GLOBAL INSTITUTIONAL CONSULTING

Investing in Managed Futures

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EXECUTIVE SUMMARY

- 'Managed futures' is a diversifying hedge fund strategy. It tends to have low correlation to traditional asset classes such as equities and bonds. It generally performs well and poorly at different times relative to those asset classes. It can potentially help improve a traditional portfolio's risk adjusted returns, primarily by mitigating drawdowns and lowering volatility.
- Performance in managed futures is cyclical and unpredictable. It depends on strong trends in a sufficiently large number of futures markets. Drawdowns can be extended while very strong performance often comes over short periods of a few months or quarters. The potential long periods of underperformance can make the strategy difficult to maintain, but the benefits of adding managed futures to an investment portfolio are evidenced by historical data. We advocate that investors spend time familiarizing themselves with the strategy, getting comfortable with the performance cycles and investing for the long term through an appropriate allocation.
- In managed futures, there is typically wide performance dispersion among funds in any given year and no manager consistently outperforms. In addition, dispersion is often greatest when the performance is most needed. Therefore, an allocation to managed futures should take a multi-manager approach.

While the historical risk/return profile of the strategy is attractive, the most important potential benefit of managed futures is the low correlation of returns.

Performance Cyclicality

In the years since the financial crisis, performance in the managed futures space can be characterized as hit-and-miss, sometimes good and sometimes not. As a result, we have often discussed the performance cycles of CTAs. (Note that we use the term CTA or Commodity Trading Advisor, a U.S. regulatory designation, to mean any manager running a managed futures strategy.) We have generally argued the following points:

- Managed futures strategies have good risk adjusted returns over the long term (as discussed and illustrated throughout this paper; in particular, see Exhibit 5 for performance over the last 18 years); however, their performance tends to be lumpy. Managers often generate significant returns in a matter of a few months or quarters when there are strong, consistent trends in a large number of markets, but then can spend long periods of time—sometimes up to several years—in a drawdown with flat to negative returns. In other words, performance tends to come in bursts rather than in a smooth and consistent fashion.

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- Another way of describing the strategy is to say it is cyclical. To illustrate the cyclical nature of the strategy, we look at several three-year periods (mostly non-overlapping) of lackluster returns and observe performance in the subsequent three years. After difficult three-year periods, performance typically improves in the subsequent three-year periods. The last time many managed futures investors were seriously concerned about performance was at the end of the difficult 2011-2013 period. We have since observed the three-year period for which the return at the time was unknown (highlighted in yellow in Exhibit 1). Difficult periods are often followed by those where performance improves.

Exhibit 1: Performance Cyclicality

From	To	Total Return (Period)	Total Return (Next 3 Years)
May '95	Apr '98	-2.8%	22.0%
Aug '97	Jul '00	3.0%	46.9%
May '99	Apr '02	-2.8%	39.8%
Mar '03	Feb '06	7.1%	34.5%
Apr '04	Mar '07	1.7%	25.5%
Dec '09	Nov '12	-1.9%	**20.2%**

Source: CIO Due Diligence, based on Credit Suisse Managed Futures Index data.
Past performance is no guarantee of future returns.

- Managed futures strategies have historically been the most uncorrelated strategies within the alternative investments universe relative to equities (see Exhibit 8). This is the result of investing in four asset classes in over a hundred different markets and the ability to go both long and short without having directional bias. Most managed futures funds implement trend following as the primary strategy within their portfolios; as a result, they are highly correlated to one another, but their correlation to equities (as well as bonds) is near zero over the long term.
- Given that trend following is the dominant strategy within managed futures, performance depends on the existence of strong and sustained trends in a diverse array of markets. Big reversals, a lack of trends, a lack of directional moves or choppy and range-bound markets can all lead to poor returns. From the end of the financial crisis through 2013, central banks (by injecting unprecedented liquidity into the markets) had put a floor under asset prices. Concurrently, volatility declined across markets with asset price moves becoming muted. In many instances, the numerous accommodative policy actions prevented strong trends from emerging, in our view. In addition, with interest rates at zero, a lack of interest income meant that cash was no longer an income generator for managed futures funds.
- Managers responded to the difficult environment that characterized the period from the end of the financial crisis by adding some diversifying non-trend strategies to their portfolios. They also expanded their investment universe to include more diverse markets that had a lower correlation to globalized factors affecting asset prices such as quantitative easing. While managers did not want to lose their 'trend following' return profile, a small allocation to non-trend models and additional uncorrelated markets was seen as a means to smooth returns and enhance risk adjusted returns while adhering to their core strategy.
- Following the performance difficulties for managed futures, especially in the 2011-2013 period, when returns were flat to slightly negative, it was our experience that some retail investors became frustrated with the strategy and redeemed. On the other hand, we generally observed that many institutional investors became increasingly interested in the strategy after gaining a better understanding of the drivers of performance and the potential benefits of adding low correlation strategies to a portfolio. Industry assets rose from $200 billion in 2008 to $330 billion in 2012 (this is also roughly where they stand in early 2018), according to BarclayHedge (www.barclayhedge.com, as of December 2017).

In the following pages, we would like to provide additional color on measuring performance, recent returns, how performance has remained uncorrelated, and most importantly how we prefer to allocate to the strategy.

Measuring Performance

Performance measurement is an important issue, and the choice of an appropriate benchmark index is critical in evaluating any investment. In managed futures, this is done by observing CTA indices. There are numerous indices in managed futures, with at least six that we regularly use. Most of these are made up of 10-20 large hedge funds, using net, after fee returns. There are a few that attempt to measure the industry as a whole, with hundreds of funds including funds that have very low assets. Some indices go back in time further than others. All indices are decently representative of the industry, which includes over 500 live funds. The top 20 managed futures funds make up the bulk of assets managed pursuant to these strategies. Names in indices often overlap. Given all this, we do not have a preferred

index. They can all be said to represent the industry well. None of them includes funds or managers that do not belong in the index. Finally, no index is a consistent outperformer or underperformer. Performance across the indices is similar and correlated, but varies over time. As a result, we do not have a favored index. We do not believe any given index is 'wrong'. We also describe and show as many of them as possible to demonstrate a lack of any bias or cherry picking. Exhibit 2 describes the most commonly used indices in the managed futures space. The list shown in Exhibit 2 is not exhaustive, but those are the indices we have come across frequently.

Exhibit 2: Some of the Most Commonly Used Managed Futures Indices

Index and Inception Date	Description
SG (SocGen) CTA Index (January 2000)	20 large CTAs, equally weighted, formerly Newedge
Credit Suisse Managed Futures Index (January 1994)	34 large CTAs, asset weighted
Barclay BTOP 50 Index (January 1987)	20 large CTAs, equally weighted
Barclay CTA Index (January 1980)	Currently 522 CTAs, equally weighted
CISDM CTA Equal Weighted Index (January 1980)	Currently 262 CTAs, equally weighted
HFRI Macro: Systematic Diversified Index (January 1990)	Currently 187 funds, equally weighted

Source: CIO Due Diligence, based on index data, January 2018. The CISDM CTA Equal Weighted Index's constituent count is as of December 2014 (most current data available).

Managed Futures Recent Performance

Exhibit 3 shows recent managed futures annual performance, along with several indices for other asset classes. The table spans recent years with examples of both good and poor performance for the strategy.

Exhibit 3: Recent Managed Futures Performance

	Percent (%)									
Index	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
SG CTA Index	13.1	-4.3	9.3	-4.5	-2.9	0.7	15.7	0.0	-2.9	2.5
CS Managed Futures Index	18.3	-6.6	12.2	-4.2	-2.9	-2.6	18.4	-0.9	-6.8	3.3
Barclay BTOP 50 Index	13.6	-4.8	6.4	-4.3	-1.8	0.7	12.3	-0.9	-4.4	-0.8
Barclay CTA Index	14.1	-0.1	7.1	-3.1	-1.7	-1.4	7.6	-1.5	-1.2	0.6
CISDM CTA Equal Weighted Index	21.8	0.6	14.3	-3.1	-1.8	0.7	15.1	0.0	4.2	5.3
HFRI Macro: Systematic Div. Index	18.0	-1.7	9.8	-3.5	-2.5	-0.9	10.7	-2.4	-1.4	2.1
S&P 500 (TR) Index	-37.0	26.5	15.1	2.1	16.0	32.4	13.7	1.4	12.0	21.8
Bloomberg Barclays U.S. Aggregate Bond Index	5.2	5.9	6.5	7.8	4.2	-2.0	6.0	0.6	2.7	3.5
Bloomberg Commodity (TR) Index	-36.6	18.7	16.7	-13.4	-1.1	-9.6	-17.0	-24.7	11.8	1.7

Source: CIO Due Diligence, based on index data. **Past performance is no guarantee of future returns.** CISDM 2017 return is as of October 31st.

Managed futures is an absolute return strategy with the potential to generate positive returns in any investment environment, regardless of the direction of markets. Since trend following is the main strategy employed, managers generally need strong market trends. Without directional moves in a sufficiently large number of markets, performance may suffer.

Performance was very strong for managed futures in 2008 as a result of a multitude of trends across asset classes during the financial crisis. In 2009, the broad shift to a risk-on environment resulted in a large reversal and losses. In 2010, the second round of U.S. quantitative easing in the latter part of the year led to strong trends and good performance. 2011 through 2013 saw an environment of rapid shifts between risk-on and risk-off behavior in markets, coinciding with the European debt crisis and frequent policy actions on the part of central banks and governments. A lack of trends resulted in a long period of weak returns. The strategy performed well again in 2014, driven by strong trends in energy markets and fixed income in the second half of the year. With few trends, 2015 was a flat year. In 2016, returns were weak, though performance was strong in the first quarter and around Brexit, when markets were volatile. In 2017, with only equity indices trending strongly, performance was again somewhat weak.

Managed futures funds have the ability to perform well in different environments as long as there are strong, consistent trends in a large number of markets, regardless of the direction of those trends. In fact, managed futures funds have often performed well in difficult environments for equities and risk assets, generating strong crisis alpha. Exhibit 4 illustrates this point by showing the average performance of several managed futures indices in the worst 15 months for the S&P 500 since 2000, grouped into three brackets of five months. For example, in the worst five months for equity markets, the S&P 500 was down -11.3% on average each month. During those months, the SG CTA Index was up, on average, 1.5%. (Note that the results would be similar if we extended the period under consideration further back in time.)

Exhibit 4: Managed Futures Performance in Down Equity Markets

Months	Average Performance						
	S&P 500 (TR) Index	SG CTA Index	Credit Suisse Managed Futures Index	Barclay BTOP 50 Index	Barclay CTA Index	CISDM CTA Equal Weighted Index	HFRI Macro: Sys. Div. Index
Oct-08, Sep-02, Feb-09, Feb-01, Sep-08	-11.3%	1.5%	1.7%	0.9%	1.0%	1.7%	1.7%
Jun-08, Jan-09, Sep-01, May-10, Nov-00	-8.2%	1.9%	2.1%	1.8%	1.0%	1.6%	-0.6%
Jul-02, Nov-08, Jun-02, Sep-11, Mar-01	-6.8%	3.4%	3.7%	3.7%	2.8%	3.2%	-0.6%

Source: CIO Due Diligence, based on index data. **Past performance is no guarantee of future returns.**

As the table shows, managed futures have often been able to help protect capital in weak equity markets and many times they have delivered strong positive returns in such periods. Again, this has been due to their ability to invest across diverse assets and to go both long and short. In many of the periods shown above, managed futures funds did not necessarily make money from shorting equity indices, but from being positioned long assets like fixed income, the U.S. dollar, the yen or gold, or from shorting commodities like energies and industrial metals. The flexibility of the strategy to go both long and short, and its wide reach across four major asset classes and over a hundred futures and forward markets, may provide the ability to generate positive returns in declining equity markets. This is not to say that managed futures funds generate positive performance every week, month or quarter that equities are down, but they have that potential and if such equity moves come within the context of strong trends, they stand ready to take advantage of those trends.

Managed Futures Long-Term Historical Performance

Exhibit 5 summarizes managed futures performance over the last five- and 10-year periods ending in December 2017 as well as since the inception of the SG CTA Index (January 2000). The goal is to observe not only recent performance, but performance going back more than just a few years and to illustrate the characteristics of the returns. All numbers are annualized. CTA risk adjusted returns have been weak recently, but they are comparable to traditional asset classes over the long term.

Exhibit 5: Managed Futures Long-Term Performance as of December 2017

	Last 5 years			Last 10 years			Since January 2000		
	Return	St. Dev	Sharpe Ratio	Return	St. Dev	Sharpe Ratio	Return	St. Dev	Sharpe Ratio
SG CTA Index	3.0%	7.8%	0.4	2.4%	7.7%	0.3	4.6%	8.6%	0.4
Credit Suisse MF Index	1.9%	10.5%	0.2	2.4%	10.7%	0.2	4.5%	11.4%	0.3
Barclay BTOP50 MF Index	1.2%	6.5%	0.2	1.4%	6.4%	0.2	3.8%	8.1%	0.3
Barclay CTA Index	0.8%	4.1%	0.1	1.9%	5.1%	0.3	3.6%	6.3%	0.3
CISDM CTA Index	4.9%	7.0%	0.7	5.4%	7.9%	0.6	6.5%	8.2%	0.6
HFRI Macro: Sys. Div. Index	1.5%	6.5%	0.2	2.6%	7.4%	0.3	5.5%	7.6%	0.5
S&P 500 (TR) Index	15.8%	9.5%	1.6	8.5%	15.1%	0.5	4.4%	14.5%	0.3
Barclays U.S. Agg. Bond Index	2.1%	2.9%	0.7	4.0%	3.2%	1.1	5.1%	3.4%	1.0
Bloomberg Commodity (TR) Index	-8.5%	12.0%	-0.7	-6.8%	17.6%	-0.4	1.4%	16.3%	0.0

Source: CIO Due Diligence, based on index data. **Past performance is no guarantee of future returns.**

Exhibit 6 illustrates the correlation characteristics of the same indices from January 2000 to December 2017. It shows that over a long period of time, managed futures indices have had very low (close to zero) correlation to benchmark equity, bond and commodity indices.

Exhibit 6: Managed Futures Long-Term Correlations

January 2000—December 2017	SG CTA Index	Credit Suisse MF Index	Barclay BTOP 50 MF Index	Barclay CTA Index	CISDM CTA Index	HFRI Macro: Systematic Div. Index	S&P 500 (TR) Index	Barclays U.S. Agg. Bond Index	Bloomberg Commodity (TR) Index
SG CTA Index	1.0								
Credit Suisse MF Index	0.9	1.0							
Barclay BTOP50 Index	1.0	0.9	1.0						
Barclay CTA Index	0.9	0.9	0.9	1.0					
CISDM CTA Index	0.9	0.9	0.9	1.0	1.0				
HFRI Macro: Systematic Div. Index	0.6	0.6	0.5	0.5	0.6	1.0			
S&P 500 (TR) Index	-0.1	-0.1	-0.2	-0.1	-0.1	0.2	1.0		
Bloomberg Barclays U.S. Aggregate Bond Index	0.2	0.3	0.3	0.3	0.2	0.1	-0.1	1.0	
Bloomberg Commodity (TR) Index	0.1	0.2	0.1	0.3	0.2	0.2	0.3	0.0	1.0

Source: CIO Due Diligence, based on index data, February 2018. **Past performance is no guarantee of future returns.**

These two tables together illustrate the following:

- The managed futures strategy has underperformed traditional asset classes such as stocks and bonds in the last five years. Its performance has been somewhat disappointing even over the last 10 years. It has performed similarly relative to traditional asset classes since 2000. Its volatility, based on indices, has typically been between that of stocks and bonds.
- The managed futures strategy has historically had very low correlation with traditional asset classes over the long term. (Over most periods longer than five years, this low correlation characteristic holds true. Over shorter periods, the correlation can be positive or negative.)

Putting together the long term performance information with the strategy's correlation characteristics, we can easily illustrate the benefits of adding managed futures to a traditional portfolio. Some investors may have seen this illustration before, but it is always worth another look as this is the reason to consider the strategy. Exhibit 7 illustrates the characteristics of a traditional U.S. 60% equities/40% fixed income portfolio with an added 10% and 20% managed futures allocation. Managed futures are represented by the SG CTA Index. Traditional assets are represented by the S&P 500 Total Return Index and the Bloomberg Barclays U.S. Aggregate Bond Index. The portfolio is rebalanced monthly (annual rebalancing yields very similar results). The analysis looks at the period from January 2000 to June 2017.

Exhibit 7: Long-term benefits of adding managed futures to a traditional portfolio (January 2000 – December 2017)

	60/40 Portfolio 0% Managed Futures	90% 60/40 Portfolio 10% Managed Futures	80% 60/40 Portfolio 20% Managed Futures
Annualized Return	5.6%	5.6%	5.5%
Standard Deviation	8.7%	7.8%	7.0%
Maximum Drawdown	-32.5%	-28.8%	-24.8%
Sharpe Ratio	0.45	0.50	0.55

Source: CIO Due Diligence, based on index data, February 2018. **Past performance is no guarantee of future returns. Please note that an allocation to managed futures may not be appropriate for all investors, as allocations vary with the risk profiles and liquidity needs of individual investors.**

- The analysis shows that over the long term, a portfolio that includes an allocation to managed futures can exhibit similar returns to a traditional portfolio, but with a meaningful reduction in volatility and drawdowns. This could result in a much stronger risk adjusted return.

Among the various hedge fund strategies, this type of analysis is most noteworthy for managed futures. That is because managed futures have historically been among the most diversifying of all hedge fund strategies relative to traditional asset classes. Exhibit 8 illustrates this by showing the long term correlations of different hedge fund strategies to stocks and bonds.

Exhibit 8: Long-term correlations between hedge fund strategies and traditional markets (January 2000 – December 2017)

Correlation (January 2000 – December 2017)	S&P 500 (TR) Index	Bloomberg Barclays U.S. Aggregate Bond Index
SG CTA Index	-0.1	0.3
HFRI Fund Weighted Composite Index	0.8	0.0
HFRI Equity Hedge (Total) Index	0.8	0.0
HFRI Event-Driven (Total) Index	0.7	-0.1
HFRI Macro (Total) Index	0.2	0.2
HFRI Relative Value (Total) Index	0.6	0.1
HFRI Fund of Funds Composite Index	0.6	0.0

Source: CIO Due Diligence, based on index data, December 2017.
Past performance is no guarantee of future returns.

- The analysis of adding managed futures to a traditional portfolio and observing the effects on performance is quite sensitive to the period under consideration. For example, running the numbers just for 2008 would result in a huge improvement, not just to volatility and drawdown numbers, but also returns since managed futures performed so strongly that year while equities crashed. Running the numbers for the 2011-2013 period only when managed futures had weak performance could result in a return reduction since managed futures strategies detracted during that period. The strategy could help from a volatility perspective, but risk adjusted returns might not improve. Given these considerations and our belief in investing in the strategy over the long term, we looked at the effects of adding the strategy over a long period of time, going back to 2000. Over the long term, we expect the risk adjusted returns of a traditional portfolio to improve as a result of adding managed futures. Additionally, we chose the 10% and 20% allocations to managed futures for illustration purposes. Most investors will typically have a smaller portion of their overall portfolio in the strategy.

Understanding Performance Expectations

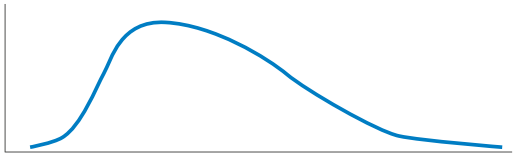
CTAs tend to perform best when markets trend and exhibit large directional moves. In the years 2008, 2010 and 2014 the strategy performed well due to strong trends in a large number of markets. (2008 also happened to be a year when equities performed very poorly.) In 2009, 2011-2013 and 2015-2017, there were fewer trends or more reversals. As a result, performance was flat to down. That said, any losses were typically muted.

Understanding performance is often not very straightforward for investors who do not follow the strategy or futures markets on a daily basis. Casual observers of markets often notice trends in some of the more visible, important, big and liquid markets and wonder why managed futures funds don't capitalize on them. But in fact they do and often have strong positive attribution from those market trends, but one must remember that they cast a wide net and generally avoid allocating risk in a concentrated manner. If the S&P 500, 10-year Treasury note and euro are all trending strongly, investors may think trend followers should be making good returns; however, three markets trending is not enough to achieve strong performance. One needs a good number of the more than 100 markets in the universe to display some trends. It is when 30, 40, 50 or more market trends coincide that returns in excess of 10% could come within reach.

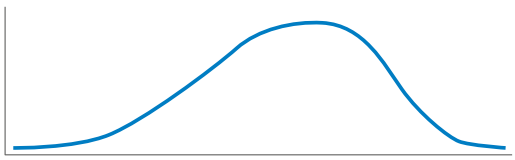
Trends are not predictable. Managers and academic researchers have attempted to forecast periods of strong/weak trends. If that could be done, one would increase risk into strongly trending environments and reduce risk ahead of periods where trends were expected to be weak. The generally accepted conclusion is that it is not possible to predict when strong trends will emerge. Thus, it is our view that investors should not attempt to time an investment in managed futures. Performance is cyclical, and it is impossible to know how long the cycles will last. We believe the best way to take advantage of the benefits of the strategy and to navigate through the cyclical nature of performance is to make an appropriate long term allocation and stick to it.

Trend followers follow a systematic process. They evaluate markets every day to discern whether individual assets are trending, then allocate capital based on the strength of the trend signals. More often than not, they are unsuccessful. But when they are successful and a strong trend kicks off, their gains tend to be large. In other words, they can lose a little money on many trades but make a lot of money on a small number of trades. Some have compared this profile to venture capital, where only a small number of startup deals truly pan out and are sufficient to deliver a good return. The resulting characteristic of trend following and managed futures is that the strategy has a return distribution with positive skew or that the distribution is right-skewed (it has a longer and fatter tail on the right side than on the left side, see Exhibit 9). Skew is a measure of the asymmetry in a return distribution. A set of returns made up of frequent small, lower than average returns and occasional large gains would be positively skewed or right-skewed. Conversely, a set of returns with frequent small, above average returns and occasional large losses would be negatively skewed or left-skewed. Long equity investing is a negative skew or left-skewed strategy, as evidenced by the typical small, above average returns, punctuated with large losses during crisis periods. Managed futures can be a good complement to such a return profile and may be beneficial to help reduce the impact of the negative skew of equities and most other hedge fund strategies.

Exhibit 9: Illustration of Right and Left-skewed Distributions



Right-skewed Distribution



Left-skewed Distribution

Source: CIO Due Diligence, February 2018

How to Invest in Managed Futures

Before making an allocation to managed futures, one should observe the performance not just of broad strategy indices, but also of individual managers.

Looking at the performance of individual managers, we see that they tend to perform well and poorly at similar times. This is natural since most implement some type of trend following as the main component of their strategy, making managers highly correlated with one another.

Looking at a simple return table showing the returns of all the main managed futures indices, we notice that indices which gauge the performance of the broad space tend not only to be correlated but also to have similar returns. These indices represent the performance of the average manager and they often include the same managers. As a result, they tend to portray how the managed futures industry performs. Exhibit 3 shows performance for many of the major managed futures indices used by the investment community by year. The range of returns in any given year may not be especially wide. Clearly, 2008, 2010 and 2014 were strong years for the average managed futures and trend following fund, while 2011-2013 and 2015-2016 were weak periods.

Since managers and indices are typically highly correlated to one another, investors may think that individual managers have similar performance and that manager selection adds little value. That is far from true. In any given year, dispersion across managed futures funds and trend followers could be extremely wide. They may be highly correlated to one another, but their performance is far from similar. In other words, they typically rise and fall together, depending on the trend environment, but their performance is quite varied.

Exhibit 10 illustrates this point. It shows the best performance and worst performance among 10 managed futures funds by calendar year. These funds were selected based on name recognition, reputation and strength of research teams. The smallest manager in the peer group manages approximately $3 billion while the largest manages approximately $30 billion. In addition, they all implement versions of trend following strategies as the main component of their portfolios. Some are pure trend followers while others use a blend of trend following and several other strategies.

Exhibit 10: Range of Annual Performance in Peer Group of 10 CTAs

	Percent (%)									
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Best performance	77.8	11.5	27.8	28.7	15.4	15.5	62.0	15.1	7.6	31.0
Worst performance	1.3	-11.5	2.5	-19.2	-17.5	-28.1	12.4	-8.7	-12.5	-4.1
Range	76.5	23.0	25.3	47.9	32.9	43.6	49.5	23.9	20.2	35.1

Source: CIO Due Diligence. As of December 2017.
Past performance is no guarantee of future returns.

As the table illustrates, the dispersion between the best performing manager in our peer group of just 10 funds and the worst performing manager is large. In fact, it is often greatest in years when performance is strong. This is the result of differences across programs along five dimensions.

1. The first dimension is time horizon. Managers typically use medium or long term time horizons when implementing their trend following strategies. A medium term trend follower may look back a month or two on average to determine the direction of market trends. A long term trend follower may look back several quarters and observe slightly different trends. A long term trend follower will usually be later to a new trend, both on the way in and on the way out. It will be slower. There can be situations where that is advantageous and disadvantageous. For example, if an upward trend reverses sharply over a few weeks, but then markets calm down and the asset fully recovers, a medium term trend follower may get whipsawed while a long term trend follower may not have shifted its exposure much. On the other hand, if the reversal was not short term and the market continues to move in the new direction, then the medium term trend follower could do better as it may have adapted to the new trend sooner. Short, medium and long term time horizons perform differently under different market conditions. Sometimes trends are short lived, while at other times they can be quite extended. The choice of time horizon is different by manager and as a result so is performance.
2. The second dimension is the allocation by sectors. Most managers in the managed futures space invest across four broad asset classes and seven sectors within them (energies, metals, agriculturals, short term interest rates, notes and bonds, equity indices and currencies). Some managers allocate equal risk to each sector. Other, larger managers may focus more on financial futures, which are typically the most liquid markets. Some smaller funds often trade commodities in larger size, for a variety of reasons, such as the belief that

they are more diversifying. As a result, managers end up with different exposures in the main sectors, and performance can be different depending on market moves. As an example, at the extreme, if only energy markets are trending, the large manager with the smallest allocation to energies could underperform while the small manager with a focus on commodities and a sizable allocation to the energy sector would be expected to outperform.

3. The third dimension is the different markets traded. This is similar to asset class and sector allocations, but at a more granular level. Some managers, typically the larger ones, focus on the most liquid markets, the 100 or so large, well-known futures markets. Their portfolios are diversified by market, but not overly so. Other managers believe that trading as many markets as possible increases diversification. As an example, within energies, these managers would trade not only oil, oil products like heating oil, gasoline and gasoil, and natural gas, but perhaps also power/electricity, kerosene and carbon emission futures. They may also allocate differently to markets, choosing to put more risk in some of the smaller, less mainstream and less correlated markets. Again, depending on the environment, these differences could result in differentiated returns.
4. The fourth dimension is non-trend models. While trend following is an important strategy, it is not the only one used by managers. In an effort to diversify their portfolios, boost their risk adjusted returns and smooth performance, managed futures funds have developed many non-trend models for their portfolios. These models are typically uncorrelated to trend following and include ideas related to carry, seasonality in markets, weather patterns, and macroeconomic relationships, among others. Managers with these non-trend models will usually have slightly different performance, depending on how these models do and how much capital is allocated to them.
5. Finally, the last dimension is the volatility target. Managers typically target a certain level of volatility for their funds. Those with higher targets will likely perform better in good times for the strategy and worse in bad times.

Not only is there typically significant dispersion in performance in any given year along the dimensions noted above, but no manager outperforms every year. A manager that does strongly this year is not necessarily going to be at the top of the performance ranking next year too. In fact, that is more often not the case. No manager's system is perfectly suited for all investment environments. As a result, managers move around a lot in the annual performance rankings.

An additional point is that the dispersion in manager returns is often largest when performance is strong. In other words, when the strategy is performing well, the subtle differences across programs may be exaggerated and lead to a wider range of outcomes. Sometimes, strong performance happens when investors need it the most, in years like 2008. Having the best performing manager in such a year is very different from having the lagging manager (a difference of 77% in return in 2008 based on the peer group as noted in Exhibit 10).

These observations can be summarized as follows:

- There is usually significant performance dispersion across managed futures funds.
- It is not possible to predict which funds within the managed futures space will perform best in any given year.
- No single managed futures manager outperforms every year.
- The dispersion in managed futures returns is often greatest when the strategy is performing well and sometimes that happens to be when investors need the strong performance the most.

While manager selection based on an evaluation of a fund's strategy, track record and research resources is still extremely important in the managed futures space, the observations noted above point to a multi-manager implementation as a prudent approach to investing in the strategy. In fact, we believe the best way is to invest in a number of managers, certainly more than two or three, and even more than five or six (the average allocation in a five-manager portfolio, 20%, is still quite large, in our view; if a manager has a particularly bad year, it can meaningfully weigh down the overall portfolio's return). An appropriate number of managers reduces the risk of a meaningful allocation to an underperformer in any given year. It also provides for a range of time horizons, sector allocations, markets traded, models and volatility targets, conceivably leading to sufficient diversification within one's managed futures allocation.

It is our observation that many investors think of the managed futures space as being quite homogeneous. "Invest in a single managed futures fund and one is done" is an approach that could result in disappointment. This may not happen this year or next year, but at some point, the chosen manager's system, time horizon, risk allocations and markets will not be well-suited to the investment environment and it will underperform. If that happens when equity markets are having trouble and other managed futures funds are performing well, the disappointment could be even greater. To avoid such a situation, the managed

futures allocation should be considered seriously and we would advocate that a number of managers be included.

Capital Allocation

Another question is how much capital to allocate to the strategy. Each investor will decide this based on the individual's risk profile and comfort level with the strategy. The Global Wealth & Investment Management Chief Investment Office (GWIM CIO) provides asset allocation guidelines for clients with different risk profiles ranging from Conservative to Aggressive. We believe the allocation to managed futures should be set within the broad context of diversification and be meaningful enough to have an impact on the overall portfolio. The following are a few points to keep in mind:

- For a simple two asset portfolio of U.S. equities and managed futures, the classic mean variance optimization method of allocating capital often leads to a very significant (up to 50%) allocation to managed futures, depending on the benchmark or proxy one uses to represent each of the two asset classes. That is because managed futures is an extremely diversifying asset class. While we do not advocate for such a large managed futures allocation in the overall portfolio, the exercise is useful in reminding investors of the potential benefits of the strategy.
- Given the diversity of available investment options, ranging from equities in a multitude of segments (U.S./international/emerging markets, large/mid/small cap, growth/value), to fixed income across issuers (governments, mortgages, corporates, high yield, international), to several alternative investment asset classes (hedge funds, private equity and real assets), it may appear difficult to make space for managed futures within one's portfolio and hedge fund allocation, especially since there are numerous other hedge fund strategies to consider. As an example, the Chief Investment Office publishes asset allocation guidelines for diverse investor categories with different risk profiles and liquidity needs. The January '18 asset allocation guidelines are for a 10% allocation to all hedge fund strategies for a Moderate risk profile, U.S.-oriented investor with Tier 1 liquidity needs. For that investor, many managed futures practitioners might argue that a meaningful portion of the 10% hedge fund allocation should be in managed futures given its diversification benefits. Thus, investors should consider how valuable they find the managed futures return profile when making their allocations.
- Within managed futures, allocating to a manager with an 8-10% volatility target will feel quite different from allocating the same dollar amount to a manager with a 15% volatility target. The latter manager will have equity-like volatility while the volatility of the former will be closer to that of bonds. In good periods for managed futures, the high-volatility manager will be expected to deliver stronger returns, but it could also see larger drawdowns. Each investor's own risk preferences and comfort level with the strategy should determine what the ideal amount to allocate is given a manager's risk profile.

Setting realistic expectations

We believe a managed futures strategy offers compelling benefits. The strategy has historically been uncorrelated to traditional asset classes and has a positive expected return over time. That said, it is still a strategy that is difficult to stick with from a psychological perspective because of the return profile described earlier. The following should be considered when evaluating performance and reviewing the strategy:

- Managed futures is not profitable every year. In recent history, it went through a difficult three-year period (from 2011 to 2013) when performance was flat to negative on average each year. More recently, the period from 2015 to 2017 has proven to be lackluster in terms of returns, though the strategy made money during several volatile quarters when equity markets were down. Returns are not smooth and consistent, but episodic, depending primarily on there being multiple trends in markets. In our view, this return profile should be expected going forward. Investors who cannot tolerate the strategy's ups and downs might redeem at the worst possible moment and may be better off not investing. Only investors who have the fortitude to hold on to such an investment should consider making an allocation.
- Some recent drawdowns in the strategy have lasted a few years. While disappointing, the strategy has historically made up for these periods of subpar performance with strong returns when markets are trending. Investors should note that managed futures has gone through many drawdown periods in the past and that it has always recovered in time.
- Much of the profits in managed futures are generated over short periods of time. Markets often do not trend for very long periods and the uncorrelated performance that is expected from managed futures typically comes during a small number of months and quarters. More often than not, the strategy is in a drawdown. That can be quite uncomfortable. In the past, investors have expressed feelings of uneasiness and frustration with the strategy. These kinds of feelings may be mitigated through education, a better understanding of the strategy and knowing what to expect.

Conclusion

Within CIO Due Diligence, we advocate for the inclusion of managed futures in hedge fund portfolios. In our opinion, the primary reason to own this strategy is the diversification benefits it can potentially provide. The low correlation to traditional asset classes like equities and bonds means that adding managed futures to a portfolio could result in lower volatility, shallower drawdowns and better risk adjusted returns over the long term.

Investors should only consider managed futures if they are familiar with its risk/return profile and are comfortable holding such a cyclical investment. We believe investors should make an appropriate long-term allocation and simply stay invested through the ups and downs of the strategy. A multi-manager CTA fund or allocations to several single-manager CTAs could be an efficient means of achieving appropriate diversification within a managed futures allocation.

Glossary

Standard deviation: Standard deviation is a measure of dispersion of a set of data from its mean. It measures the absolute variability of a distribution; the higher the dispersion or variability, the greater is the standard deviation and thus the magnitude of the deviation of the data values from their mean.

Drawdown: A drawdown is the peak-to-trough decline during a specific recorded period of an investment, fund or commodity. A drawdown is usually quoted as the percentage between the peak and the subsequent trough. Its length is measured from the time a retrenchment begins to when it reaches a new high.

Maximum drawdown: A maximum drawdown is the maximum loss from a peak to a trough within a return series, before a new peak is attained. The maximum drawdown is an indicator of downside risk over a specified time period.

Sharpe ratio: The Sharpe ratio is a measure that indicates the average return minus the risk-free return divided by the standard deviation of return on an investment. It is used as a measure of risk adjusted returns.

Crisis alpha: Crisis alpha is a term used when describing an investment strategy that may generate positive returns in periods of high financial market stress, typically coinciding with times when equity markets perform very poorly. The ability to generate positive returns at a time of market crisis is viewed as highly valuable.

Index Definitions

The indices referred to herein do not reflect the performance of any account or fund managed by affiliates of BofA Corp, or of any other specific fund or account, are unmanaged and do not reflect the deduction of any management or performance fees or expenses. One cannot invest directly in an index.

Credit Suisse Managed Futures Hedge Fund Index: The Credit Suisse Managed Futures Hedge Fund Index is a subset of the Credit Suisse Hedge Fund Index that measures the aggregate performance of managed futures funds. Managed futures funds (often referred to as CTAs or Commodity Trading Advisors) typically focus on investing in listed bond, equity, commodity futures and currency markets, globally. Managers tend to employ systematic trading programs that largely rely upon historical price data and market trends. A significant amount of leverage may be employed since the strategy involves the use of futures contracts. CTAs tend not to have a particular bias towards being net long or net short any particular market.

SG CTA Index: The SG CTA Index provides the market with a reliable daily performance benchmark of major commodity trading advisors (CTAs). The SG CTA Index calculates the daily rate of return for a pool of CTAs selected from the larger managers that are open to new investment. Selection of the pool of qualified CTAs used in construction of the index is conducted annually, with re-balancing on January 1st of each year. A committee of industry professionals has been established to monitor the methodology of the index on a regular basis. The SG CTA Index allows market participants and institutional investors to:

- Measure aggregate CTA performance on a day-to-day basis;
- Track the performance of a CTA (or a pool of CTAs) against the market; and
- Assess the performance of managed futures funds against an index with the same accuracy as is already possible for other asset classes.

Barclay BTOP 50 Index: The Barclay BTOP50 Index seeks to replicate the overall composition of the managed futures industry with regard to trading style and overall market exposure. The BTOP50 employs a top-down approach in selecting its constituents. The largest investable trading advisor programs, as measured by assets under management, are selected for inclusion in the BTOP50. In each calendar year the selected trading advisors represent, in aggregate, no less than 50% of the investable assets of the Barclay CTA Universe. To be included in the BTOP50, the following criteria must be met:

- Program must be open for investment
- Manager must be willing to provide daily returns
- Program must have at least two years of trading activity
- Program's advisor must have at least three years of operating history
- The BTOP50's portfolio will be equally weighted among the selected programs at the beginning of each calendar year and will be rebalanced annually.

Barclay CTA Index: The Barclay CTA Index is a leading industry benchmark of representative performance of commodity trading advisors. There are currently 522 programs included in the calculation of the Barclay CTA Index for 2017. The Index is equally weighted and rebalanced at the beginning of each year.

To qualify for inclusion in the CTA Index, an advisor must have four years of prior performance history. Additional programs introduced by qualified advisors are not added to the Index until after their second year. These restrictions, which offset the high turnover rates of trading advisors as well as their artificially high short-term performance records, ensure the accuracy and reliability of the Barclay CTA Index.

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Index Definitions (continued)

CISDM CTA Equal Weighted Index: The CISDM CTA Equal Weighted Index is designed to broadly represent the performance of all CTA programs in the Morningstar database that meet the inclusion requirements.

The index calculation methodology is designed to exclude, each month, constituent performance deemed to be an outlier observation. Each month, statistics are generated for CTA programs in the Morningstar database that meet the inclusion requirements and that have reported returns for that month. Programs whose returns are +/- 3 standard deviations from the average return are excluded. The index return for the month is the simple average return of the non-excluded programs.

As of December 2014, currently 262 CTAs, equally weighted in the CISDM CTA Equal Weighted Index (most current data available).

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

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

HFRI Macro (Total) Index: Macro: Investment Managers which 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 Relative Value techniques, Macro strategies are distinct from Relative Value 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 Equity Hedge, in which the fundamental characteristics on the company are the most significant are integral to investment thesis.

HFRI Relative Value (Total) Index: Investment Managers who maintain positions in which the investment thesis is predicated on realization of a valuation discrepancy in the relationship between multiple securities. Managers employ a variety of fundamental and quantitative techniques to establish investment theses, and security types range broadly across equity, fixed income, derivative or other security types. Fixed income strategies are typically quantitatively driven to measure the existing relationship between instruments and, in some cases, identify attractive positions in which the risk adjusted spread between these instruments represents an attractive opportunity for the investment manager. A Relative Value position may be involved in corporate transactions also, but as opposed to Event Driven exposures, the investment thesis is predicated on realization of a pricing discrepancy between related securities, as opposed to the outcome of the corporate transaction.

HFRI Fund of Funds Composite Index: Fund of Funds invest with multiple managers through funds or managed accounts. The strategy designs a diversified portfolio of managers with the objective of significantly lowering the risk (volatility) of investing with an individual manager. The Fund of Funds manager has discretion in choosing which strategies to invest in for the portfolio. A manager may allocate funds to numerous managers within a single strategy, or with numerous managers in multiple strategies. The minimum investment in a Fund of Funds may be lower than an investment in an individual hedge fund or managed account. The investor has the advantage of diversification among managers and styles with significantly less capital than investing with separate managers. Please note: The HFRI Fund of Funds Index is not included in the HFRI Fund Weighted Composite Index.

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

S&P 500 Total Return Index: The S&P 500 is widely regarded as the best single gauge of large-cap U.S. equities. There is over USD 7.8 trillion benchmarked to the index, with index assets comprising approximately USD 2.2 trillion of this total. The index includes 500 leading companies and captures approximately 80% coverage of available market capitalization.

Bloomberg Barclays U.S Aggregate Bond Index: The Barclays Capital U.S. Aggregate Bond Index is the most common index used to track the performance of investment grade bonds in the U.S.

The Bloomberg Barclays U.S. Aggregate Bond Index is weighted according to market capitalization, which means the securities represented in the index are weighted according to the market size of the bond category.

Bloomberg Commodity Total Return Index: The Bloomberg Commodity Total Return index is composed of futures contracts and reflects the returns on a fully collateralized investment in the Bloomberg Commodity Index. This combines the returns of the Bloomberg Commodity Index with the returns on cash collateral invested in 13 week (3 Month) U.S. Treasury Bills.

The Bloomberg Commodity Index is a broadly diversified commodity price index distributed by Bloomberg Indexes. The index tracks prices of futures contracts on physical commodities on the commodity markets. The index is designed to minimize concentration in any one commodity or sector. It currently has 22 commodity futures in seven sectors. The weightings for each commodity included are calculated in accordance with rules that ensure that the relative proportion of each of the underlying individual commodities reflects its global economic significance and market liquidity. Annual rebalancing and reweighting ensure that diversity is maintained over time.

Important Information

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The investments discussed have varying degrees of risk. Some of the risks involved with equities include the possibility that the value of the stocks may fluctuate in response to events specific to the companies or markets, as well as economic, political or social events in the U.S. or abroad. Bonds are subject to interest rate, inflation and credit risks. Investments in foreign securities involve special risks, including foreign currency risk and the possibility of substantial volatility due to adverse political, economic or other developments. These risks are magnified for investments made in emerging markets.

Managed futures funds are speculative, involve a high degree of risk and are subject to substantial fees and expenses, which may offset trading profits. There can be no assurance that any managed futures fund will achieve its objectives or avoid substantial or total losses. Since underlying positions held in managed futures funds may fluctuate widely in value, individual funds can be highly volatile. Managed futures funds may also make significant use of leverage, adding to the volatility of a fund's performance. Managed futures funds may trade on unregulated markets lacking the regulatory protection of exchanges. Single-manager funds lack diversification and thus may involve higher risk. Since many managed futures funds employ trend-following strategies, periods without clear trends in the market will typically be highly unfavorable to these funds. Managed futures funds are subject to large drawdowns. The minimum margin requirements for various futures markets may subject investors to significant leverage. While margin-to-equity levels are closely managed to historic volatility ranges by the funds, investors should note that they are investing in securities on a leveraged basis.

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