DEMYSTIFYING SYSTEMATIC MACRO HEDGE FUND STRATEGIES

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Introduction: The Case for Systematic Macro

Equity markets, particularly in the United States, have exhibited strong performance since the credit crisis in 2008. As the risk-reward in maintaining an overweight allocation to these markets diminishes, investors looking to rebalance gains from equities should consider incorporating systematic macro strategies as part of their hedge fund portfolios. Part of the objective of a hedge fund portfolio is to provide diversification from equities. Systematic macro strategies meet this objective. They are an effective and liquid way to incorporate further diversification into a hedge fund portfolio due to their low correlation with equities. They also tend to perform well in periods of financial market dislocations. For instance, during the credit crisis, the Barclay CTA Index recorded gains of 9.5% from September 2008 to March 2009, compared to losses of 37.6% posted by the Standard & Poor's 500 Index (S&P 500) during the same period.

To be sure, systematic macro strategies can appear opaque and complex, discouraging many investors from a potentially rewarding investment that may benefit their portfolios. While there are some systematic macro models that are fairly complicated, the most commonly used strategies the paper focuses on—trend following and counter-trend—are conceptually simple. This paper attempts to demystify the underpinnings of these strategies by exploring the fundamental factors driving their returns. In doing so, we hope to increase investors' level of comfort with and ability to analyze these investment strategies.

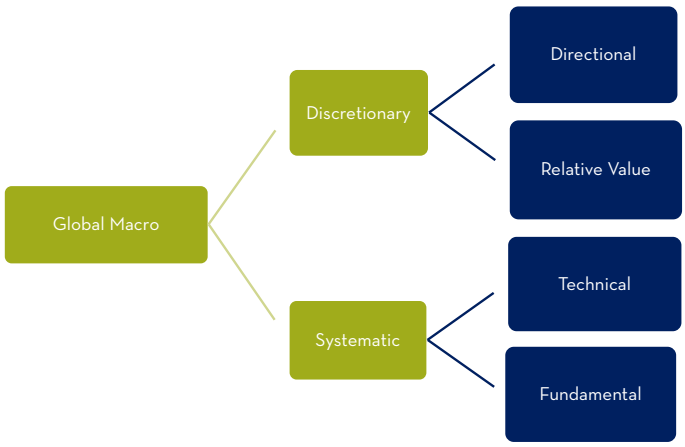
Systematic macro strategies profit from inefficiencies fueled by long-term macroeconomic cycles and trends as well as the behavioral tendencies of market participants. They are model-driven approaches that use buy and sell signals based on rules devised from statistical and historical analyses. They aim to generate returns by taking long and short positions in global markets, that is, equity indexes, sovereign fixed income, currencies and commodities. Note that the terms 'managed futures' and 'commodity trading advisors (CTAs)' are often used interchangeably to refer to systematic macro strategies.

The paper also explores how systematic macro strategies can add value to an investment portfolio, and details their potential risks while offering solutions for their implementation. Overall, we believe a diversified portfolio of systematic macro strategies can provide healthy long-term risk-adjusted performance, diversification and downside protection. While these strategies have exhibited tepid performance in the aftermath of the financial crisis in 2008 (we discuss this later), their current low valuations may provide an opportune time to get in on the ground floor as investors seek to rebalance gains into their hedge fund portfolios and diversify away from richly valued US equities.

Systematic Macro Strategies: An Overview

The evolution and development of systematic macro strategies can be tied to the growth of the futures contract, one of the instruments primarily traded to execute systematic macro strategies. A futures contract is a standardized contract between two parties to buy or sell a specified asset of standardized quantity and quality for a price agreed upon today with delivery and payment occurring at a specified future date, that is, the delivery date. Farmers began using futures contracts in the 1800s to hedge fluctuations in prices of crops and livestock. Eventually, futures contracts were used by speculators and investors as

Exhibit 1: Types of Systematic Macro Strategies



Source: NEPC

a vehicle for generating long-term investment returns.

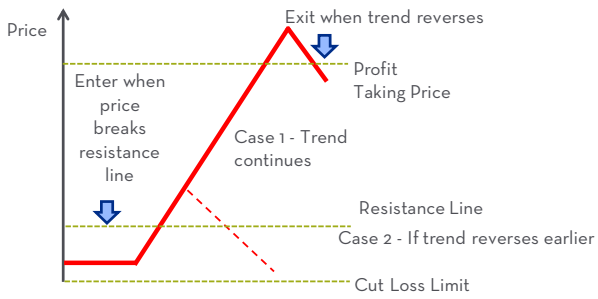
The first publicly available systematic macro fund was introduced in 1948 by Richard Donchian. Many of the techniques he developed, for instance, breakouts and moving average crossovers, are still being used today. However, the growth of systematic macro strategies really started to accelerate in the 1970s and 1980s. This can be attributed to a combination of:

a. Rampant inflation in the 1970s, which set the stage for an unprecedented commodities bull run that fueled a great opportunity for the use of futures contracts.

b. Technological innovation in futures markets, which led to the rapid growth of the number and volume of futures contracts traded during this period, fueling greater liquidity and diversification.

In general, systematic macro strategies are classified into two broad groups: technical and fundamental systematic macro strategies (Exhibit 1).

Exhibit 2: Trend Following Systematic Macro Strategy



Source: www.trendfollowing.com

Technical systematic macro strategies are the largest group. This methodology is based on the theory that price data provides all the necessary information needed to profit from market movements. The main types of technically-based systematic strategies include:

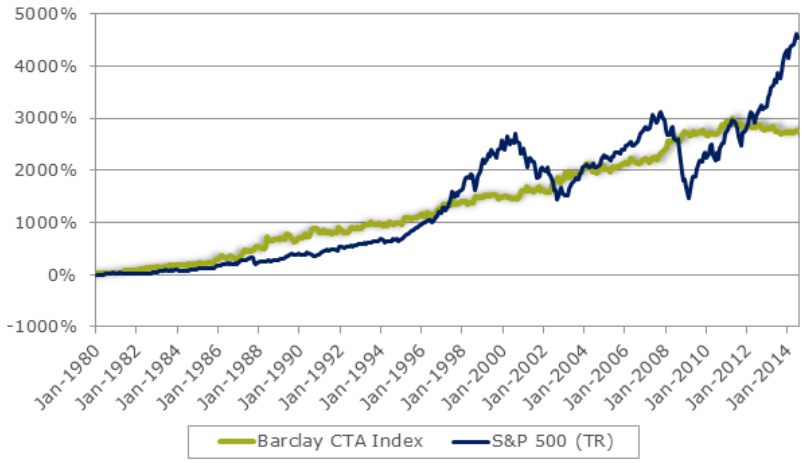
i. Trend following – This is the most commonly utilized systematic macro strategy (Exhibit 2). Its popularity is due to its consistent long-term performance, continuity of returns, ability to trade large amounts of capital, and relatively simple trading rules. In fact, up to 80% of the returns generated by systematic macro strategies can be attributed to simple trend following of some form. Trend following trading models seek to exploit medium- and long-term price moves in markets.

Trend followers will enter a position once a trend in a market has been established (whether up or down), expecting that trend to continue. Trend following models are reactionary, that is, they do not typically attempt to forecast or anticipate price movement. These models are designed to react to recent price movements. Trend following systems have a low percentage of winning trades (approximately 30% of the trades are successful). However, the profits made in the successful trades are larger than the losses that occur, that is, they have a high winning trade to losing trade ratio (usually at least 2:1). Additionally, trend following systems do not perform well in directionless markets or during market turning points.

ii. Counter trend – These strategies use methodologies that are the opposite of those used in trend following systems. Counter trend strategies look to buy and sell oversold and overbought markets, respectively. Unlike trend following strategies which do not do well in directionless markets, counter trend strategies thrive in trendless markets. They do not do well in trending markets. Additionally, they have a high percentage of winning trades (approximately 60%) but a smaller profit per trade, that is, a low winning trade to losing trade ratio (usually less than 2:1). These attributes result in a low correlation between trend following and counter trend strategies. They also tend to focus on shorter time frames than trend following strategies. As a result, counter trend strategies tend to be capacity constrained.

iii. There are other subsets, such as strategies that focus on very short-term time frames and/or pattern recognition, which we will not discuss since they are only a small part of the technical systematic macro strategies offered today.

Exhibit 3: Cumulative Performance of Barclay CTA Index vs. Equities (January 1980– June 2014)



Source: PerTrac

Fundamental systematic macro strategies are a much smaller group in terms of number of managers that utilize these models. This methodology attempts to examine and understand the underlying factors driving market price through econometric models that analyze a broad set of macroeconomic data. It seeks to develop an understanding of how fundamentals and markets interact and bases its positions on that understanding through systematic rules. Typically, these models focus on value and momentum factors. While the inputs used in fundamental systematic macro models are different from those in technical models (that is, fundamental versus price data), the drivers of return are similar. Momentum factors are somewhat similar to those used in trend following while value factors are similar to those used in counter trend. There are only a few investment managers that utilize these types of models. However, they comprise a significant portion of the systematic macro universe in terms of assets. This is due to the size of one particularly large manager in this space.

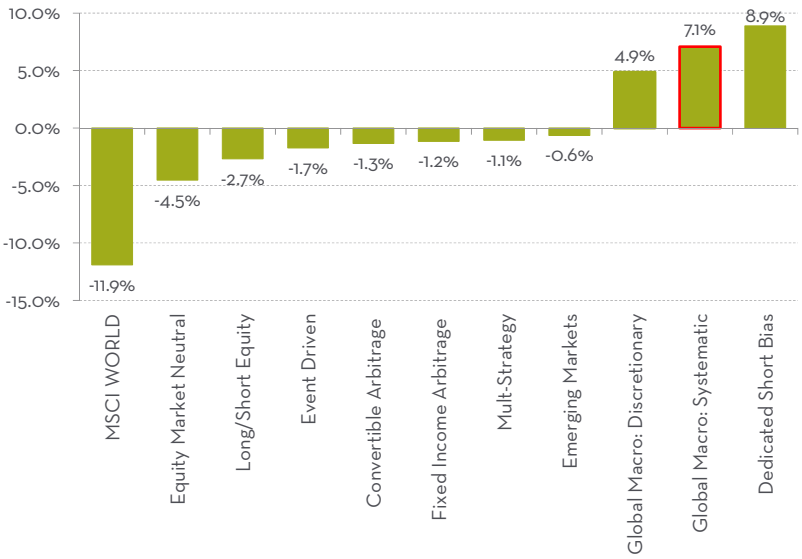
SYSTEMATIC MACRO RELIES ON TRENDING AND COUNTER TREND BEHAVIOR OF MARKETS TO GENERATE RETURNS

Demystifying Systematic Macro Strategies

Investors tend to be more comfortable and have more experience with traditional discretionary strategies that are based on fundamental analyses of markets and individual securities. Since systematic macro strategies are model-based, they tend to be more mysterious and it is not always clearly understood how they consistently generate returns. This section of the paper aims to demystify the underlying factors driving returns for these strategies.

Systematic macro strategies typically rely on the trending and counter trend behavior of markets to generate returns. But what causes this market behavior? Many academic theories have linked the trending and counter trend behavior of mar-

Exhibit 4: Average Returns of the Barclay CTA Index, Dow Jones Hedge Fund Indices and the MSCI World Index in Periods of Equity Drawdowns*



*Source: PerTrac (*The average return was determined by calculating the percentage decrease from an equity high to an equity low of MSCI World Index during the calendar year when the index has experienced its largest drawdowns relative to the performance of Dow Jones Credit Suisse Hedge Fund Indexes. These values were then added up and then divided by the number of periods when the drawdowns occurred.)*

Exhibit 5: Systematic Macro Performance in Financial Market Dislocations

Period	Number of Months	Event	S&P 500 (Total Return)	Barclay CTA Index
Fourth Quarter 1987	3	U.S. Stock Market Crash	-23%	14%
Third Quarter 1990	3	Invasion of Kuwait by Iraq	-14%	16%
Third Quarter 1998	3	Russian Default, LTCM Crisis	-10%	9%
November 2000 - December 2000	2	U.S. Presidential Election Uncertainty	-7%	9%
September 2001 - October 2001	2	9/11 Terrorist Attack	-6%	1%
October 2001 - July 2002	10	Enron and World Com Bankruptcies	-11%	8%
January 2000 - December 2002	36	Technology Bubble Burst, U.S. Recession	-38%	22%
July 2007 - December 2008	18	Global Credit and Mortgage Crisis	-38%	20%
September 2008 - December 2008	4	U.S. Financial Institutions Face Liquidity Crunch	-29%	7%

Source: Morgan Stanley

kets to factors as simple as macroeconomic cycles. These cycles can cause asset prices to go up and down based on factors, for instance, boom and bust business cycles, technological events such as the industrial revolution or the tech bubble in the late 1990s, inflation, the movements of interest rates, supply and demand of commodities, and central bank policies.

SYSTEMATIC MACRO IS AGNOSTIC AS TO WHETHER MARKETS TREND DUE TO TECHNICAL OR FUNDAMENTAL REASONS

The behavioral tendencies of market participants also have an impact on market movements, sometimes resulting in bubbles and market crashes. For example, there are a number of factors that that can lead to an initial under-reaction in price, keeping the value of a market artificially low, including:

- Anchoring - Investors can be slow to update their views in response to new information.
- Confirmation bias - Investors tend to seek out information that confirms their views or thesis while disregarding contradictory evidence.
- Loss aversion - Sellers are afraid to cut losing positions while buyers want to realize notional gains too quickly.
- Herding – Investors tend to chase assets moving higher and higher in price.
- Hedgers versus speculators – Prices can be influenced by the actions of market participants who buy or sell assets without seeking to maximize profits, for instance, a central bank trying to keep rates from increasing.

These tendencies can then lead to under-reaction to information, which is suddenly changed by a catalyst causing a market to break out and start trending. Trend followers and fundamental momentum models benefit from those movements. After a period of time, this could lead to over-reaction and extend the trend too long. Eventually, market participants realize their mistakes and prices revert back to reasonable prices. Counter trend and fundamental value models benefit from those movements.

Systematic macro managers simply build systematic rules that buy and sell markets based on these market movements; they are agnostic as to whether markets trend due to technical or fundamental reasons. These trading rules are designed to generate returns as long as these market inefficiencies persist.

This leads to another misconception that investors may have with regard to many of these strategies: the belief that eventually all models break. This may be true for some models that are built to exploit short-term market anomalies. However, as described above, the market inefficiencies that the most robust systematic macro strategies seek to exploit are based on factors that are deeply embedded in macroeconomic cycles and human behavior that have persisted over a long period of

[1] *A Century of Evidence on Trend-Following Investing (AQR Capital paper): This paper studies the performance of trend following over the past 110 years. It concludes that the strategy has exhibited consistent long-term performance.*

Two Centuries of Trend Following: This paper studies futures and spot price time series from 1800 and 1960 on indices and commodities, respectively. It establishes the existence of anomalous excess returns based on trend following strategies across four asset classes (commodities, currencies, stock indices and bonds).

time. To this end, there have been a large number of academic studies that have validated the long-term success of trend following.[1]

Benefits of Systematic Macro Strategies

1. Long and successful track record: Systematic macro strategies have exhibited robust long-term risk-adjusted performance (Exhibit 3). The recent rally in US equities has outpaced systematic macro performance which we explain in more detail in the *Drawbacks* section.

2. Portfolio diversification: Systematic macro strategies are an effective and liquid way to diversify a hedge fund portfolio because of their low correlation to equities. More importantly, they have outperformed in periods where equities have experienced market dislocations (Exhibit 4).

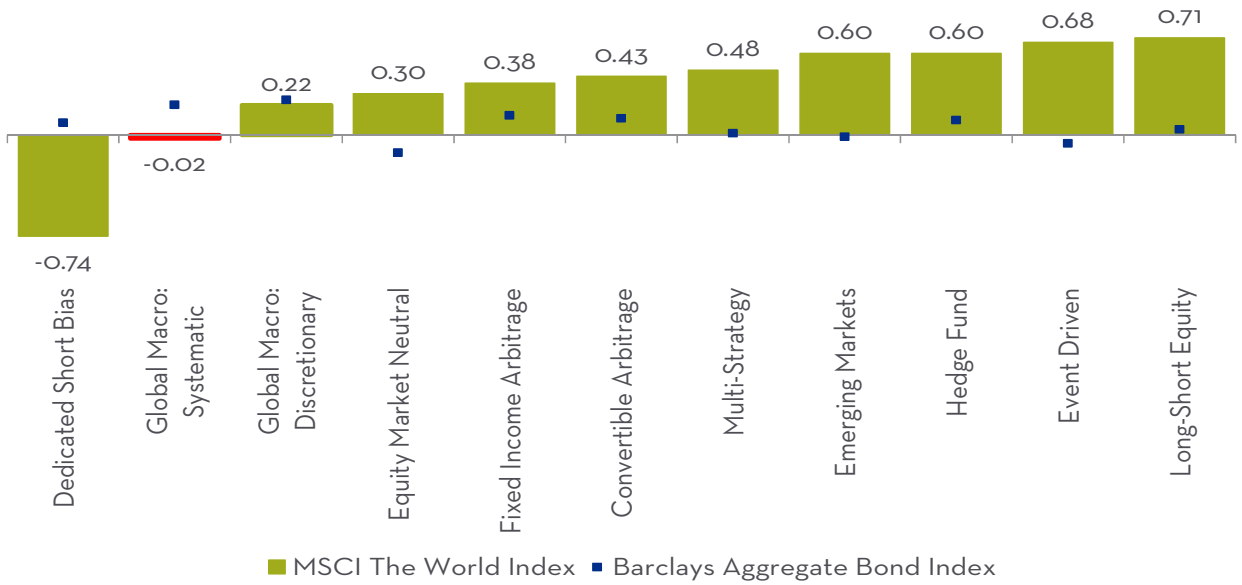
In Exhibit 5, we cite specific examples of the outperformance of systematic macro strategies during periods when equities have experienced dislocations.

The outperformance stems from the fact that systematic macro models are not driven by emotions. Typically, markets sell off faster than they rise due to panic or forced selling when catastrophic events occur, for instance, the credit crisis in 2008, as market participants' decisions are often dictated by fear. Systematic macro trend following models will, for example, detect and trade these trends irrespective of direction which can allow them to profit while other strategies are experiencing losses. This is what creates the low correlation to traditional investments and provides the powerful portfolio diversification effects of systematic macro strategies (Exhibit 6). The low-to-negative correlation of these strategies to traditional instruments can enhance the risk-return profile of investment portfolios.

3. Lower drawdowns: Systematic macro strategies have generally exhibited smaller drawdowns than equities and many other hedge fund strategies (Exhibit 7). This is due to robust risk management practices that focus on the preservation of capital. For example, many systematic macro strategies incorporate stop-loss disciplines. This can sometimes be costly during choppy market conditions, repeatedly triggering stop-loss orders. However, in the long run, it can allow for the generation of option-like returns with limitations on capital losses.

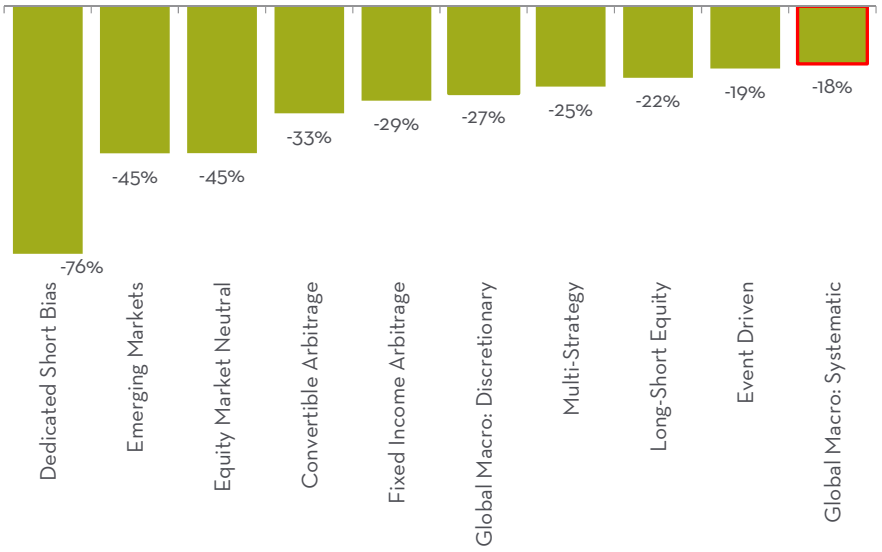
4. Liquidity: Most systematic macro managers trade the most liquid, centrally-cleared and exchange-traded global commodity and financial futures markets to protect investors from excess slippage risks that can cause negative returns. The diversification of positions across several markets makes it possible to enter and exit positions with reasonable efficiency. Futures contracts also require only a small margin payment (typically less than 10% of the notional value of the exposure provided per contract) to establish a position. The

Exhibit 6: Correlation of Systematic Macro and Other Hedge Fund Strategies to the MSCI World Index (April 1994– June 2014)



Source: PerTrac

Exhibit 7: Historical Maximum Drawdowns for Systematic Macro and Other Hedge Fund Strategies to the MSCI World Index (April 1994– June 2014)



Source: PerTrac

remaining portion of an investor's capital is kept in cash or cash-like instruments. These features enhance the liquidity profile of most systematic macro managers and allow investors the ability to access their capital in a timely manner. For instance, during the financial crisis in 2008, many investors had difficulty accessing capital in less liquid hedge fund strategies with an asset-liability mismatch. This was generally not the case with systematic macro managers.

5. Transparency: Most systematic macro managers are regulated entities and are required to report their performance on a monthly basis. Additionally, track records and business processes are audited. In separately managed accounts, systematic macro managers place trades directly into individual accounts and investors have full access to monitor all trades, calculate gains and losses, and view open positions and account value on their daily statement.

6. Low key-man risk: Systematic macro investing holds low key-man risk since maintenance of models can be transferred from one person to another. This is unlike discretionary investing, which could hold key-man risk related to the manager.

Drawbacks of Systematic Macro Strategies

1. Reactionary: Systematic macro strategies are generally reactive. This is because of their reliance on backward-looking market data. When new dynamics enter the market, it may take a while for these strategies to adapt. For example, many systematic macro strategies have underperformed since the financial crisis in 2008.

This is likely due to the impact of central bank intervention which has caused:

- *A decrease in longer-term volatility* – This has reduced the number of opportunities, particularly for trend followers.
- *An increase in short-term volatility* – While longer-term volatility has decreased since 2009, there has been intermittent short-term volatility leading to stop outs and losses from time to time, for instance, the equity and fixed income selloff in the first half of 2013 led to large losses.
- *An increase in correlations between markets* - Markets had been moving in a much more synchronous fashion due to quantitative easing, reducing the ability for diversification. Note that the correlations between markets have decreased, which we hope will provide a more positive environment for systematic macro strategies going forward.

2. Leverage: Systematic macro funds utilize derivative contracts—futures, forwards and swaps—to gain asset exposure. These contracts come with an implicit amount of leverage. For example, futures contracts typically require an initial deposit of a small percentage of the value of the contract. Although this is very different from borrowing leverage, the impact on the fund is similar. Leverage can increase portfolio returns. However, it can also increase the level of risk and volatility in a portfolio. These strategies have traditionally exhibited a realized volatility of 10%-25%.

3. Manager risk: When selecting a systematic macro manager or CTA, investors must conduct their due diligence. (Many hedge funds, particularly those that trade futures, are registered as a Commodity Trading Advisor, or CTA.) In addition to evaluating the operational strength of the organization and team, other factors specific to this strategy that investors should focus on include research development, that is, the level of invest-

ment in research, model evaluation and leverage. Potential investors should also examine the integrity of the research data such as curve-fitting and over-optimization of the strategy, and use of back-tested results.

4. Overcrowding: A significant amount of capital has entered the space and is concentrated in the largest systematic macro firms (Exhibit 8). This implies that the growing capital dedicated to systematic macro strategies could have a negative impact on future profitability.

That said, the return drivers of these strategies, for instance, macroeconomic cycles and behavioral bias, are likely to continue to influence markets, potentially supporting long-term performance of systematic macro strategies. This is because the trends that are caused by these factors are fairly scalable. In addition, these strategies are still a relatively small portion of the volume in the markets they trade. Systematic macro strategies should still provide investors with adequate portfolio diversification even with a relatively low but positive Sharpe ratio. The key is that these strategies provide little or no correlation to traditional assets.

Implementation of Systematic Macro Strategies

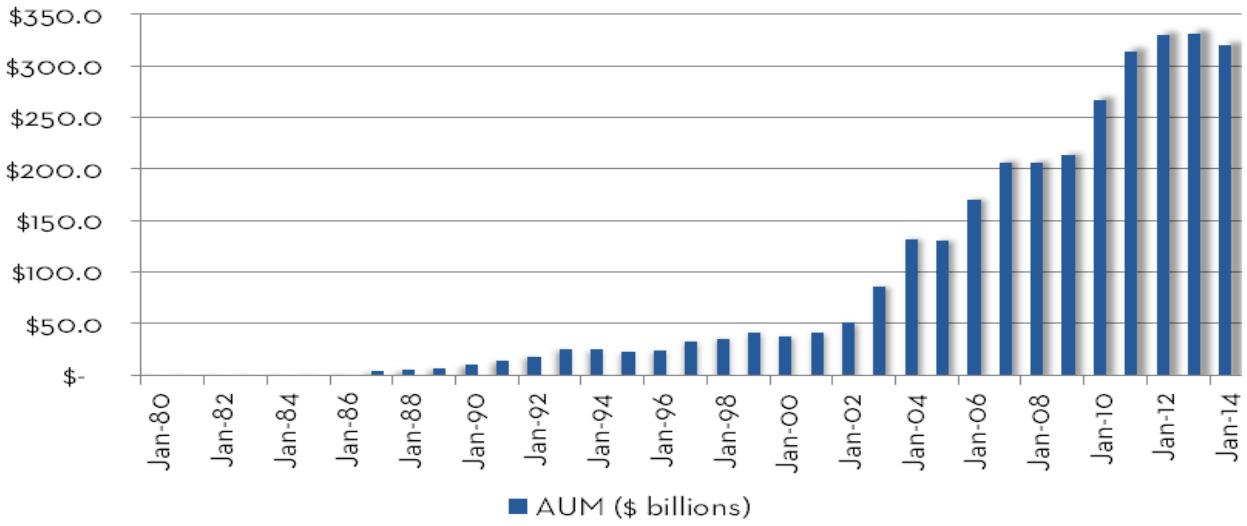
There are a number of ways to invest in systematic macro strategies. The simplest is to invest in a passive or active index. One such passive index is the Mount Lucas Management ("MLM") Index, which is based on actual market prices for a basket of passively traded futures contracts consisting of commodities, global bonds, and currencies. Thus, it can be replicated in real time. Passive indexes offer significantly lower expense ratios than actively managed strategies. However, the tracking error can be quite large. The performance of these indexes has also been poor.

Actively managed indexes, including the S&P Managed Futures Index provided by Standard and Poor's, the BTOP50 Index provided by the Barclay Group, the AQR Managed Futures Strategy Fund, and Credit Suisse First Boston (CSFB)/Tremont Partners are also available to investors. These indexes have fairly higher expense ratios than passive indexes and have underperformed significantly relative to systematic macro managers.

While passive or active indexes may be suitable for some investors, top quartile systematic macro managers can offer far more compelling performance. Many systematic macro managers, particularly those that trade futures, are also registered as Commodity Trading Advisers (CTAs). Investors can invest through a managed account or through a limited partnership structure. The fees that these managers charge can be considerably higher than those of passive and active indexes However, the top quartile managers have significantly outperformed passive and active indexes after fees.

Systematic macro managers typically operate with a hedge fund-style fee structure that combines an asset management fee with a performance fee, which is generally subject to a high water mark. The median fees for single-manager hedge funds employing systematic macro strategies are a 2%

Exhibit 8: Industry Growth of Systematic Macro Strategies



Source: BarclayHedge

management fee and 20% performance fee, according to an analysis of the manager universe tracked by NEPC. Fund of CTAs are managers that utilize external investor capital and invest it in a diversified portfolio of systematic macro managers. While these managers offer the benefit of "instant diversification," investors are subject to an additional management and incentive fee.

There are also a number of factors one should consider when evaluating how to construct a portfolio of systematic macro strategies. One of the most important: understanding the method that a systematic macro manager uses to generate its trading signals. This has a direct impact on the risk and return profile one can expect in different market environments.

As described earlier, the most common method utilized by systematic macro managers is trend following. While conceptually simple, trend following models use a number of different technical indicators to identify trends. Individual trend following models will interpret price action differently, resulting in different behavior for different models. In general, trend following models work best when markets are exhibiting persistent trending behavior. In periods like 2008, where you have markets continually trending downwards, trend following strategies did very well. Therefore, investors seeking this specific attribute or attempting to capture longer-term trends should include a larger percentage of trend following in their portfolio. However, trend following tends not to do well in certain types of market environments, including periods without sustained moves in one or more of the markets traded, so-called whip-saw markets in which trends begin to develop but then reverse, or times when markets are driven by factors or events not reflected in technical analysis. Diversifying the portfolio by incorporating non-trend strategies (such as counter trend, short term and fundamental) can meaningfully mitigate this issue.

SYSTEMATIC STRATEGIES HAVE A DISTINCTLY POSITIVE RETURN PROFILE WITH LOW CORRELATION TO TRADITIONAL ASSET CLASSES

In addition, the trade time frame of the systematic strategy can have a significant impact on how the risk expectations for a strategy are evaluated. For instance, larger drawdowns should be tolerated for longer-term managers since they may ignore short-term drawdowns, if the longer-term trade signal remains positive. Varying time horizons can also lead to divergences in positioning as managers with shorter holding periods will be quicker to change positioning in the event of a market reversal, but may underperform if a trend resumes after a minor correction.

Understanding what markets work best for a particular systematic strategy is also important. Typically, trend following strategies have a relatively limited edge in any individual market, but benefit from diversification across many different assets, which can result in attractive risk-adjusted returns for the overall portfolio. The same applies to most fundamentally-based systematic strategies. Counter trend strategies can be limited to specific dislocations in certain markets such relative value spreads in energy (for example, crack spreads) or fixed income markets (for example, on the run/off the run Treasury spreads). This is the reason why they are typically less scalable than trend following strategies.

Ultimately, combining different strategies, trading time frames, and markets can have the beneficial effect of reducing the potential for drawdowns in environments that do not work well for an individual strategy. Investors that prefer to simplify this evaluation process should consider multi-model systematic macro managers or fund of CTAs, which provide instant diversification.

Conclusion

Through this paper we have attempted to build a better understanding of systematic macro strategies by linking the underpinnings of these strategies to what drives their returns. A better understanding of how returns are generated in this space should hopefully lead to an increased level comfort with these strategies and encourage more investors to explore the benefits they provide. The empirical evidence provided in the paper demonstrates that systematic strategies have carried a distinctly positive return profile with a low correlation to traditional asset classes. At NEPC, we believe a portfolio of systematic models within the hedge fund allocation has the potential to provide robust long-term risk-adjusted performance and downside protection.

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- Past performance is no guarantee of future results.
- The information in this report has been obtained from sources NEPC believes to be reliable. While NEPC has exercised reasonable professional care in preparing this report, we cannot guarantee the accuracy of all source information contained within.
- The opinions presented herein represent the good faith views of NEPC as of the date of this report and are subject to change at any time.
- This report contains summary information regarding the investment management approaches described herein but is not a complete description of the investment objectives, portfolio management and research that supports these approaches. This analysis does not constitute a recommendation to implement any of the aforementioned approaches.

In addition, it is important that investors understand the following characteristics of non-traditional investment strategies including hedge funds, real estate and private equity:

1. Performance can be volatile and investors could lose all or a substantial portion of their investment
2. Leverage and other speculative practices may increase the risk of loss
3. Past performance may be revised due to the revaluation of investments
4. These investments can be illiquid, and investors may be subject to lock-ups or lengthy redemption terms
5. A secondary market may not be available for all funds, and any sales that occur may take place at a discount to value
6. These funds are not subject to the same regulatory requirements as registered investment vehicles
7. Managers may not be required to provide periodic pricing or valuation information to investors
8. These funds may have complex tax structures and delays in distributing important tax information
9. These funds often charge high fees
10. Investment agreements often give the manager authority to trade in securities, markets or currencies that are not within the manager's realm of expertise or contemplated investment strategy