate has a short-term liquidity issue but a strong asset base that can serve as collateral for a loan. For example, a company could be suffering from an overleveraged balance sheet and may need to unlock liquidity by monetizing its receivables to pay down existing debt and to fund its business plan. A company could be facing an upcoming covenant issue that it expects to be mitigated as new business comes online, but requires a capital solution that bridges the timing gap until the revenue is recognized. Managers can seek to earn an attractive rate of return for alleviating such challenges given the urgent nature of situations and as banks are hesitant to lend to companies whose capital structures are distressed. However, managers must have proprietary sourcing networks to identify potential opportunities, which often arise from their previous involvement in a company's capital structure and deep relationships with management teams and private equity sponsors. Both have proven to be an effective channel not only for initial transactions, but follow-on ones as well. We provide a case study in which a manager with prior, highly unique expertise in receivables financing facilities was contacted by one of the largest global private equity firms about a liquidity solution for one of its portfolio companies:

Case Study: Logistics Company[3]

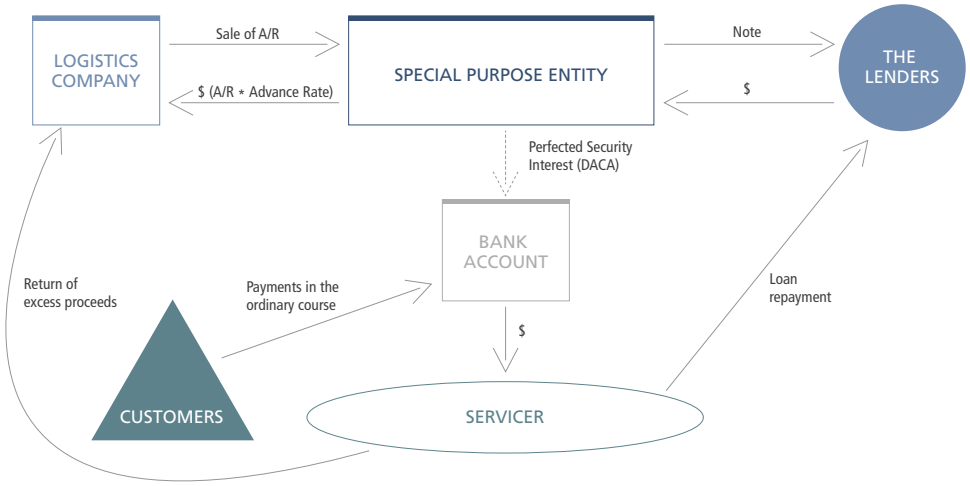
The manager structured a $100 million receivables financing facility for a private-equity-backed global provider of logistics and fulfillment services in the technology and automotive industries. The company was facing a liquidity issue related to a springing secured leverage covenant attached to its existing debt. The company had cash needs to fund its growth plan, but, if additional amounts were drawn on its revolver, there would be a covenant breach that would force management into considering an equity cure or amendment. The company had trailing 12-month revenues of over $900 million and EBITDA of $70 million, which was split evenly between technology customers and automotive customers. The company had historically reinvested all of its free cash flow, a strategy that was starting to be rewarded in the form of new business wins. The recent business wins were expected to contribute another $144 million in revenue and take EBITDA to over $100 million for the year. However, the company needed additional capital to support the customer wins with the construction of new fulfillment sites. All of the company's facilities are strategically located in close proximity to its clients' manufacturing facilities. On the technology side, the company provides assembly services and software installations before shipping the products to customers. On the automotive side, the company typically packs auto parts and ships them overseas. Upon review of the company's $900 million of sales, it was determined there was a bad debt expense of only 0.02%. The receivables were diversified across *Fortune 500* companies, with top obligees such as Apple, Google, Dell, FCA, Daimler, Jaguar and BMW, which were bound by multiyear master services agreements and had been with the company for over 10 years. Overall, the company had experienced a 100% renewal rate the year before, extending long-term contracts with other high-quality accounts such as IBM, Xerox and Harley Davidson. Geographically, the receivables were primarily spread across Canada, the U.S., the U.K., Ireland, the Netherlands and Germany. Approximately 94% of the receivables were current and paid immediately on invoice and 99% were paid within 30 days. Importantly, the collateral in the deal would only include receivables for services already completed and where the revenue had been recognized; the company did not have to provide any follow-on services once the initial products were shipped and their customers were invoiced. Since the company did not have any other financing alternatives as it was rapidly approaching a covenant issue, the manager was able to secure an attractive package of terms, which are highlighted in the accompanying display.

[3] For illustrative and discussion purposes only. The case study discussed does not represent all past investments. It should not be assumed that an investment in the case study listed was or will be profitable. The information supplied about the investment is intended to illustrate the investment process and not performance.

Accounts Receivable Facility: Summary of Terms

- **Structure:** Asset-based revolver
- **Interest Rate:** Libor + 775 bps on drawn amount; 75 bps on undrawn
- **Maximum Facility Size:** $100 million
- **Advance Rate:** 85% for almost all contracts; collateral coverage of roughly 1.2x
- **Minimum Amount:** 80% of max amount; full interest on at least $80 million is owed regardless of the amount drawn
- **Final Maturity Date:** Earlier of three years or 90 days prior to any other debt maturity, including the existing revolving credit facility
- **Upfront Fee:** 2% of maximum amount
- **Exit Fee:** 2 – 3% of maximum amount depending on termination date
- **Litigation Reserve:** $1 million
- **Collateral:** High-quality and investment grade receivables

TRANSACTION STRUCTURE



Source: Neuberger Berman. For illustrative and discussion purposes only.

The manager effectively created an investment-grade-like risk profile with a high yield return, which was safeguarded by the deal's strict operational and legal framework. The highlights of the transaction included a bankruptcy-remote structure to protect the assets from being administered as property in the event of a bankruptcy, a perfected lien on the collateral and the cash it generated, an instruction to customers to pay their invoice directly to the collection account controlled by the manager, a requirement that the proceeds of the advances would go toward reinvestment in the company, and a legal opinion in each jurisdiction that the title to the receivables had transferred, among other protections.

Accounts Receivable Financing: Government Counterparties

A more niche sector of receivable financing is focused on providing capital solutions to middle-market companies that conduct business with the government. Receivable payments from government agencies have consistently experienced long delays due to structural and bureaucratic inefficiencies, creating a need for financings to bridge the timing gap. With a government entity acting as the counterparty, we consider the probability of default to be low and instead believe the main risk exposure to be the timing to repayment. And this government-type risk can be created by lenders at much higher yields relative to similar risk that is available in the marketplace, as the companies involved generally have a lack of financing options and an immediate need for cash to facilitate their growth initiatives. Earlier this year, we saw the partial U.S. government shutdown expose federal contractors to an estimated $200 million per day in lost or delayed revenue after 13 major federal departments and agencies, which had awarded $89.3 billion in obligations

to contracts in the 2018 fiscal year, shuttered temporarily.[4] Many contractors that had completed work were unable to get paid for it because the offices that would normally process their invoices were closed. This created cash flow issues for smaller companies with highly concentrated revenues from the impacted government entities, particularly relative to their larger, more diversified counterparts. Even when the government remains functional, payment delays on earned receivables to the private sector are systemic given the highly regulated nature of contracting, which may involve the coordination of multiple departments, budget impasses that frequently stall appropriations for projects, changes in administration that lead to new decision makers, and outdated and manual procedures for billing and collecting, all of which slows processing times. These inefficiencies occur across trillions of dollars a year that the U.S. government spends on an exceptionally broad spectrum of programs.[5] There is even a specific target established by Congress to award almost 25% of federal contract dollars to small businesses.[6] While a large addressable market that offers double-digit yields secured by high-quality cash flows from an AAA rated entity would ordinarily attract a lot of attention, there are relatively high competitive barriers to entry. Government agencies are complex organizations requiring strong relationships at the federal, state and local levels, as well as specialized structuring and legal expertise to execute transactions. For example, the government may only work with capital providers that have been designated as official alternative lending partners, an approval that typically involves a multiyear vetting process and is given only to a select number of counterparties and, in some cases, as few as one, depending on the agency. Technology integration with the relevant agencies is another issue that not all lenders are equipped to handle. This includes direct interfaces with procurement payment systems and tracking of a program's deployment and progress, which helps limit the potential for operational errors (e.g., incorrect claims or payments). Individual deals also tend to be small in size, are highly customized in nature and are short in duration, which means larger middle-market lenders such as community banks and finance companies have been unable to scale and replenish opportunities quickly enough to create sustainable business models. With fewer competitors putting pressure on pricing and terms, we believe there is a relatively long runway of opportunity for lenders with specialized government experience and expertise to structure unique loans with attractive yields. We provide illustrative examples of government-related transactions below:

Case Study: FEMA Receivable Financing[7]

This is a deal that was sourced by a manager who has had relationships with the leadership at the Federal Emergency Management Agency (FEMA) for over a decade. FEMA is a division of the U.S. Department of Homeland Security, which had already approved the manager as a "regulated business." In September 2017, FEMA committed to provide funding for the disaster relief response to the devastating water and wind damage caused by Hurricane Florence in the Carolinas. FEMA has contracted with a number of private companies to carry out its recovery plan, which includes the repair of infrastructure such as roads and bridges, water control facilities, and buildings and equipment. However, the companies will not be paid until roughly 10 weeks after the completion of their respective projects. The manager agreed on a $250 million transaction with FEMA in which capital is provided to the underlying contractors as recovery work is completed over a four- to six-month period. The deal is structured as factoring facility in which the FEMA receivables are assigned to the manager and purchased at discounts of 3 – 5%. Upon collection of the cash at the estimated 10-week mark, the manager would realize a roughly 15 – 25% gross annualized return on what we consider to be Treasury-type risk. Capital would then be recycled into new factoring opportunities as companies submit invoices for their finished work. We believe the main risk the manager faces is a longer-than-expected recoupment period for the earned receivables. For example, FEMA could take longer to pay their invoices if the agency finds itself preoccupied with future catastrophic storms or if there are disagreements about the services performed.

[4] Source: Bloomberg, January 9, 2019.
[5] Source: Congressional Budget Office.
[6] Source: Small Business Act.
[7] For illustrative and discussion purposes only. The case study discussed does not represent all past investments. It should not be assumed that an investment in the case study listed was or will be profitable. The information supplied about the investment is intended to illustrate the investment process and not performance.

Case Study: Australian Tax Credit Financing[8]

Governments use various tax subsidies to stimulate economic growth by incentivizing businesses to relocate to strategic areas, increase the size of their workforce, and invest in new facilities and technologies. However, eligible companies commonly face reimbursement delays of up to 12 months under such programs. We are seeing financing solutions that accelerate the payment of tax-credit receivables due to middle-market companies in the U.S. as well as other common-law countries. As an illustrative example, we highlight Australia's Research and Development (R&D) Tax Incentive, which encourages businesses to invest in R&D by offering tax offsets for eligible expenditures. Under the program, companies with annual turnover of less than $20 million can receive a 43.5% refundable cash rebate for R&D investments of up to $100 million in an income year.[9] However, the cash rebate is paid by the government on an annual basis, which means it can take 12 months for companies to monetize the incentive. The bottleneck in the payment is typically alleviated in two main forms: (1) senior secured bridge loans collateralized by the tax credits; and (2) outright purchases of the tax-credit receivables at a discount. While there is some competition from banks to provide such financing arrangements, they tend to focus on large transactions, leaving a gap in the market for loans of less than $2 million in size. The 2019 – 2020 budget estimate for the R&D Tax Incentive is $2.3 billion,[10] which is spread across a large number of small refunds that are candidates to be financed by specialist players that are more nimble.

Case Study: State Economic Development Authority Guaranteed Loan[11]

In addition to tax-based incentives, U.S. states devote billions of dollars a year to a variety of other programs that promote economic development activities. In this case study, we discuss how one state's initiative to revitalize its forest industry created an opportunity to provide a capital solution to the private company involved in the implementation. The state's forest economy is heavily dependent on traditional products such as paper, which has been challenged by a secular decline in demand. However, the government has taken a leadership role in diversifying the state's forest products sector into new applications for the chemicals and plastics industries. This has included supporting the development of technology that converts wood pulp and resin into forms of biodegradable plastic used in medical devices and water filtration products. The state worked with an alternative lender, which became its exclusive partner after a two-year due diligence process, to facilitate a financing arrangement for the company tasked with installing this technology at the lumber mills. The lender provided a senior-secured term loan to the company that matures in three years and is guaranteed by the general taxing authority of the state. While the primary form of loan repayment is the company's ordinary cash flow and not the liquidation of a specific set of receivables, the lender still has a first-lien interest in the company's assets in the event of default, although the claim is more general in nature. However, it is the state's backing of the debt that promotes the transition of traditional corporate credit risk to governmental risk much in the same way as the previously discussed government-related transactions. The loan was attractive for an obligation that is treated *pari passu* to the much lower-yielding municipal bonds of the state.

Commodity Trade Finance

Commodity trade finance (CTF) consists of funding solutions that facilitate the movement of physical commodities across global supply chains. Historically, banks were the principal players in CTF; however, capital adequacy rules under the Basel accords have significantly constrained their activities. Loans are frequently made to unrated, small and medium-sized enterprises (SMEs) in emerging markets, which carry punitive capital charges for banks. As banks have relinquished their dominant role in CTF, opportunities are opening up for alternative lenders to alleviate the trade funding gap, which has widened to approximately $1.5 trillion.[12] CTF encompasses a wide range of lending products that service companies involved in the trading, production, processing and distribution of commodities that are used as essential inputs for commercial applications. We believe the importance of raw materials to the supply chain has contributed to relatively low default rates across CTF historically. Based on $12 trillion of exposure across more than 24 million CTF transactions from 2008 to 2017, default rates ranged from 0.05% to 0.76%, as shown in Figure 1.

[8] For illustrative and discussion purposes only. The case study discussed does not represent all past investments. It should not be assumed that an investment in the case study listed was or will be profitable. The information supplied about the investment is intended to illustrate the investment process and not performance.
[9] Source: Australian Government, Taxation Office, June 2017.
[10] Source: Australian Government, Department of Industry, Innovation and Science, October 2018.
[11] For illustrative and discussion purposes only. The case study discussed does not represent all past investments. It should not be assumed that an investment in the case study listed was or will be profitable. The information supplied about the investment is intended to illustrate the investment process and not performance.
[12] Source: 2018 International Chamber of Commerce Global Survey.

FIGURE 1: CTF DEFAULT RATES (2008 – 2017)

Product/Asset Class	Obligor-Weighted Default Rate	Loss Given Default	Obligor-Weighted Expected Loss	Time to Recovery (Days)
Import L/Cs	0.37%	30%	0.11%	184
Export L/Cs	0.05%	36%	0.02%	111
Loans for Import/Export	0.76%	36%	0.27%	123
Performance Guarantees	0.47%	3%	0.01%	61

Source: International Chamber of Commerce, Trade Register 2018.

One area of CTF where we are seeing opportunities is pre-export finance. Transactions are typically structured as a senior loan to a producer or exporter located in an emerging market, which is secured by the future export flows of a commodity to a pre-approved buyer (off-taker) in a developed market. They have relatively short-term tenors of three to nine months and floating rate structures, limiting interest rate risk. Loans are self-liquidating, meaning repayment is driven by the receivables generated from the sale of the commodity in the assigned export contract. As the collateral is converted to cash, periodic payments of both principal and interest can be made throughout the life of the transaction. Off-taker payment terms are usually cash against document (CAD). This is an arrangement in which the exporter transfers shipping and title documents to the importer only upon full payment of the invoice, thereby reducing credit risk. All assigned proceeds are generally remitted directly to a collection account controlled by the lender for additional protection. Transactions also typically take place in the lender's domestic currency to eliminate FX exposure. Loans are made on an over-collateralized basis to account for the volatility of the underlying commodity, although some export contracts have fixed prices that require a smaller cushion. This requires a strong understanding of the supply/demand dynamics of the raw material to set the appropriate coverage ratio, which is the value of the pledged assets divided by the draw amount. Asset coverage is often further bolstered by bankruptcy-remote liens on secondary collateral such as property and equipment.

Fraud is another risk involved in CTF, given generally weaker legal and regulatory frameworks in emerging economies and lenders' lack of a local presence to monitor production activity. Examples of fraud include the unauthorized movement of physical commodities, the fabrication of warehousing receipts to misrepresent stockpiles, and the buying or selling of goods with no intention of ever delivering on those obligations. As a result, we believe it is important to employ independent collateral managers to monitor the quantity and quality of the collateral throughout the life of lending facilities to ensure the borrower is in compliance with the loan terms. At regular intervals, this should include onsite visits to monitor the progress of the commodity's harvest, to verify that the proceeds of the loan are only going toward activities linked to fulfilling the order in the assigned export contract, and to inspect the final product before it is released by the lender for shipment to the off-taker. Even if these precautions are taken, the nonbinding nature of export contacts presents an additional challenge as the lender could end up in a position of financing the production of a commodity without a defined buyer. This risk can be moderated by focusing on commodities that are essential inputs for off-takers' operations, which reduces the potential for the contract to be cancelled, and that have strong global demand, which increases the likelihood of finding another buyer. Finally, there is production risk, which can be mitigated by an evaluation of the producer's track record, the stage of the harvest being financed (e.g., root vs. seed), and legal rights to crops in future seasons. We believe pre-export finance, after controlling for the aforementioned risks, is an attractive way to capture emerging market-like returns without the associated volatility of their home markets, as repayment risk is transferred to the developed market counterparties importing the goods. Below is an illustrative example that contextualizes the risk-reward proposition of pre-export finance:

Case Study: Pre-Export Loan to a Brazilian Sugar Producer[13]

- **Company Highlights:** The company produces very high polarization (VHP) raw sugar, which has strong global demand due to its high quality and the relative ease of its refinement. The quality of the VHP sugar produced by the company is superior to that produced by other mills in the region, which has allowed the company to charge a premium for its product. The company's plants also exhibit much higher productivity than regional levels, which has attracted a high-quality customer base consisting of multinational investment-grade companies. The company had net sales of $100 million and EBITDA of $20 million in its most recent financial year.
- **Deal Background:** An alternative lender provided the company with a senior-secured, uncommitted revolving credit facility to fund the purchasing, processing, warehousing and exporting of VHP sugar under export contracts with one of the largest sugar traders in the world.

Key Terms

- Facility Amount: $7 million
- Coupon: 3-Month LIBOR + 10.90%
- Structuring Fee: 0.50%
- Tenor: Nine months with lender option to extend to 16 months
- Deployment/Repayment Schedule: $2.5 million to be funded at closing with the remaining $4.5 million to be drawn over the following three to five months; principal repayment of 50% in eight months and 50% in nine months; interest paid monthly
- Primary Collateral: VHP sugarcane and the resultant sugar that is produced to fulfill the export contracts with the approved off-taker; prior to any initial disbursement, the off-taker is to execute and deliver a Notice of Assignment and Acknowledgement of Assignment of the export contracts to the lender; 76.92% advance rate if the price of sugar in the contract is not fixed; 86.96% advance rate if the price of sugar in the contract is fixed; once sales are made, the accounts receivable becomes the collateral
- Secondary Collateral: 70% of the loan secured by a bankruptcy-remote lien on two properties located close to the existing sugarcane mill
- Coverage Ratio: 185 – 200% based on the total collateral package; if the coverage ratio is breached, the borrower is to provide either additional sugarcane and/or sugar or prepay part of the initial draw to ensure compliance with the requirements

- **Risks and Mitigating Factors:**
  - Operational Risk: Independent collateral manager to verify the quality and quantity of the collateral and to provide a report every three weeks during crop season and every six weeks during inter-harvest season; once the sugarcane is processed into sugar, it will be stored in a warehouse at the port which issues Agricultural Deposit Certificates (CDA) and Agricultural Warrants (WA) endorsed to the lender; the CDA represents the promise of delivery of deposited goods while the WA grants the lien rights on those goods; the lender is the only entity that can authorize the release of sugar for shipment; all assigned proceeds are directed to a lender-owned, U.S.-based trust account
  - Commodity Price Risk: Based on the sugar futures delivery contract with an expiration date corresponding to the anticipated export date, prices would need to be stressed by almost 40% for the primary collateral value to be at breakeven to the loan amount; this would put sugar prices at a five-year low, despite supply/demand analysis suggesting that there will be a considerable sugar deficit during the next two crop cycles; additional collateral is provided by the land pledge, which cannot be advanced against, but covers 70% of the value of the loan; the facility is also uncommitted, meaning the lender could opt to no longer advance additional amounts if there is a downturn
  - Production Risk: While the lender is financing the growing cycle, it is from the root status of existing sugarcane and not the seed status. This reduces production risk as the specific sugarcane has proven to be productive in the past (sugarcane can be harvested roughly six to eight times from each planting); several farms are providing the sugarcane,

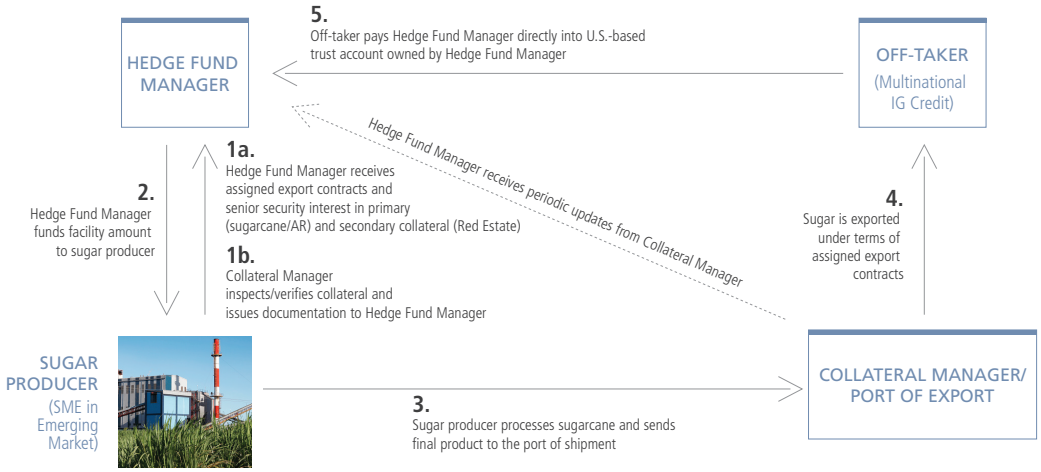
[13] For illustrative and discussion purposes only. The case study discussed does not represent all past investments. It should not be assumed that an investment in the case study listed was or will be profitable. The information supplied about the investment is intended to illustrate the investment process and not performance.

which diversifies the sources of collateral; the pledge of the sugarcane also gives the lender rights to the following crop in the event the current crop is unsuccessful; the company has been producing sugar for over 60 years and represents a meaningful portion of the market

– Non-Binding Nature of Export Contracts: The off-taker appears likely to honor its orders due to the timing of the crop cycle; VHP sugar must be purchased from the region of Brazil in which the producer is located, as other parts of the country will be exiting "maintenance" mode during the delivery period window; this forces the off-taker to rely on the output from that region, in which the producer accounts for 15% of total volume; there is also strong global demand for sugar, suggesting it would be feasible to locate other buyers if the off-taker cancels its contracts

– Credit Risk: Loan structure transfers repayment risk from a small producer in an emerging market to a higher grade off-taker in a developed market; off-taker generated revenues of more than $6 billion in the previous year and controls about 20% of the global sugar trade; the terms of payment are CAD, further reducing credit risk

PRE-EXPORT LOAN STRUCTURE



Source: Neuberger Berman.

Conclusion

While making a call on the timing of the next credit cycle is typically a futile task, we are mindful of the warning signs that the market is already exhibiting and how they may influence the opportunity set going forward. Unprecedented levels of corporate leverage, the prevalence of loan-only issuers and generally weaker underwriting standards are just a few of the red flags that continue to build caution into our view of the market. In a more uncertain economic environment, where the likelihood of credit stress is elevated, we believe it is time for investors to prioritize downside protection and to ensure they are receiving appropriate compensation for the risks they are taking in their portfolios. In our view, for investors who can tolerate a degree of illiquidity, proprietarily sourced asset-based loans such as those discussed throughout this article can deliver on both principles. Key to our thinking is the ability to bypass the corporate credit risk normally associated with below-investment-grade borrowers through sound structures that are collateralized by highly marketable asset types linked to high-grade payors, while the origination of unique deals that are difficult for competitors to replicate can help deliver differentiated relative performance for investors. We believe these characteristics can create relatively short-duration debt investments with much higher yields than the underlying credit risk implies.

Insurance-Linked Securities: Fortified After Two Event-Heavy Years

For investors looking for virtually no correlation to traditional asset classes, ILS now offer compelling pricing in light of past realized risks.

Background

Insurance-linked securities (ILS) are still a relatively new and constantly evolving asset class. Issuers of ILS (sometimes referred to as "protection buyers" or "cedents") include both life and non-life insurers and reinsurers seeking to pass on certain risks on their balance sheet to the capital markets, thereby accessing a diversifying source of capital on a fully collateralized, and often multiyear, basis. Investors in ILS include both hedge funds and specialist asset managers, as well as some direct investments from select sovereign wealth and pension funds. Investors in ILS effectively underwrite a set of risk exposures and, in exchange, earn an insurance risk premium.

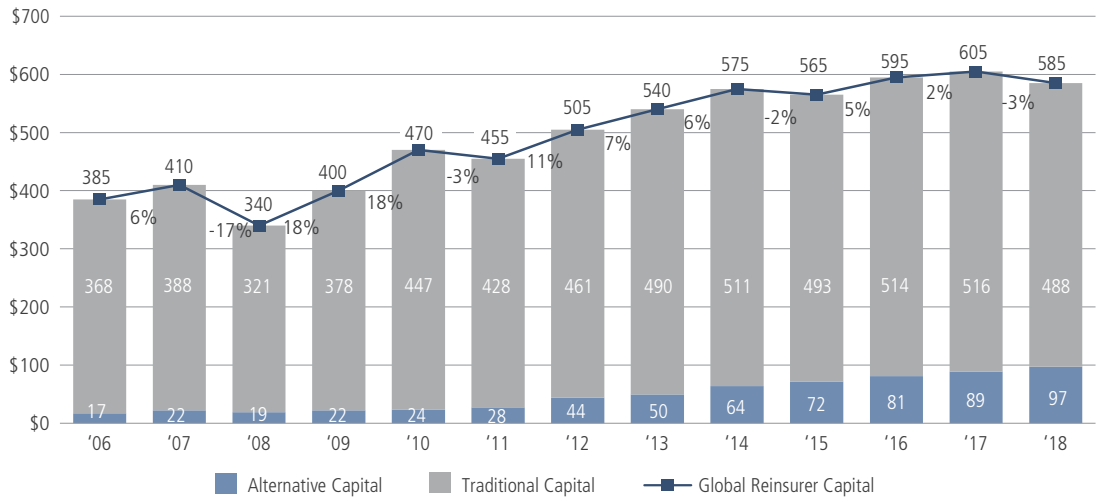
The first direct transfer of reinsurance risk to the capital markets followed Hurricane Andrew in 1992, which at the time was the costliest hurricane the U.S. had ever experienced and profoundly affected the Florida insurance market, ultimately resulting in the failure of at least 16 insurers[1] and highlighting the need for collateralized protection outside the traditional reinsurance market. The 2005 hurricane season was a second catalyst and an inflection point for major growth and diversification. Interestingly, growth in the market has been driven by both demand and supply, with investors attracted to the asset class due to attractive absolute returns and a near-zero correlation to the broader financial markets. The 2008 financial crisis led to a third inflection point in the space, resulting in a broader, modernized set of offerings to answer investors' appetite, risk-return profiles and liquidity constraints.

Asset Growth in ILS

The size of the ILS market has more than doubled since 2012.[2] Recent studies estimate the market at just over $100 billion in 2019, accounting for approximately 16% of the global reinsurance market.[3] This pool of capital is dominated by specialized ILS hedge funds, with their funding mainly from institutional investors in particular pension funds. Assets have increased largely due to investor appetite for uncorrelated strategies and the attractive performance by the asset class. In particular, positive performance in 2008 helped galvanize investor attention. 2017 – 2018 was also an important milestone for the industry, with asset inflows continuing despite posted losses, predicated on pricing strength in the wake of these losses. Absent another heavy loss year in 2019, it seems likely that alternative capital in the space will continue to grow, with some predicting it will double by 2021.[4] Growth has also been driven by demand from the reinsurers as an efficient way to hedge part of their risk; the changing regulatory framework, including Solvency II in Europe, acts only to further incentivize this phenomenon.

[1] Source: https://www.insurancejournal.com/news/southeast/2017/08/24/462204.htm.
[2] Source: Aon Benfield, *Reinsurance Market Outlook*, April 2019.
[3] Source: Aon Benfield, *Reinsurance Market Outlook*, April 2019.
[4] Source: Ernst & Young, *Dying, Surviving, Thriving – Global Reinsurance Market,* August 2017.

FIGURE 1: GROWTH OF ALTERNATIVE CAPITAL IN THE ILS MARKET
($ Billions)



Source: Aon Benfield, *Reinsurance Market Outlook*, April 2019.

Today, 32 funds report to the Eurekahedge Insurance Linked Index, with Artemis reporting 51 distinct insurance-linked securities investment managers. This includes 25 managers managing in excess of $1 billion in the space, although the AUM spread is large, with over 10 managing below $200 million. The individual sub-advised funds managed by these groups also see meaningful dispersion in size, with the typical AUM in the $500 million to $1 billion range. By way of comparison, in 2009, the peer group tracked by NB Alternatives stood at 15 dedicated funds in the ILS space, with an average size of below $350 million, another testament that growth has been rapid.

Early fund vehicles focused predominantly on the catastrophe (or "cat") bond market, but with the rise of AUM and therefore competition in the market, the complexity of the space has also increased, with hedge funds moving to favor the collateralized reinsurance space. Barriers to entry in the ILS space are reasonably high, particularly at the bilaterally negotiated private end of the asset class spectrum. It is difficult to gain access unless participants can display significant size, presence in the market and high-level collateral for some of the strategies. Size can be useful for pricing power, particularly in the private transaction market when creditworthiness is also relevant. Termed "tiering in," larger managers may get better pricing than those that can only play in the syndicated space.

Bermuda remains the most popular location for ILS hedge funds, and acts as the center of expertise for the catastrophe reinsurance market, supplying the majority of Florida's reinsurance capacity. The insurance market remains largely intermediated and, in a market where relationships are a key advantage, it is important to have a local presence.

ILS Strategies

Hedge fund strategies tend to focus on natural property catastrophe reinsurance, which dominates tail risk for most insurers or reinsurers, driving what is referred to as "peak" risk exposure (i.e., the one that carries the highest risk-adjusted premium). A second and much smaller focus is on life insurance, including but not limited to longevity and excess mortality risk as well as the adjacent life settlements market. Man-made (e.g., terrorism, cyber) and specialty risks (e.g., marine or aviation) currently represent an even smaller part of the asset class.

Natural property catastrophe reinsurance has two primary features that attract investors. First, it tends to have a shorter development period than aviation, shipping, terrorism and satellite, to name a few. Second, the availability of robust

and more established catastrophe-modeling software provides a degree of comfort around risk assessment, pricing and portfolio management.

This bias to well-modeled risk, along with the depth arising from the large-scale exposure of the U.S. residential and commercial property market to U.S. hurricane risk, has led to this exposure dominating hedge fund strategies. U.S. earthquakes are the second largest catastrophe insurance exposure, followed by European windstorms and Japan earthquakes. Smaller exposures in the natural catastrophe market include Japan typhoons, Australia/New Zealand earthquakes, South American earthquakes and Caribbean hurricanes.

Risk/Reward

ILS returns are generated by charging an insurance premium for taking on the risk that a large natural catastrophe could occur. This may include but is not limited to damage caused by wind, rain, snow, earthquake and/or tidal surge and flood. These contracts can be written across any geographic regions where natural peril events occur that may result in insurance losses. The U.S. is the largest market, followed by Japan and Europe. Contracts can also be more granular geographically, for example specifying or even excluding various U.S. states. Contracts may also combine various geographies and perils.

Critics of the space as an investment strategy have highlighted the potential risk of concentration, in particular from U.S. wind events. Such exposure is difficult to avoid, as this is the largest insured market with the highest potential losses and, therefore, the strongest demand for coverage and reinsurance. That said, a number of mechanisms exist to create further diversification. For example, ILS risk capital can be diversified by coverage type. Broadly speaking, this is split into single-event only (occurrence), multiple events (aggregate) and frequency structures (e.g., second or third event). The latter means that the contract is only triggered if the named event (e.g., a U.S. hurricane) occurs for a second or third time. Of the issuance outstanding in the cat-bond market, 42% is per occurrence and 58% is per annual aggregate. Further diversification can be obtained by underwriting multiple strike prices or "severities." ILS transactions can either be characterized by an attachment point (the point at which the investor is first exposed to a loss) or an exhaustion point (the point at which the investor's capital is depleted). In these transactions, losses evolve in a linear fashion between these two points. Alternatively, transactions can involve a type of ILS structured around the losses of the entire insurance industry and are thus binary in nature. For example, an industry losses contract of $60 billion will only be triggered if losses hit that level.

The ILS industry represents a spectrum of liquidity, complexity, transparency and risk/return, with cat bonds at one end and collateralized reinsurance at the other. These sub-sectors will be discussed in more detail below.

FIGURE 2: CHARACTERISTICS ACROSS THE INDUSTRY

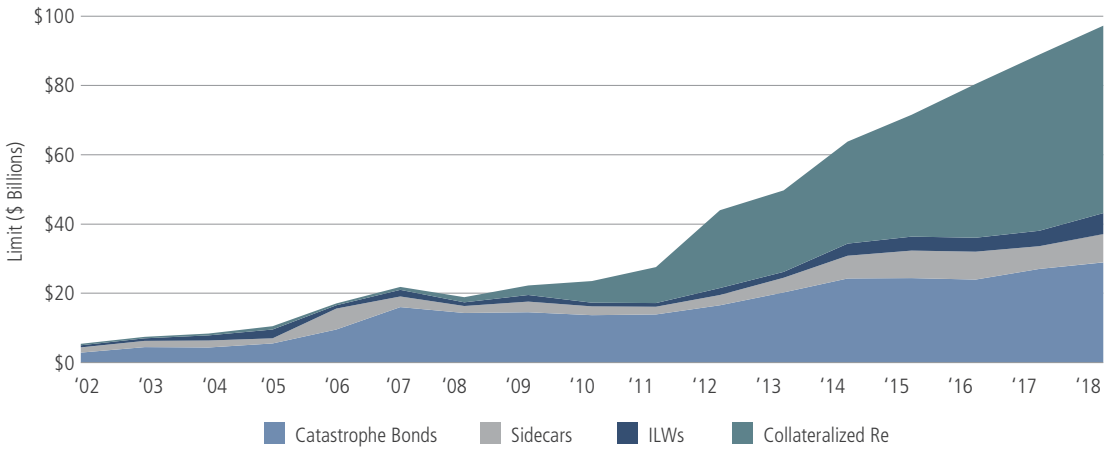
	Liquidity	Transparency	Customizable
Cat Bonds	Medium	Medium	None
ILWs	Low	High	High
Side Cars/Quota Shares	None	Low	Low
Collateralized Reinsurance	None	Low	Medium

Source: Neuberger Berman.

Starting around 2011 – 2012, the ILS market has seen a significant shift in focus. While the volume of cat bonds and ILWs has grown slightly, the majority of new capital entering the market has been deployed in the form of collateralized reinsurance. This is largely due to supply and demand dynamics. Cat-bond issuance has been outstripped by investor inflows. The total amount of cat bonds outstanding in 2019 is around a third of the total alternative capital.[5] This supply imbalance has also contributed to a reduction in catastrophe bond yield spreads. Hedge funds have therefore shifted up the risk curve in an effort to seek higher absolute yields.

[5] Source: https://www.artemis.bm/dashboard/catastrophe-bonds-ils-issued-and-outstanding-by-year/.

FIGURE 3: INSTRUMENT SPLIT EVOLUTION OVER TIME



Source: Aon Securities Inc.

The most commonly utilized strategies by ILS hedge funds are outlined below. Many hedge funds can have exposure across the spectrum dependent on the opportunity set, although some are more specialized.

Catastrophe ("Cat") Bonds: Typically structured as 144A floating-rate notes, cat bonds are issued by insurers, reinsurers or other corporate sponsors, and designed to transfer catastrophic event risk to the capital markets. A cat bond looks to mirror a multiyear insurance contract between a sponsor, the insurance company and bondholders. Collateral is held in an AAA rated segregated trust account and, in return, the issuer pays a quarterly, or sometimes monthly, coupon. If the bond is triggered by an event, the insurer collects the collateral. If no event occurs, the noteholders get back the principal. The first cat bond was seen in 1994 with the issuance of an $85 million bond by Hannover Re. The majority of cat bonds cover the following perils: U.S. named storms and hurricanes, U.S. earthquakes, North Pacific typhoons, Japan earthquakes and European windstorms. Other natural perils include earthquakes and tropical storms in other locations, severe thunderstorms and tornadoes, wildfires and crop damage from drought. The cat-bond market also covers a number of non-natural perils, including aviation, marine, extreme mortality, life, health care and terror.

Bonds can be exposed to a single peril or to multiple perils, in which case the risk and return is generally higher. Bonds tend to have a one- to five-year term with a three-year average, and typically feature a "reset" mechanism when covering multiple years to continue matching risk/return following the issuance. They usually have a size of $100 million to $300 million, although the market will sometimes support deals as large as $1 billion to $2 billion. They typically pay quarterly coupons (some are monthly), structured as a stated spread over a floating rate (such as treasuries or Libor), with the principal at risk if a defined natural catastrophe event occurs. Coverage type is split into annual aggregate (exposure to multiple events over 12 months culminating in the total loss for that year), per occurrence (exposure to a single event) or multiple loss/frequency, triggered by a second or third event in the calendar year.

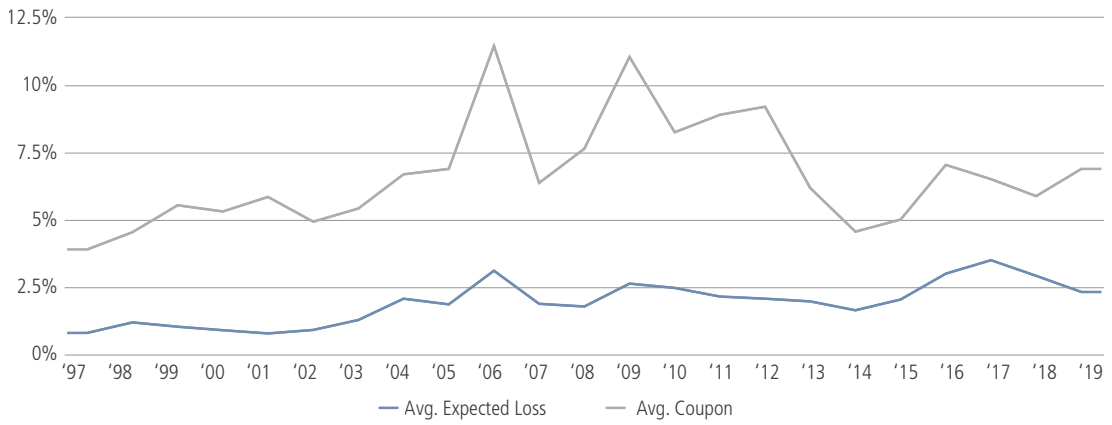
Trigger types may be structured in a number of ways, the most usual being as follows:

1. **Indemnity:** Trigger is based on the issuer's actual losses above a predetermined level.
2. **Index/Industry Loss:** Trigger is based on the loss incurred by the overall insurance industry exceeding a specified amount, calculated by an independent third party.
3. **Parametric:** Trigger is based on physical parameters of the natural hazard, such as moment magnitude of earthquake or maximum wind speeds of a hurricane event.
4. **Modelled Loss:** Trigger is based on losses above a specific modeled threshold calculated by third parties.
5. **Hybrid:** In bonds that cover multiple events, the above triggers can be combined.

There is an active secondary market in cat bonds, in which half a dozen institutions act as market makers, although bid-offer can be relatively wide at times. The risk/return characteristics of cat bonds vary according to the underlying peril. It is generally the case that the best return for a given level of risk is available in U.S. hurricane coverage because of high demand for protection against this peril.

Cat-bond spreads are determined by expected modelled loss and risk premium, the latter of which varies over time depending on factors such as perceived riskiness and sentiment. Peak perils such as U.S. wind typically demand higher spreads than more diversifying risks due to portfolio concentrations. The risk premium pricing and therefore spreads are strongly influenced by the previous year of losses in the insurance market. A significant year of loss activity will result in higher coverage demand the following year, while adverse sentiment will need higher pricing to match this increased supply. Pricing in the short term can also be influenced during a live event such as a hurricane and the perception of potential higher losses. As seen in the chart below, spreads widened significantly following Katrina in 2005 and more modestly in 2011 following the New Zealand earthquake and Japanese earthquake. Pricing is also a function of supply and demand in the market, which explains why spreads did not move significantly following 2017, as large amounts of capital were raised in anticipation of premium increases.

FIGURE 4: CATASTROPHE BONDS AND ILS ISSUANCE AVERAGE EXPECTED LOSS AND COUPON BY YEAR



Source: www.Artemis.bm Deal Directory.

Industry Loss Warranties (ILWs): These are privately negotiated contracts based on predefined industry-wide insured losses. Contracts typically have a six-month to one-year risk period and will also have a defined loss development period of 12 to 36 months for claims to accumulate. Similar to cat bonds, coverage types include aggregate, occurrence and multiple frequency. Index-based losses are calculated by a third-party provider, typically Property Claim Services (PCS) for U.S. natural catastrophe losses and PERILS AG for European natural catastrophe risks. ILWs are used by protection buyers to reduce their exposure to "peak" industry event losses. The advantage of ILWs is that they are highly customizable in terms of attachment level, region and/or peril combination, and highly transparent. For example, although the most common transaction type sees attachments based on predefined industry-wide modelled losses, more niche structures can see parametric triggers written into ILWs. The market is broker-driven and the reliance of strong relationships also creates a high barrier to entry.

Collateralized Reinsurance: This refers to privately structured contracts that insure a portfolio of specific insurance policies against losses caused by predefined peril. In these transactions, a hedge fund will underwrite a risk by fully reserving collateral to match the potential loss and, in return, will receive a coupon from the reinsurer. Contracts are typically 12 months in length but can go out to three years. To underwrite reinsurance, an entity is required to have an insurance license. Therefore, a hedge fund, for example, cannot enter into private reinsurance deals directly but instead will invest through a Special Purpose Reinsurer (SPR) or what is commonly called a Transformer. Funds can either use a commercial entity or establish their own. There is very limited liquidity, with no organized secondary market. Contracts

are typically indemnity in nature. The advantages of collateralized reinsurance contracts include the ability of hedge funds to customize their risk exposure, thereby adding diversification or shaping portfolio risk profile, and the growing demand from the reinsurers allows large amounts of capital to be put to work. This explains why this sub-sector has been the most rapidly growing part of the ILS universe in recent years. On the negative side, the space can see adverse risk selection from insurers as there is no alignment of interest, transparency can be poor and the high level of competition can impact pricing. At over $60 billion, this is now the largest segment of the ILS market.

Quota Shares: Quota shares are transactions designed to give exposure to slices of an insurer's or reinsurer's book. The buyer will receive a flat percentage of premiums and, in return, must pay the same fixed percentage of any losses occurring. On the positive side, as this is participation in the reinsurance business directly, there is access to best-in-class risk selection and portfolio management tools and an alignment of interests with the cedent, while the rated balance sheet allows for partial collateralization of deals. On the negative side, typically, transparency into the underlying can be poor as risk is selected by the reinsurer. This market stands at $20 billion to $30 billion, including the sidecars noted below.[6]

Reinsurance Sidecars: These are separate reinsurance vehicles created to allow investors participation in a reinsurer's book of business. In return for capital and commission to the reinsurer, the investor shares in a percentage of the reinsurer's risks and premiums. These are similar to quota shares in that a sidecar is usually a quota share agreement, but are typically structured as separate reinsurance entities to take advantage of pricing opportunities in the market, in particular after Hurricane Katrina. Vehicles are illiquid and have a fixed life of one to three years. The growth of collateralized reinsurance as an alternative has seen this structure decline in popularity.

Private Transactions: Increasingly, the market has seen an erosion of activity between hedge funds and reinsurers as hedge funds look to become the latter. This has included a move into primary issuance of private cat bonds, which allowed hedge funds to customize risk. Other, larger ILS funds have evolved to begin to transact directly with insurance companies, thereby cutting out the reinsurance broker and effectively acting as the reinsurer, removing the reliance on the syndicated renewal cycle. For example, in 2016 Nephila Capital set up its own internal managing general agent (MGA), called Velocity Risk Underwriters, to get direct access to insurers' U.S. wind catastrophe exposures. The size and breadth of the primary issuance market means that these transactions are also highly scalable and, in being closer to the original point of sale, cut cost. The need for scale to enter into this space means that barriers to entry are very high.

Hedging

Hedging within the ILS space can come in several guises. The most common form of hedging is using ILWs as short instruments against long collateralized reinsurance positions to hedge out where contracts are overexposed. Other forms of hedging can include "live-cat" trading that seeks to smooth losses during a hurricane or other event, most typically through live cat ILWs purchased during a storm or other event. In practice, this is difficult to execute due to limited appetite to take the other side of the trade. During Katrina in 2005, the cat-bond market was not deep enough for ILS managers to actively trade around the storm. 2017 was the first opportunity to live-trade cat bonds during a storm event, and daily volumes spiked materially over this period as managers adjusted positioning, with evidence this did help reduce portfolio losses in some instances. That said, the illiquidity of the market and the wide bid-ask spreads during this period limited the return generation. Another challenge is the potential for considerable modeled uncertainty over the exact path of a storm, as recently demonstrated by Hurricane Dorian in September 2019.

More routinely, hedging can look to mitigate exposure where the portfolio is over-allocated to certain perils (which by nature is inevitable given the dominance of certain perils/regions in the market) or if there is evidence that a season could be a particularly bad one for hurricanes. In addition, in some instances ILS funds will look to arbitrage the pricing differentials in the public and private market. The former will typically involve the use of cat bonds, ILWs or retro contracts with either the reinsurer or another ILS fund as the counterparty. Although rarer, some hedge funds look to sell protection in the private market at higher rates and buy protection in the syndicated market to capture the spread.

[6] Source: Neuberger Berman.

Opportunistic Trading

As an extension of live cat trading, ILWs and bonds can also be bought and traded on an event which has played out but where the final loss is still to be determined, thereby taking a view on where loss levels will end up. These contracts are referred to as "dead cat." Following the 2011 Japanese earthquake and more noticeably, the events in 2017, secondary trading volume increased as uncertainty prior to the release of data for the parametric index calculation created opportunities for trading desks, opportunistic buyers and concerned sellers.

Cat-bond trading also displays a seasonal pattern surrounding the hurricane, typhoon and European windstorm seasons, which can see material spread moves through the year, with cat-bond pricing typically falling prior to the U.S. hurricane season and then rising significantly once the risk season begins, again creating trading opportunities. The cat-bond new issue market is another area where tactical trading can be deployed. Dependent on demand post-issuance, these can trade up or down markedly and thereby provide opportunities for managers to either buy cheap off-the-run names as an attractive entry point or, conversely, flip on-the-run names they participated in at a premium. However, the cat-bond market can be relatively resilient even when there is an impending risk event. In September 2019, as Hurricane Dorian threatened to make landfall in Florida, the cat-bond market fell by less than 1%, limiting managers' ability to opportunistically trade their cat bond portfolios.[7]

Non-Natural Cat Insurance

Life Insurance: While the size of the U.S. life insurance market is deep, for example in 2017 life and health premiums stood at $595 billion or 51.6% of the total insurance market, the life market has to date seen less hedge fund involvement than its non-life counterparts. It has seen more, but still modest, interest from private equity managers, a trend that appears to be growing. For example, in first-quarter 2019, Apollo announced that it, in tandem with its reinsurance company Athene, was looking to raise $5.5 billion of insurance-linked strategies, of which $1.5 billion would be targeted for a fourth version of its life settlement fund. That said, there exist a handful of standalone life managers and several more who combine the two sub-sectors. Structures typically fall in the more illiquid and opaque end of the ILS market structure. Life insurance securitizations require detailed actuarial analysis to determine expected losses. Life risk will include both mortality and longevity. The first is the risk that holders of life insurance policies die earlier than expected, while the second is the risk that beneficiaries of annuities live longer than expected. Life ILS is beneficial to the insurer in several ways. First, it allows them to monetize the value of in-force or VIF securitization or the potential profits of an insurance portfolio to support other business objectives. In addition, it can be used for capital requirement relief and broader balance sheet risk reduction. As the regulatory environment continues to tighten, it is likely activity in the life reinsurance space will continue to grow.

Life Securitizations: The majority of life transactions are bespoke. The most common securitization transaction types are redundant reserve, embedded value and catastrophic mortality. Hedge funds typically purchase a tranche of a life securitization in the form of debt or surplus notes issued by an SPV created by the insurer. The hedge fund is taking a view on the reward relative to the actuarial assumptions and loss distribution in transactions to insurance mortality or longevity risk in return for being paid premiums. Deals are typically much longer than in the natural catastrophe space as they do not have a seasonal renewals element, and notes with a 30-year scheduled maturity are typical. These can be traded on the secondary market, but liquidity is limited.

Life Settlements: This is the purchase of a life insurance policy from an individual for cash, anticipating that the amount of the eventual payout will provide an attractive IRR on the base cost of purchase and maintenance of the policy.

Casualty ILS: This covers traditional casualty lines, such as auto liability, aviation insurance, workers' compensation, and employers and professional liability classes, as well as financial-related lines including guaranty and mortgage credit risk. This has been slower to gain traction, with only a handful of successful completed transactions in the space. Growth remains hampered by perceived issues around whether risk/reward is adequately compensated and how accurately this risk can be modelled. In particular, the loss development tail for casualty is particularly hard to model where there is the potential for

[7] Source: Artemis, https://www.artemis.bm/news/cat-bond-market-dipped-less-than-1-on-hurricane-dorian-threat.

accumulation risk. These sorts of contract exposure, particularly in the mortgage space, could also exhibit higher correlation to financial markets than cat risk, and the longer-dated nature of the exposure means it is not a fit for many hedge funds' liquidity profile.

Non-natural Cat Bonds: At the more liquid end of the spectrum, as discussed above, the cat-bond market is increasingly seeing issuance exposed to some non-natural perils, including in the life and mortality space. The biggest growth in 2018, however, came from the mortgage insurance linked note issuance. Current outstanding bonds in this space include coverage in motor third-party liability, extreme mortality, life, healthcare, operational risk and terrorism, for example, the $75 million Pool Re transaction issued in February 2019 by the U.K. government.

Risk/Reward Expectations

While the overriding characteristic of the asset class—that it is uncorrelated to broader markets—remains a common thread, risk/reward levels can vary meaningfully among the strategies. Returns in ILS are essentially driven by the tradeoff between yield and expected loss. The expected loss is the average loss incurred over the risk period divided by the principal amount. In the cat-bond universe, this can range from below 0.5% to over 8% and higher in privately negotiated transactions. While the strategy has a low volatility over the longer term, clearly this strategy also has a tail-risk component. The magnitude of this would depend on many factors, including diversification, sizing and structure (e.g., trigger types and attachment and exhaustion points), so it is impossible to make assumptions across the peer group as to potential size. By way of illustration, the Neuberger Berman ILS peer group saw some funds down in excess of 20% in September 2017, while others were down less than 2%.

Liquidity

Liquidity of the underlying instruments varies considerably. Cat bonds sit at the most liquid end of the scale; they trade daily and there is a secondary market, although there is limited market depth. Liquidity offered by cat-bond-only hedge funds can therefore be as liquid as weekly, although more typically it is monthly. The remainder of the space typically sees transactions with a 12-month horizon, which represents a full season of risk plus time for any significant losses to materialize. That said, when an event occurs, many transactions will have hold-back facilities, given the time delay for the full loss number to be published. This is typically in the form of a side-pocket provision. Deals can also be structured as far out as three years, and duration is typically longer in the life space. Investor liquidity for the most illiquid ILS strategies is typically annual, but more recently there has been a trend toward drawdown structures with a fixed life.

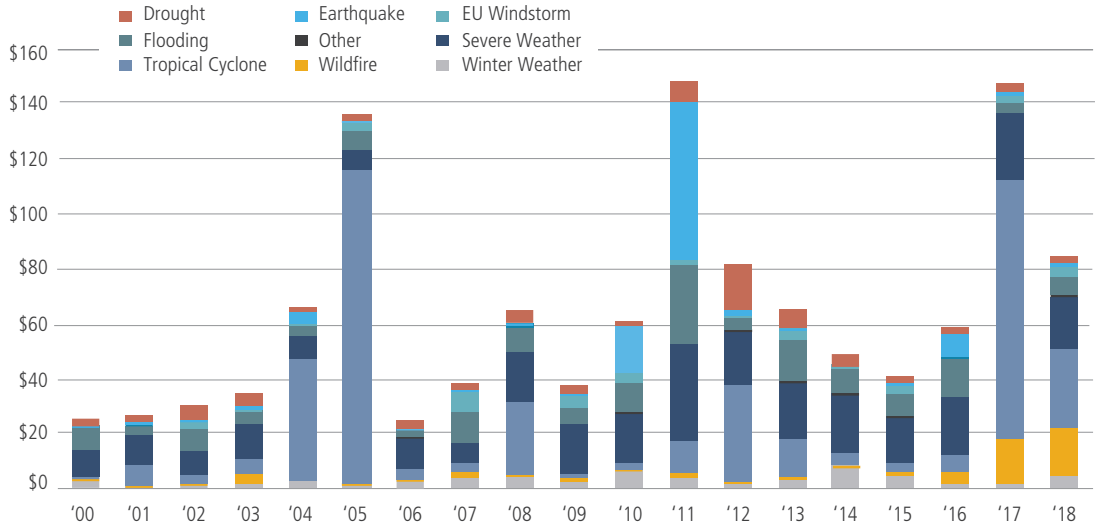
Historical Performance

Swiss Re launched a cat-bond index in 2007, tracking the performance of cat bonds since 2002 with the explicit aim of improving transparency and thereby attracting more investors to the space. This was followed by the creation of the Aon Benfield Index in 2010. Although there are some small differences in the weightings of the outstanding universe, the Swiss Re and Aon Benfield indices both focus on cat bonds, which are the most transparent and liquid instruments in insurance-linked investments. The outstanding cat-bond market finished 2018 at $37.8 billion.[8] This equates to only around 37% of the alternative market, with the remainder invested in contracts such as collateralized reinsurance and private ILS, where there is no transparency on performance. In order to overcome this opacity, in March 2012, ILS Advisers, in collaboration with Eurekahedge, launched the Eurekahedge ILS Advisers Index with the aim of capturing the performance of the entire ILS spectrum. This is an equally weighted index, which is calculated monthly by Eurekahedge and reported to Bloomberg, which tracks the performance of 34 ILS hedge funds.

Performance of the asset class should be directly correlated to global insured losses, with more challenging performance in years of higher insured losses. That said, this correlation is by no means perfect in that performance is also determined by premiums and the nature of the losses incurred, i.e., many small perils versus one large peril.

[8]Source: Artemis, https://www.artemis.bm/dashboard/catastrophe-bonds-ils-issued-and-outstanding-by-year/.

FIGURE 5: ANNUAL INSURED EVENT LOSSES BY TYPE
($ Billions)

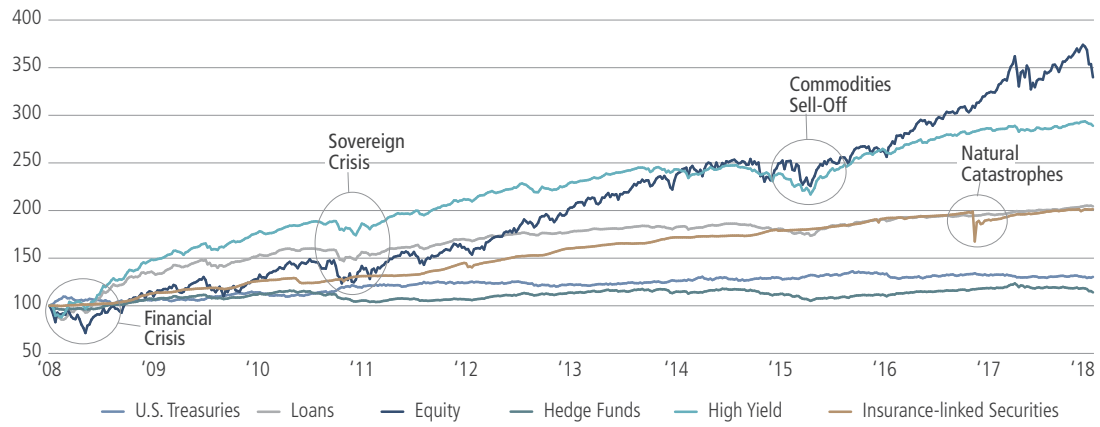


Source: Aon's Analytics Division in Reinsurance Solutions.

For example, although 2005 was a year of severe losses for the industry, performance of ILS strategies was strong. The Swiss Re Cat Bond Index finished the year in positive territory, albeit initially trading down in September to November of that year. 2005 did see the first principal loss to a cat bond, but only one of nine covering the gulf region at this time was triggered. The market also saw some mark-to-market moves due to selling pressure before a strong period of repricing. However, the limited losses for the year were largely attributable to a less mature market and smaller coverage scope at the time.

On an absolute basis, the performance of ILS as an asset class has been strong. Since 2002, the return of the Swiss Re Index has been over 8% on an annualized basis, with a volatility of less than 3%. This includes several large loss events, from Hurricane Katrina in 2005 to the Japanese Tohoku earthquake and tsunami of 2011, as well as the highest loss year of 2017, driven by Harvey/Irma/Maria and the California wildfires. This outperformance has been particularly marked since the 2008 financial crisis.

FIGURE 6: SWISS RE INDEX PERFORMANCE VS. OTHER ASSET CLASSES SINCE 2008
Cumulative returns, 2008 – 2018



Source: Eurekahedge and Bloomberg. The benchmark performance is presented for illustrative purposes only to show general trends in the market for the relevant periods shown. The investment objectives and strategies of each fund in the benchmark may be different than the investment objectives and strategies of a private fund and may have different risk and reward profiles. A variety of factors may cause this comparison to be an inaccurate benchmark for any particular fund and the benchmarks do not necessarily represent the actual investment strategy of a fund. It should not be assumed that any correlations to the benchmark based on historical returns would persist in the future.
Past performance is not indicative of future results.

As anticipated, the asset class has also exhibited little to no correlation to financial markets, which is unsurprising as natural and man-made catastrophes have nothing to do with financial risk factors.

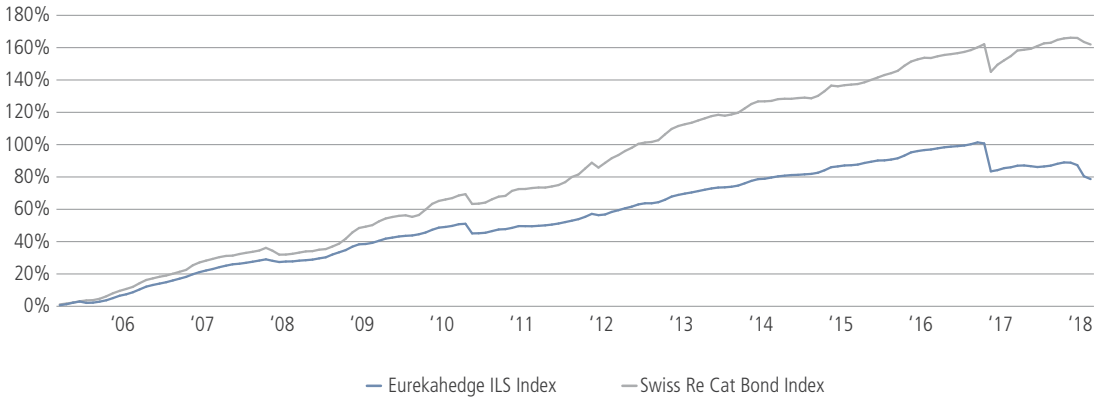
FIGURE 7: CORRELATION MATRIX TO OTHER ASSET CLASSES (2008 – 2019 YTD)

High Yield	0.03
Hedge Funds	0.04
Equity	0.03
U.S. Treasuries	-0.05
Commodities	0.13

Source: Bloomberg and NB Alternatives Analysis. Data through May 31, 2019.

Perhaps surprisingly, although the absolute performance of the Eurekahedge ILS Index has also been strong since inception in January 2006, with an annualized return of 4.6% and a standard deviation of 3.4% through August 2019, it has underperformed the Swiss Re Cat Bond Index over the same period. This suggests that you are not necessarily compensated for complexity and liquidity in the asset class. That said, this performance is relatively skewed by negative years in 2018 and 2017, down 2.5% and 5.3%, respectively.

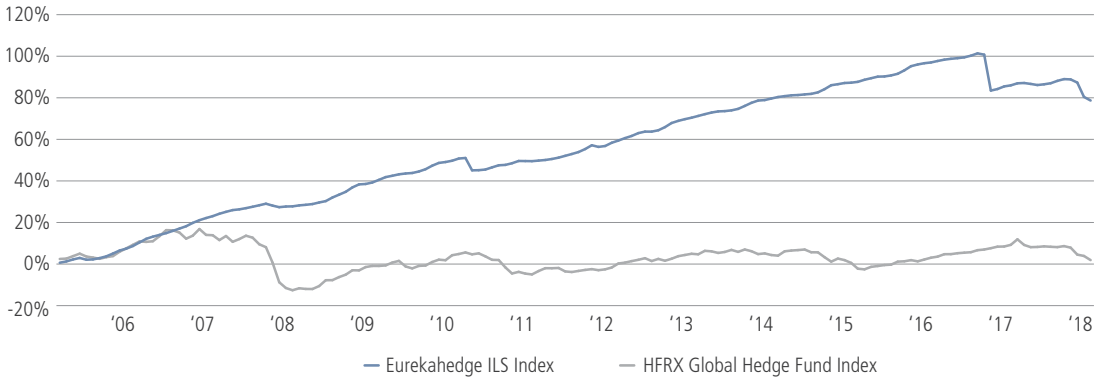
FIGURE 8: CUMULATIVE PERFORMANCE OF EUREKAHEDGE ILS INDEX VS. SWISS RE CAT BOND INDEX



Source: Eurekahedge and Bloomberg. The benchmark performance is presented for illustrative purposes only to show general trends in the market for the relevant periods shown. The investment objectives and strategies of each fund in the benchmark may be different than the investment objectives and strategies of a private fund and may have different risk and reward profiles. A variety of factors may cause this comparison to be an inaccurate benchmark for any particular fund and the benchmarks do not necessarily represent the actual investment strategy of a fund. It should not be assumed that any correlations to the benchmark based on historical returns would persist in the future. **Past performance is not indicative of future results.**

Nevertheless, an information ratio of 1.4 over this period compares extremely favorably with other hedge fund strategies, as indicated in the graph below. The only relative outperformers were certain credit and event-driven strategies.

FIGURE 9: PERFORMANCE OF EUREKAHEDGE ILS INDEX VS. HFRX

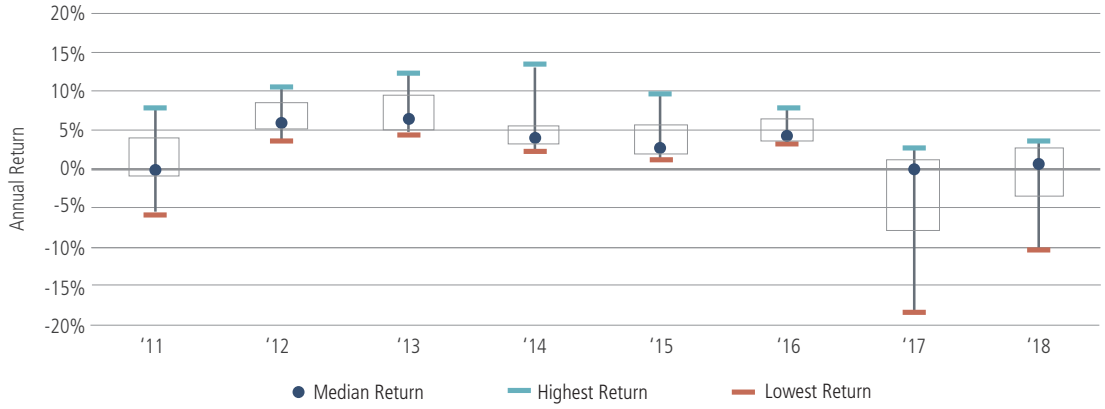


Source: Eurekahedge and Bloomberg. The benchmark performance is presented for illustrative purposes only to show general trends in the market for the relevant periods shown. The investment objectives and strategies of each fund in the benchmark may be different than the investment objectives and strategies of a private fund and may have different risk and reward profiles. A variety of factors may cause this comparison to be an inaccurate benchmark for any particular fund and the benchmarks do not necessarily represent the actual investment strategy of a fund. It should not be assumed that any correlations to the benchmark based on historical returns would persist in the future. **Past performance is not indicative of future results.**

Peer Group Dispersion

The ILS peer group has exhibited meaningful performance dispersion from underlying manager performance, which has been particularly evident in 2017 – 2018 and in other years with major events, such as 2011. In these years, the spread saw managers with materially negative results and others with strong positive returns.

FIGURE 10: PERFORMANCE DISTRIBUTION OF UNDERLYING ILS FUNDS



Source: Eurekahedge. The benchmark performance is presented for illustrative purposes only to show general trends in the market for the relevant periods shown. The investment objectives and strategies of each fund in the benchmark may be different than the investment objectives and strategies of a private fund and may have different risk and reward profiles. A variety of factors may cause this comparison to be an inaccurate benchmark for any particular fund and the benchmarks do not necessarily represent the actual investment strategy of a fund. It should not be assumed that any correlations to the benchmark based on historical returns would persist in the future. **Past performance is not indicative of future results.**

This can be attributed to 1) the differing risk profile of managers and exposure to different levels of remoteness and 2) different underlying peril exposure by manager. For example, managers with higher allocations to California wildfires saw larger losses as both private collateralized reinsurance contracts and the single-peril wildfire cat bond issued by Cal Phoenix Re were triggered. Similarly, in 2011 managers with outsized exposure to Japanese earthquake risk saw negative performance. The takeaway from this is the importance of manager selection with the peer group.

2017: A Pivotal Year

This was a pivotal year for ILS strategies as it addressed some of the concerns about the resilience and sustainability of the space when faced with a year of outsized losses. At the simplest level, it confirmed that diversification worked and, although high losses would likely result in negative performance, the occurrence of a covered peril would not necessarily see a tail-risk scenario playing out. Many managers say that in 2017, actual catastrophe losses compared very favorably to their modelled expectation of similar events. In addition, it confirmed that investors had the tolerance to weather some periods of negative returns and understood side-pocketing and loss-reserving and the potential for "loss creep."

Although the year resulted in negative performance for many in the peer group, the cyclical nature of the industry also created the perception of an opportunity, as many of the large ILS players launched new funds to capitalize on the pricing dislocations in which reinsurance rates rose up to 20% for the January and June renewal seasons in 2018.

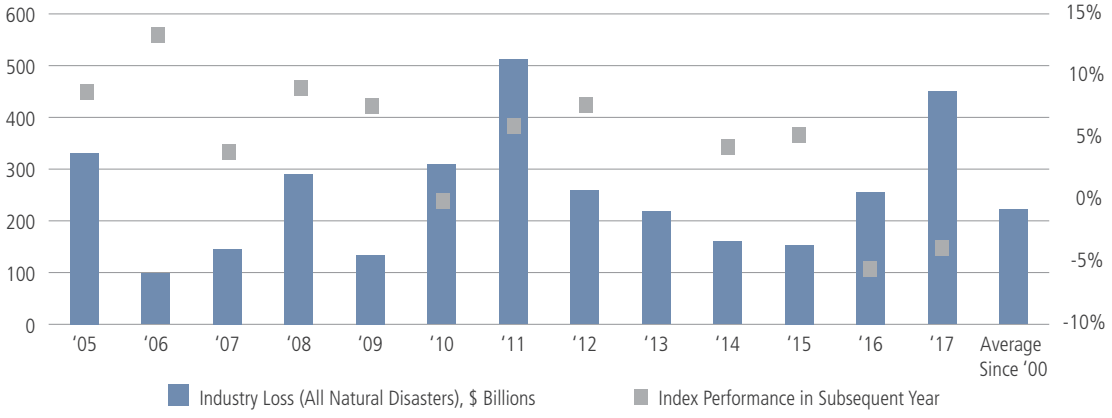
2018: Multiple Individual Events

2018 tested the market further with the industry seeing a double-dip of loss years. While overall losses were smaller and more diversified than in 2017, there were a high number of individual events, including Hurricane Michael, Typhoon Jebi and the Camp Fire in California. One of the differences in 2018 was that several of these events represented more historically remote risks. The industry finished the year with uncertainty regarding the wildfire losses and concerned about loss creep from Michael, as had been the case for Irma, with the negative performance suggesting that rate increases in post-2017 renewals had been insufficiently compensative. Given the number of opportunistic ILS funds that had been launched to capitalize post-2017, this was particularly disappointing for investors and raised the question as to whether outflows would ensue.

Pattern of Returns

Historically, following a major catastrophe event, risk spreads widen materially, although as 2018 demonstrated, this does not necessarily translate into higher return if the subsequent year is also one of high insured losses. That said, the ILS space has posted attractive performance historically after several major events, including Katrina and the Japan 2011 earthquake. Following two years of higher-than-average losses, pricing in 2019 has looked very compelling.

FIGURE 11: EUREKAHEDGE ILS INDEX PERFORMANCE IN YEAR FOLLOWING INDUSTRY LOSSES
($ Billions)



Source: Eurekahedge and Aon's Analytics Division in Reinsurance Solutions. The benchmark performance is presented for illustrative purposes only to show general trends in the market for the relevant periods shown. The investment objectives and strategies of each fund in the benchmark may be different than the investment objectives and strategies of a private fund and may have different risk and reward profiles. A variety of factors may cause this comparison to be an inaccurate benchmark for any particular fund and the benchmarks do not necessarily represent the actual investment strategy of a fund. It should not be assumed that any correlations to the benchmark based on historical returns would persist in the future. **Past performance is not indicative of future results.**

Higher premiums are being supported by other structural market features. Higher demand from counterparties is set against lower supply as many managers have collateral trapped in 2018 deals while loss levels are being finalized. In addition, some ILS funds have been more cautious in deploying risk following the previous years of losses and it could still be the case that investor tolerance has been reached, and we see redemptions in the space during 2019 also making some managers cautious about deploying capital in longer-dated deal structures. This has meant that while pricing momentum is generally positive, the market initially was slower than in 2018, although the activity increased into the June 1 renewals season.[9] While it is too early to draw conclusions from the 2019 risk season, it seems many of these positive dynamics could persist into 2020. For managers with a stable capital base and strong sourcing relationships, the current opportunity set is potentially very compelling.

Another consideration in ILS is the seasonality of risk and consequently returns. The dominance of U.S. wind risk means that risk exposure peaks in the hurricane season from August to mid-October. Earthquake risk does not exhibit this sort of seasonality, while some risks such as European windstorms are greater in the winter months. While the coupon payment structure should help smooth returns in bilateral deals, losses are more likely to be realized during these months. In the secondary cat-bond market, prices typically have traded down ahead of the hurricane season and up exiting the season. In addition, investor inflows and outflows around key renewal dates and the use of the cat-bond market as a liquidity provider can result in price moves.

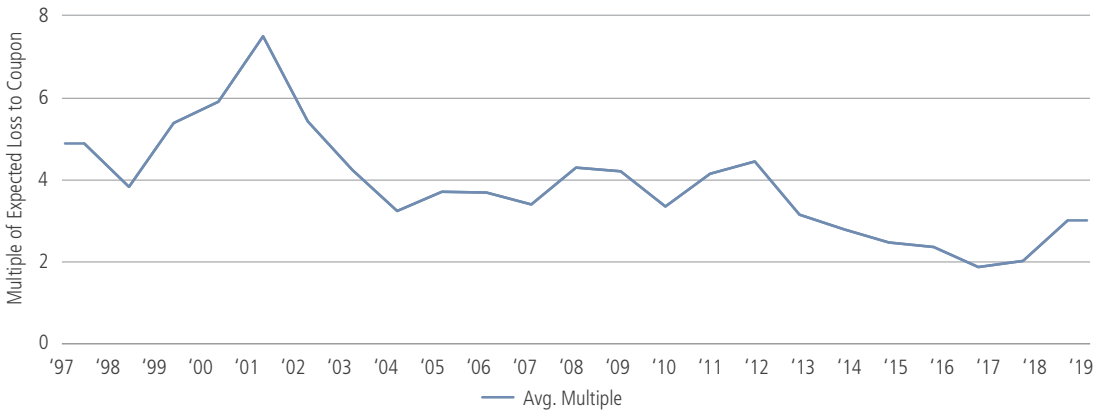
FIGURE 12: AVERAGE, MAXIMUM AND MINIMUM RETURNS OF THE EUREKAHEDGE ILS INDEX BY MONTH

	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
Average	0.61%	0.49%	0.09%	0.37%	0.24%	0.44%	0.60%	0.67%	0.14%	0.43%	0.07%	0.33%
Max.	1.60%	1.56%	0.92%	0.75%	0.74%	1.33%	1.03%	1.03%	1.37%	1.37%	0.84%	1.18%
Min.	0.18%	-0.01%	-3.94%	-0.28%	-0.82%	0.00%	0.40%	-0.31%	-8.61%	-0.81%	-3.68%	-0.97%

Source: Eurekahedge and NB Alternatives analysis. **Past performance is not indicative of future results.**

While yields have increased after events as reinsurance demand and the cost of reinsurance has risen, there has been evidence of spread compression in the asset class in recent years. Although recent performance is somewhat distorted by the high loss years of 2017 and 2018, even prior to this the annualized returns posted by the index had compression from the peaks seen prior to 2013. By way of comparison, the average annual return of the Eurekahedge ILS Index in 2006 – 2010 stood at 8.5% before falling to 5.7% in 2012 – 2016, thereby excluding the loss years.

FIGURE 13: CAT BOND ILS AVERAGE MULTIPLE (RISK SPREAD/EXPECTED LOSS) BY YEAR

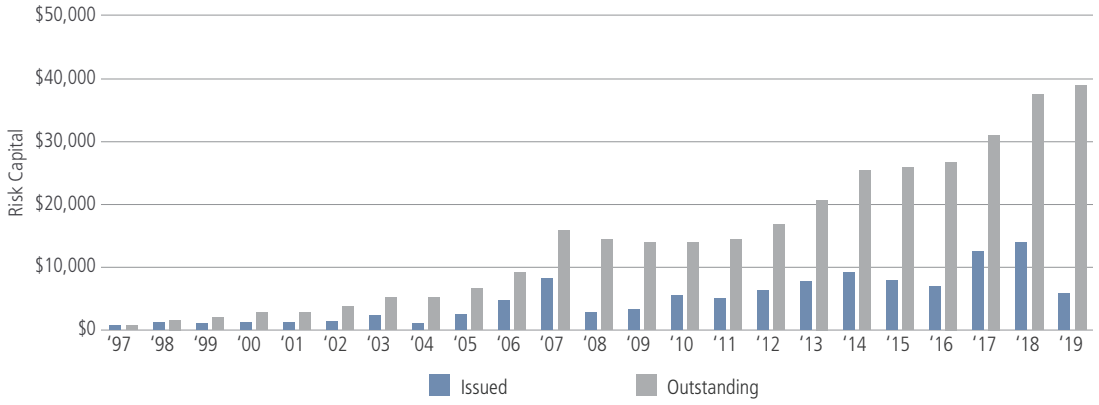


Source: www.Artemis.bm Deal Directory. **Past performance is not indicative of future results.**

[9] Willis Re 1st View January 2019: Contrasting Realities.

Cat bonds are floating-rate instruments, so in part this can be explained by the low-interest-rate environment over this period (and consequently should benefit from the increasing rate regime). However, looking at the cat-bond space, the multiple of risk spread to expected loss has also seen a trend of compression in recent years, presumably driven by increased flows into the space, making supply and demand dynamics less favorable. This is evident when looking at the outstanding paper in the cat-bond universe. This remained static between 2014 and 2016, and only rose slightly in 2017. This set against the growth of assets investing in the space, resulting in a negative supply/demand headwind. In 2019, only 15% of the outstanding universe is set to mature, so with reinvestment demand lower due to the events of 2018 – 2019, this could create a more favorable opportunity set in 2020.

FIGURE 14: CAT-BOND UNIVERSE OUTSTANDING BY YEAR
($ Millions)



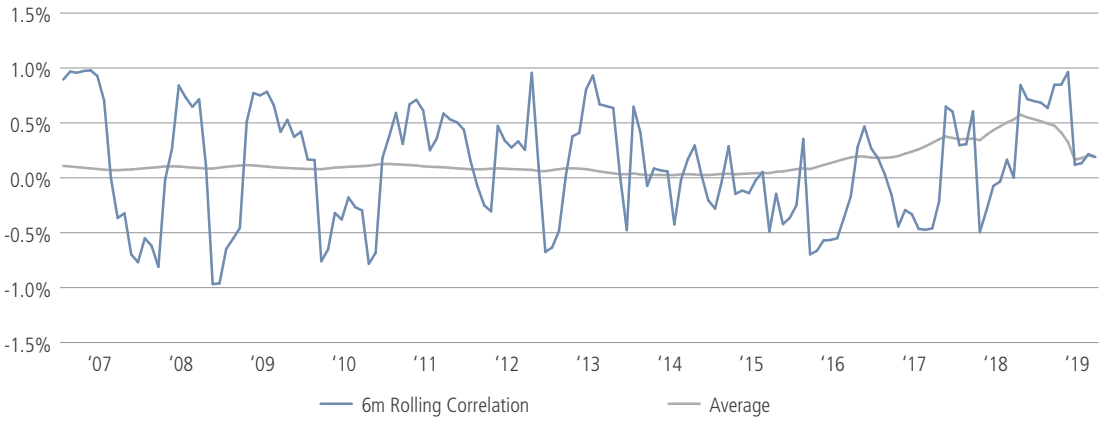
Source: www.Artemis.bm Deal Directory.

In addition, these issues of capacity constraint are also less relevant in other forms of ILS, such as retro and collateralized reinsurance, where the potential for scale is still significantly greater than demand, so the continued growth of ILS alternative capital should not negatively impact spreads as much. That said, in times of lower reinsurance capacity, spreads will likely be higher as reinsurers have fewer counterparties to transact with, as is the case today.

Uncorrelated Asset Class: What Happened in 2008?

Despite the uncorrelated characteristic of the asset class, the Swiss Re Cat Bond Index and the Eurekahedge ILS Index traded off in September and October 2008. This resulted from four cat bonds that lost significant value after Lehman Brothers, the TRS counterparty, filed for bankruptcy. Two of these bonds fell into technical default, either failing to make a scheduled interest payment or unable to return principal at the bond's expiration date. One of the bonds, Ajax Re, fell to 25 cents on the dollar. The rest of the universe traded off 5 – 10% on concerns about the solvency of other counterparties, as well as selling pressure following outflows as hedge fund investors used these monthly funds as a liquidity provider to meet their own liabilities. The dislocation in pricing, however, normalized by year-end, with the index finishing 2008 up 2.3%. Since then, cat bonds have been structured to avoid counterparty risks, and collateral standards and covenants have been raised. Other periods of short-term perceived correlation to equities have proven spurious. For example, Q4 2018 negative ILS performance was entirely driven by U.S. wind and wildfire and Japanese typhoon losses that happened to be concurrent with the equity market sell-off.

FIGURE 15: SIX-MONTH ROLLING CORRELATION OF ILS INDEX VS. S&P 500 INDEX



Source: www.Artemis.bm Deal Directory.

Conclusion: What to Look For in an ILS Hedge Fund

Central to investment success in the ILS industry is a manager with strong sourcing capabilities, including strong relationships with major brokers and other intermediaries. Asset scale can be useful in this regard, allowing hedge funds to be meaningful counterparties in bilateral agreements. Superior modeling capabilities are also crucial as they relate to expected portfolio loss, diversifying risk and managing tails. Strong risk management is important—including how rigorously territory/perils are stressed—as are liquidity management and portfolio construction capabilities, with consideration to risk/return analysis. Other factors that could indicate manager quality include the ability to take a top-down view on the insurance markets and identify relative absolute opportunities within ILS—which could include capital rotation into different underlying instruments or taking advantage of particularly strong pricing in a renewal season. Finally, trading capabilities can be relevant; active portfolio management can capitalize on short-term pricing dislocations, routinely hedge outsized exposures, attempt to make use of live cat bond trading during a storm or opportunistically hedge exposure if hurricane activity looks high. In addition, loss provisioning methodologies and how conservative these are by the manager must be assessed.

While an allocation to natural catastrophe ILS historically has attractive features in the form of strong risk-adjusted returns with no correlation to major markets, there is evidence to suggest that 2019 could be a particularly attractive entry point to the asset class. This is premised on stronger pricing in the wake of two high-loss years and a lack of any statistical reason to suggest the potential for natural catastrophe losses in 2019 that are higher than any other year. As laid out in this article, the space encompasses many different approaches and the tolerance for liquidity versus risk/reward expectations will influence or limit investor participation.

RISKS OF ILS INVESTING

Tail risk: While 2017 turned out to be a difficult year for the asset class, it was not nearly as bad as it could have been, in that losses were attributable to three approximately $20 billion insured losses and smaller losses from the California wildfires. Overall losses were capped given that these events occurred in relatively distinct risk sectors. A major hurricane making landfall in the U.S. would have resulted in a much higher loss year. The portfolio impact of an event like this depends on where on the risk/reward spectrum a hedge fund sits.

Concentration: The ILS space has had disproportionally large U.S. coastal exposure. Particularly in the cat-bond market, the number of insurable events tends to be fairly low, with the majority of issues relating to a limited number of risks. For example, as of March 2019 the outstanding paper in the cat-bond universe, 35% of exposure, was to U.S. named storms and hurricanes, with a further exposure in multi-peril contracts. Diversifying risk tends to result in poorer pricing, so over-diversification typically is at the expense of annualized returns.

Modeling: Insured events are by definition extreme. The probability of occurrence is low, ranging from once in 20 to perhaps once in 200 years. Models calibrated on 100 to 200 years of historical data may not accurately predict the true frequency of events. The majority of hedge funds use an off-the-shelf modeling provider such as AIR, RMS or CoreLogic. Models are updated frequently to incorporate new meteorological and economic data. Managers will then typically enhance the output using their own calculations, but the limitations of this model-based approach cannot be eliminated. This may result in either under- or overestimation of risks. Given that the insured perils happen infrequently by definition, there is a risk that a lookback of 100 to 200 years of data may not result in a statistically significant conclusion. Transparency in the private market also remains limited.

Credit/counterparty: There can be loss of value because of the way the reinsurance vehicle is structured with respect to collateral. That said, cat bonds are typically fully collateralized. The counterparty risk to underlying sponsors is minimal and typically limited to the interest payments. Post-Lehman, cat bonds have initiated strict constraints on the collateral account, mostly restricting investment to U.S. Treasury instruments along with collateral top-up provisions. This is also typically the case in bilaterally negotiated deals, but risks remain when deals are not fully collateralized or with respect to opportunity cost of interest payments if the sponsor sees a credit event.

Maturity extension: Many structures rely on industry loss finalization as provided by the index providers PCS in the U.S. or PERILS in Europe. While an initial estimate is typically available fairly quickly after an event, the final number can see many iterations of revisions over a 12- to 18-month period. Deals are written with bespoke conditions on collateral release to allow for this lag and in some instances the sponsor may have to extend the bond or contract past the scheduled maturity while reinsurance recoveries are calculated. Collateral release schedules typically have a wait of up to 36 months before full payback. Entering 2019, it is estimated that around 20% of 2018 ILS capacity remains trapped. This may result in negative performance revisions if losses come in higher than anticipated.

Supply/demand imbalances: The absence of significant loss events for several years will push down reinsurance premiums, making it cheaper for insurers to access reinsurance capital than the financial markets. For example, total cat-bond issuance fell 22.5% from 2014 – 2015, driven by declining reinsurance rates. Too much capital chasing too little paper will result in yield compression at best and at worst, and could see managers forced into increasingly risky and illiquid structures. While pricing typically looks attractive in years following significant losses, this can be eroded by managers raising a large amount of capital to put to work.

Liquidity: Cat bonds can be traded on the secondary market, but liquidity can be thin, with large bid-offer spreads. In addition it should be assumed that if a manager wants to sell, it could be at a time when other owners also want to, and in a period where there are few natural buyers. Other types of ILS have no real secondary market, although their liquidity is backstopped by contract timeframes. Consequently, it is crucial for hedge funds to adequately match their investor liquidity with the underlying asset composition of the portfolio.

Regulation: Given that the industry remains relatively immature, it could attract further regulatory interest down the line. For example, the life settlements business has experienced controversy over the years given that it involves allowing elderly policy owners to cash out prior to death, and thereby benefits if they die faster than modeled. The cat space saw controversy at the end of 2018 on news that Markel CATCo was under regulatory investigation following multiple, significant NAV adjustments due to aggregating loss adjustments months after the actual event occurrences.

Climate change and increasing natural disasters: There is as yet no conclusive scientific agreement as to whether global warming will uniformly increase the number and severity of natural disasters covered by ILS,[8] although the multiple events of 2017 and 2018 saw these concerns reignited. These trend risks are likely less important in the near term than 1) growth of property at risk, which is increasing the potential for larger insured loss events and 2) short-term weather oscillations and meteorological phenomena such as El Nino, which can dramatically affect the likelihood of hurricane seasonal activity year to year.

[8] Source: "AIR Worldwide Releases Report on Climate Change Impacts on Extreme Weather," AIR Worldwide, June 29, 2017.

OTHER RISK CONSIDERATIONS

Market Risk: The risk of a change in the value of a position as a result of underlying market factors, including among other things, the overall performance of companies and the market perception of the global economy.

Liquidity Risk: The risk that the portfolio may be unable to sell an investment readily at its fair market value.

Emerging Markets Risk: Emerging markets are likely to bear higher risk due to a possible lack of adequate financial, legal, social, political and economic structures, protection and stability as well as uncertain tax positions which may lead to lower liquidity. The value of a portfolio may experience medium to high volatility due to lower liquidity and the availability of reliable information, as well as due to the strategy's investment policies or portfolio management techniques.

Credit Risk: The risk that bond issuers may fail to meet their interest repayments, or repay debt, resulting in temporary or permanent losses to the portfolio.

Interest Rate Risk: The risk of interest rate movements affecting the value of fixed-rate bonds.

Derivatives Risk: The strategy may use certain types of financial derivative instruments (including certain complex instruments). This may increase the portfolio's leverage significantly which may cause large variations in the value of investments. Investors should note that the strategy may achieve its investment objective by investing principally in Financial Derivative Instruments (FDI). Certain investment risks apply in relation to the use of FDI.

Counterparty Risk: The risk that a counterparty will not fulfill its payment obligation for a trade, contract or other transaction on the due date.

Single Country Risk: Where a portfolio invests primarily in a single country, it may be subject to greater risk and above-average market volatility than an investment in a broader range of securities covering multiple countries.

Operational Risk: The risk of direct or indirect loss resulting from inadequate or failed processes, people and systems, including those relating to the safekeeping of assets or from external events.

Currency Risk: Investments in a currency other than the base currency of the portfolio are exposed to currency risk. Fluctuations in exchange rates may affect the return on investment. If the currency of the portfolio is different from your local currency, then you should be aware that due to exchange rate fluctuations, the performance may increase or decrease if converted into your local currency.

INDEX DEFINITIONS

Aon Benfield ILS Index: This index was launched in 2010. It is base-weighted back to December 2000 and tracks the performance of catastrophe bonds in four different baskets: All Bond, BB-rated Bond, U.S. Hurricane Bond, and U.S. Earthquake Bond. Each index is a total return index representing the return an investor would have achieved by allocating an amount of capital weighted to each catastrophe bond available in the market at a particular point in time. The index is calculated monthly by Thomson Reuters.

HFRI Equity Market Neutral Index: Equity Market Neutral strategies employ 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 of technical analysis or opportunistically to exploit new information the investment manager believes has not been fully, completely or accurately discounted into current security prices. Equity Market Neutral Strategies typically maintain characteristic net equity market exposure no greater than 10% long or short.

HFRI Macro Index: Investment Managers that trade 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. Managers employ 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 opposed to EH, in which the fundamental characteristics of the company are the most significant are integral to investment thesis.

HFRX Relative Value Volatility Index: Volatility strategies trade volatility as an asset class, employing arbitrage, directional, market neutral or a mix of strategy types and include exposures which can be long, short, neutral or variable to the direction of implied volatility, and can include both listed and unlisted instruments. Directional volatility strategies maintain exposure to the direction of implied volatility of a particular asset or, more generally, to the trend of implied volatility in broader asset classes. Arbitrage strategies employ an investment process designed to isolate opportunities between the price of multiple options or instruments containing implicit optionality. Volatility arbitrage positions typically maintain characteristic sensitivities to levels of implied and realized volatility, levels of interest rates and the valuation of the issuer's equity, among other more general market and idiosyncratic sensitivities. Hedge Fund Research, Inc. (HFR) utilizes a UCITSIII-compliant methodology to construct the HFRX Hedge Fund Indices. The methodology is based on defined and predetermined rules and objective criteria to select and rebalance components to maximize representation of the hedge fund universe. HFRX Indices utilize state-of-the-art quantitative techniques and analysis; multi-level screening, cluster analysis, Monte-Carlo simulations and optimization techniques ensure that each index is a pure representation of its corresponding investment focus.

SG Short Term Traders Index: The SG Short-Term Traders Index is designed to track the performance of the largest 10 (by AUM) short-term, diversified CTA and Global Macro managers, who meet the following criteria: Program must have an average holding period of less than 10 days; program must be diversified and futures must be their primary investment instrument; program must be open to new investment; manager must provide returns on a daily basis. Constituents are volatility weighted (12-month lookback, daily returns), and the index is rebalanced and reconstituted annually.

SG Trend Index: The SG Trend Index (a.k.a. SG Trend-Sub Index) is designed to track the 10 largest (by AUM) trend-following CTAs and be representative of the trend followers in the managed futures space. Managers must meet the following criteria: must be open to new investment; must report returns on a daily basis; must be an industry-recognized trend follower as determined at the discretion of the SG Index Committee; must exhibit significant correlation to trend-following peers and the SG Trend Indicator. The index is equally weighted, and rebalanced and reconstituted annually.

Swiss Re Cat Bond Index: This index was launched in 2007. The Swiss Re Cat Bond Index is a market-value weighted index of cat bonds, excluding life and health bonds. It is gross of fees and transaction costs and has data since 2002. It is designed to reflect the returns of the catastrophe bond market.

Eurekahedge ILS Advisers Index: ILS Advisers's and Eurekahedge's collaborative equally weighted index of 33 constituent funds. The index is designed to provide a broad measure of the performance of underlying hedge fund managers that explicitly allocate to insurance-linked investments and have at least 70% of their portfolio invested in non-life risk. The index is base-weighted at 100 at December 2005, does not contain duplicate funds and is denominated in local currencies.

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