LINTNER REVISITED

A Quantitative Analysis of Managed Futures Strategies

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ABSTRACT:

Managed futures comprise a wide array of liquid, transparent active strategies which offer institutional investors a number of benefits. These include cash efficiency, intuitive risk management, and a proclivity toward strong performance in market environments that tend to be difficult for other investments. This paper revisits Dr. John Lintner's classic 1983 paper, "The Potential Role of Managed Commodity-Financial Futures Accounts (and/or Funds) in Portfolios of Stocks and Bonds," which explored the substantial diversification benefits that accrue when managed futures are added to institutional portfolios. As Lintner did, it analyzes the portfolio benefits that managed futures, offer through the mean-variance framework, but it draws on more complete techniques such as the analysis of omega functions to assess portfolio contribution. The paper also conducts a comparative qualitative and quantitative analysis of the risk and return opportunities of managed futures relative to other investments, and includes a discussion as to why managed futures strategies tend to perform well in conditions that are not conducive to other investment strategies. It provides an overview of the diversity of investment styles within managed futures, dispelling the commonly held notion that all CTAs employ trend following strategies. Finally, it highlights the opportunities the space offers to pension plan sponsors, endowments and foundations seeking to create well-diversified, liquid, transparent, alpha generating portfolios.

Dedicated to the late John Lintner

RISK DISCLOSURE STATEMENT

TRADING FUTURES AND OPTIONS INVOLVES SUBSTANTIAL RISK OF LOSS AND IS NOT SUITABLE FOR ALL INVESTORS. THERE ARE NO GUARANTEES OF PROFIT NO MATTER WHO IS MANAGING YOUR MONEY. PAST PERFORMANCE IS NOT NECESSARILY INDICATIVE OF FUTURE RESULTS.

THE RISK OF LOSS IN TRADING COMMODITY INTERESTS CAN BE SUBSTANTIAL. YOU SHOULD THEREFORE CAREFULLY CONSIDER WHETHER SUCH TRADING IS SUITABLE FOR YOU IN LIGHT OF YOUR FINANCIAL CONDITION. IN CONSIDERING WHETHER TO TRADE OR TO AUTHORIZE SOMEONE ELSE TO TRADE FOR YOU, YOU SHOULD BE AWARE OF THE FOLLOWING:

IF YOU PURCHASE A COMMODITY OPTION YOU MAY SUSTAIN A TOTAL LOSS OF THE PREMIUM AND OF ALL TRANSACTION COSTS.

IF YOU PURCHASE OR SELL A COMMODITY FUTURES CONTRACT OR SELL A COMMODITY OPTION YOU MAY SUSTAIN A TOTAL LOSS OF THE INITIAL MARGIN FUNDS OR SECURITY DEPOSIT AND ANY ADDITIONAL FUNDS THAT YOU DEPOSIT WITH YOUR BROKER TO ESTABLISH OR MAINTAIN YOUR POSITION. IF THE MARKET MOVES AGAINST YOUR POSITION, YOU MAY BE CALLED UPON BY YOUR BROKER TO DEPOSIT A SUBSTANTIAL AMOUNT OF ADDITIONAL MARGIN FUNDS, ON SHORT NOTICE, IN ORDER TO MAINTAIN YOUR POSITION. IF YOU DO NOT PROVIDE THE REQUESTED FUNDS WITHIN THE PRESCRIBED TIME, YOUR POSITION MAY BE LIQUIDATED AT A LOSS, AND YOU WILL BE LIABLE FOR ANY RESULTING DEFICIT IN YOUR ACCOUNT.

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THE PLACEMENT OF CONTINGENT ORDERS BY YOU OR YOUR TRADING ADVISOR, SUCH AS A ''STOP-LOSS'' OR ''STOP-LIMIT'' ORDER, WILL NOT NECESSARILY LIMIT YOUR LOSSES TO THE INTENDED AMOUNTS, SINCE MARKET CONDITIONS MAY MAKE IT IMPOSSIBLE TO EXECUTE SUCH ORDERS.

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MANAGED FUTURES MAY NOT NECESSARILY BE PROFITABLE UNDER ALL MARKET CONDITIONS AND ALSO MAY NOT NECESSARILY REDUCE VOLATILITY. THIS MATTER IS INTENDED AS A SOLICITATION.

THIS MATERIAL MAY MENTION SERVICES WHICH RANK THE PERFORMANCE OF COMMODITY TRADING ADVISORS. PLEASE NOTE THAT THE RANKINGS APPLY ONLY TO THOSE CTAs WHO SUBMIT THEIR TRADING RESULTS. THE RANKINGS IN NO WAY PURPORT TO BE REPRESENTATIVE OF THE ENTIRE UNIVERSE OF COMMODITY TRADING ADVISORS. THE MATERIAL IN NO WAY IMPLIES THAT THESE RESULTS ARE OFFICIALLY SANCTIONED RESULTS OF THE COMMODITY INDUSTRY. BE ADVISED THAT AN INDIVIDUAL CANNOT INVEST IN THE INDEX ITSELF AND THE ACTUAL RATES OF RETURN FOR AN INDIVIDUAL PROGRAM MAY SIGNIFICANTLY DIFFER AND BE MORE VOLATILE THAN THE INDEX.

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INTRODUCTION

The Managed Futures industry is a diverse collection of active trading strategies which specialize in liquid, transparent, exchange-traded futures markets and deep foreign exchange markets. Some of the approaches taken by managed futures managers exploit the sustained capital flows across asset classes that typically take place as markets move back into equilibrium after prolonged imbalances. Others thrive on the volatility and choppy price action which tend to accompany these flows. Others do not exhibit sensitivity to highly volatile market environments and appear to generate returns independent of the prevailing economic or volatility regime. This explains in part why managed futures often outperform traditional long-only investments and most alternative investment and hedge fund strategies during market dislocations and macro events.

This paper endeavors to re-introduce managed futures as a liquid, transparent hedge fund sub-style which actively trades a diversified mix of global futures markets. We seek to dispel some of the more common misconceptions many institutional investors hold regarding the space. We discuss the likely effects and implications of the proliferation of futures markets and managed futures assets under management on the performance and capacity of trading managers. We also address trading manager selection and style, and differentiate among the myriad unique trading strategies which currently encompass managed futures. An assessment of the performance and risk characteristics of managed futures relative to traditional investments and other alternatives is conducted, including a critique of the mean-variance framework in which many practitioners and investment professionals analyze performance and risk. The Omega performance measure is offered as an alternative to traditional mean-variance ratios since it accounts for the non-Gaussian nature of the distributions typically encountered in finance; the Omega function was invented by mathematicians in 2002, and thus was not available to Lintner.

This paper also gives a brief treatment of risk management and the importance of liquidity. From there, we analyze historical correlations among managed futures, traditional investments, and other alternative investment strategies, demonstrating the diversification benefits that may be reaped from the introduction of managed futures' uncorrelated variance into traditional portfolios and blended portfolios of traditional and alternative investments. We explore the proclivity of managed futures strategies toward strong performance during market dislocations due to their tendency to exploit the massive flows of capital to or from quality that tend to coincide with these events. Although managed futures strategies have often produced outstanding returns during dislocation and crisis events, it must be emphasized that they are not and should not be viewed as a portfolio hedge. Rather, they are sources of liquid transparent returns that are typically not correlated to traditional or other alternative investments.

And while most of this piece focuses on CTA's and separately managed accounts, one must be made aware of the rapid growth in managed futures mutual funds over recent years. Back in 2006, there was under a billion in such funds. As of June 30 of 2014 there were over $13 billion in Assets in mutual funds and ETFs that followed managed futures strategies. Both vehicles, separately managed accounts offered through CTAs and managed futures mutual funds have great potential in the years to come.

Finally, we conclude with a discussion of some of the unique benefits offered to pension plan sponsors, endowments and foundations, namely, the ability to use notional funding to efficiently fund exposure to managed futures, diminish the risks associated with asset-liability mismatches, and capitalize on favorable tax treatment. We also close the loop in relation to how Lintner's insights on the role of managed futures in an institutional portfolio have held up after more than 30 years.

REVISITING LINTNER

The late Dr. John Lintner (1916 – 1983), a Harvard University Professor, had an illustrious and prolific career, including recognition as one of the co-creators of the Capital Asset Pricing Model (CAPM). Lintner also published a classic paper entitled "The Potential Role of Managed Commodity-Financial Futures Accounts (and/or Funds) in Portfolios of Stocks and Bonds," which he presented in May 1983 at the Annual Conference of the Financial Analysts Federation in Toronto. Lintner found the risk-adjusted return of a portfolio of managed futures to be higher than that of a traditional portfolio consisting of stocks and bonds. The Lintner study also found that portfolios of stocks and/or bonds combined with managed futures showed substantially less risk at every possible level of expected return than portfolios of stocks and/or bonds alone. The following passage from Lintner's scholarly work furnishes good insight on his findings:

"Indeed, the improvements from holding efficiently selected portfolios of managed accounts or funds are so large – and the correlations between the returns on the futures portfolios and those on the stock and bond portfolios are surprisingly low (sometimes even negative) – that the return/risk trade-offs provided by augmented portfolios consisting partly of funds invested with appropriate groups of futures managers (or funds) combined with funds invested in portfolios of stocks alone (or in mixed portfolios of stocks and bonds), clearly dominate the trade-offs available from portfolios of stocks alone (or from portfolios of stocks and bonds). Moreover, they do so by very considerable margins.

The combined portfolios of stocks (or stocks and bonds) after including judicious investments in appropriately selected sub-portfolios of investments in managed futures accounts (or funds) show substantially less risk at every possible level of expected return than portfolios of stock (or stocks and bonds) alone. This is the essence of the "potential role" of managed futures accounts (or funds) as a supplement to stock and bond portfolios suggested in the title of this paper.

Finally, all the above conclusions continue to hold when returns are measured in real as well as in nominal terms, and also when returns are adjusted for the risk-free rate on Treasury bills." [Lintner, pages 105-106]

Sadly, Lintner died shortly after presenting his treatise on the role of managed futures in institutional portfolios.

The objectives of this paper are not at all modest. We seek to furnish a modern-day Lintner paper, and also to dispel some common misconceptions regarding managed futures. While Lintner's study has been applauded by scholars and practitioners who have read it, there still seems to be a gap and disconnect between many institutional investors and the managed futures space. Is this because through the passage of time the kernel of Lintner's findings is no longer true? Or have some institutional investors simply not performed their fiduciary duty in a comprehensive manner?

Updating the Lintner paper will help to supply the answer to this question. In order to do this properly, it is best to lay out the framework of what managed futures are in terms of the current landscape before exploring the impact of adding them to traditional portfolios.

MANAGED FUTURES – SOME BASIC PROPERTIES

A discussion of managed futures performance, particularly during periods of market dislocation, may be more illuminating if preceded by a brief discussion of what managed futures strategies are and are not. As previously mentioned, these strategies encompass a variety of active trading approaches which specialize in liquid, transparent, exchange-traded futures, options, and foreign exchange, and may be thought of as liquid, transparent hedge fund strategies. Like long/short equity and equity market neutral hedge fund strategies, managed futures strategies may take long and short positions in the markets they trade, are available only to qualified investors. They may employ leverage. An important difference, however, is that equity hedge fund leverage requires borrowing funds at a rate above LIBOR, whereas managed futures investing allows for the efficient use of cash made possible by the low margin requirements of futures contracts. Rather than allowing cash not being used for margin to collect interest at the investor's futures commission merchant (FCM), the investor can deploy it to gain a higher notional exposure when investing using a managed account. Consequently, the investor is not paying interest, since they did not need to borrow money to get the extra exposure. The following example helps to highlight this important point.

Example: A pension plan sponsor has $50 million (USD), and wishes to get $50 million exposure in a managed futures strategy that allows for a funding factor of two. The investor then only needs to invest $25 million to the managed futures strategy and may put the other $25 million in Treasury bills to receive interest.

Another critical difference between futures and equities is that there are no barriers to short selling in futures. Since two parties agree to enter into a contract, there is no need to borrow shares or incur other costs associated with entering into equity short sales. Thus, in that sense, it is easier to invoke a long-short strategy via futures than it is using equities.

Managed futures traders are commonly referred to as "Commodity Trading Advisors" or "CTAs," a designation which refers to a manager's registration status with the Commodity Futures Trading Commission and National Futures Association. CTAs may trade financial and foreign exchange futures, so the Commodity Trading Advisor registration is somewhat of a misnomer since CTAs are not restricted to trading only commodity futures. The highly diversified and global nature of the markets included in most managed futures programs makes the selection of a passive long-only index for analysis of value added through active management extremely difficult since many CTAs trade portfolios of futures contracts which span across all asset classes. The name Commodity Trading Advisor also results in the common mistake of using passive long-only commodity indices, such as the Goldman Sachs Commodity Index (GSCI), DJ AIG Commodity Index (DJ AIG), and Rogers International Commodity Index (RICI) as performance benchmarks. These indices are not appropriate because they include only a small fraction of the futures markets most CTAs trade (excluding the many financial products), and do not account for active management or the ability to take short as well as long positions, all of which should result in lack of correlation over time.

Active management and the ability to take long and short positions are key features that differentiate managed futures strategies not only from passive long-only commodity indices, but from traditional investments as well. Although most CTAs trade equity index, fixed income, and foreign exchange futures, their returns should be uncorrelated and unrelated to the returns of these asset classes because most managers are not simply taking on systematic exposure to an asset class, or beta, but are attempting to add alpha through active management and the freedom to enter short or spread positions, which can result in totally different return profiles than the long-only passive indices.

Not all CTAs are trend followers. Many of the earliest and most successful futures traders employed trend following strategies, as do some of the largest CTAs today, which might help to explain the prevalence of this overly casual generalization. Trend following may be the most common managed futures strategy, but it certainly is not the only one. The myriad other approaches to futures trading offer institutional investors access to a variety of sources of return, including trend following, which are uncorrelated to traditional and alternative investments, and oftentimes, to one another.
These include discretionary fundamental or global macro managers who express their views using futures, short-term traders whose strategies vary tremendously, chartists who scan the markets for patterns, and contrarian traders. The wide availability of clean data has also converted academics, researchers, and scientists to trading. These individuals apply advanced quantitative techniques to the markets that go beyond basic rules-based systems to forecast the direction in price or changes in volatility. Managed futures programs that rely on strategies other than trend following are becoming a larger and more important part of the space.

Another common misconception about managed futures strategies is that they are a zero sum game. This would be the case if CTAs were trading exclusively against other CTAs, but academics and practitioners have demonstrated that some futures markets participants are willing to hedge positions, or buy or sell forward even if they expect spot prices to rise or fall in their favor (CISDM 2006, 4).

The existence of these risk premia is consistent with futures prices' role as biased predictors of expected spot prices. The futures price equals the discounted present value of the expected spot price plus a risk premium, which can be positive or negative depending on the skewness or bias of distribution of expected spot prices. If all financial assets, including futures contracts, have a zero net present value (NPV), then:

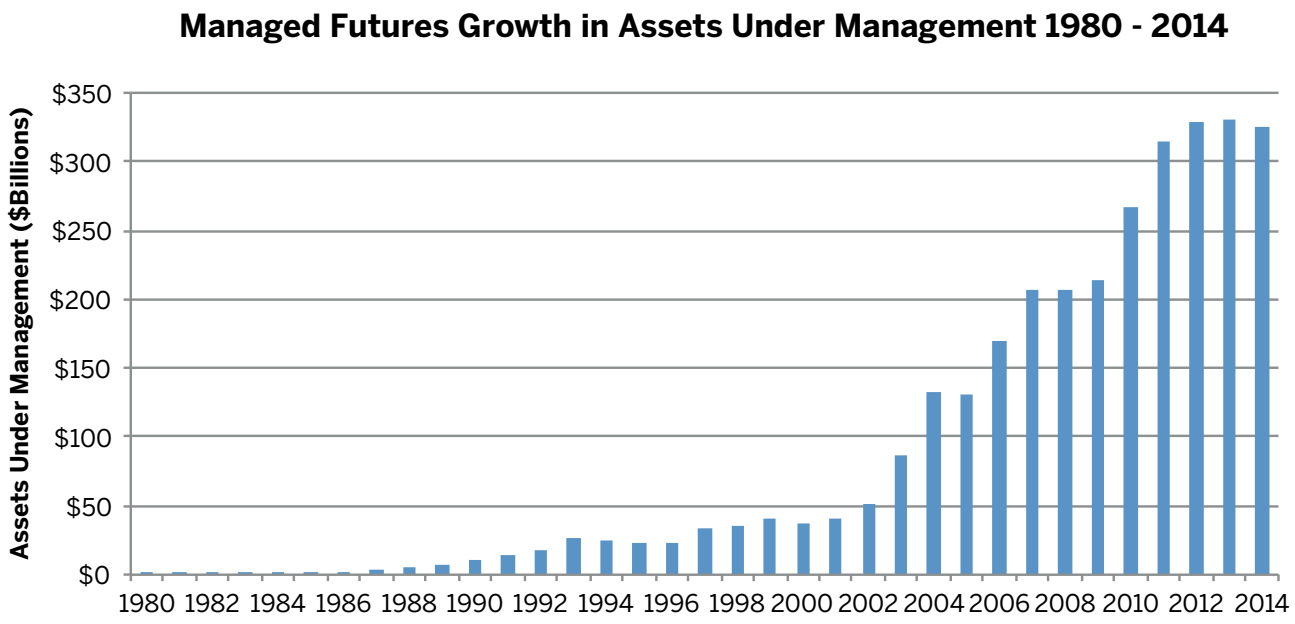
$$E(S_T) = F_e^{(\mu_s - r)T}$$

where T represents the delivery date, $E(S_T)$ the expected spot price, F the futures price, and $(\mu_s - r)$ the risk premium, the sign of which depends on whether or not the risk premium is positive or negative. Equity index futures, for example, tend to be downward-biased predictors of expected spot prices since the natural risk in equities markets is to the downside. CTAs offer liquidity to hedgers in order to capture positive risk premia (CISDM 2006, 4). It is also important to account for transactions, storage, and other costs which may affect futures prices.

GROWTH OF FUTURES MARKETS AND MANAGED FUTURES

The growth in open interest in futures markets has led to a substantial growth in managed futures assets under management. Electronic exchanges and technology have also contributed to the scalability and capacity of managed futures.

EXHIBIT 1: Managed Futures Growth in Assets Under Management 1980-2014



Source: BarclayHedge Alternative Investment Database

The substantial influx of assets into the futures markets in the form of passive long-only money in commodity markets as well as the explosion of assets under management for active traders has had numerous important implications for CTAs. The tremendous increase in open interest has resulted in increased depth and liquidity in many markets, allowing managers to add previously inaccessible markets to their domain of traded instruments.

It has also augmented the capacity of the more niche strategies and large diversified trend followers alike. The proliferation of passive long-only indices has created new opportunities and risks for CTAs as exchange traded funds and notes attempt to roll massive numbers of contracts each month. Fundamental discretionary traders, for instance, must incorporate the augmented interest from the long side when making trading decisions.

MANAGER STYLE AND SELECTION

As previously mentioned, most observers closely associate managed futures with trend following strategies. The liquidity of futures contracts and copious amounts of available data, however, facilitate the application of numerous other variations of quantitative systematic trading strategies to these instruments and the time series associated with them. The influence of fundamental economic variables on commodities and futures markets provides opportunities for niche sector and market specialists to trade programs which generate returns that are often uncorrelated to most trend following programs.

A useful analogy for the different managed futures trading programs and styles, as well as for alternative investments in general, consists of thinking of the various trading styles or programs as radio receivers, each of which tunes into a different market frequency. Simply put, some strategies or styles tend to perform better or "tune in" to different market environments.

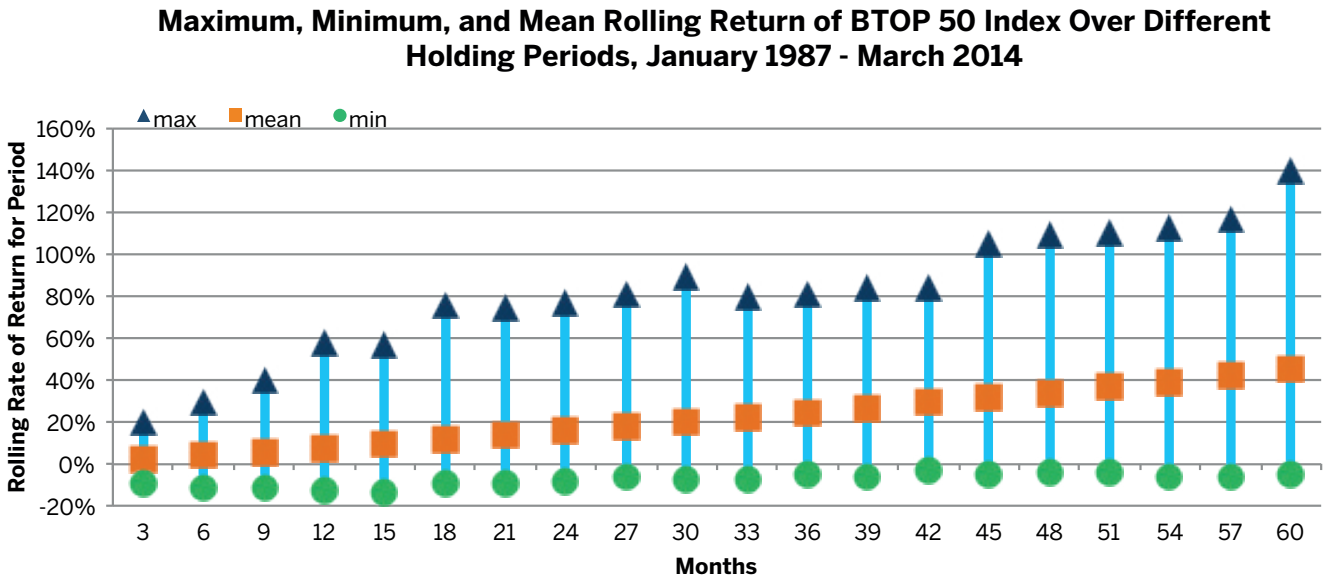
Trend Following

Trend following has demonstrated performance persistence over the more than 30 years since the first "turtle" strategies began trading, and roughly 70 percent of CTA strategies belong to this managed futures strategy sub-style. Trend following is dominated by momentum and/or breakout strategies, both of which attempt to capture large directional moves across diversified portfolios of markets. It also tends to be diversified across time frames, although some trend followers may be exclusively long-term (multiple months) or very short-term (days, hours, or minutes). Subtle differences in risk budgeting across markets, time horizons, and parameter selection may result in trend following programs which yield vastly different performance statistics and/or exhibit non-correlation to one another. Even within the trend-following space, there can be large differences between managers; these differences range from multi-billion dollar institutional quality firms employing an array of sophisticated and diversified techniques, to small shops trading with discretion.

Although certain voices in the investment management community have heralded the death of trend following many times over the years, there is a high probability of generating strong returns over sufficiently long rolling time periods, 36 months or more, for instance. The "long gamma" profile associated with most CTAs and trend followers in particular often means that returns are lumpy and a given manager's performance will usually depend on a few large positive months. As such, it may take some time to draw from this right tail of the distribution of returns, and the likely interim outcome is flat lining or entering a drawdown as the program searches for opportunities in the markets it trades. Those who do not hold these investments over sufficiently long time horizons will typically experience frustration and disappointment since the events that drive performance, typically massive flights of capital to or from quality, only take place occasionally. The market environment for most CTAs post-2008 financial crisis has been challenging. Market interventions are widely regarded as the cause of a reduced number of trends and higher correlations, significantly shrinking the opportunity set for most CTAs.

Exhibit 2, on the following page, illustrates the maximum, minimum and mean rolling return of the Barclays Capital BTOP 50 Index over different holding periods since January 1987. Each blue bar represents the range of all rolling returns for that number of months over the life of the index. For example, the bar furthest to the left represents all 3-month rolling returns since the inception of the BTOP 50 Index. The minimum, depicted by the green dot, shows the worst 3-month rolling return in the distribution. The orange square indicates the mean, and the blue triangle shows the best 3-month rolling return in the distribution for this particular example.

EXHIBIT 2: Maximum, Minimum, and Mean Rolling Return of Barclays Capital BTOP 50 Index Over Different Holding Periods



Source: Bloomberg

The conclusion readers should draw from the graph is that the possibility of making money increases dramatically if the investor maintains the allocation to managed futures three to five years.

During periods of flat or underperformance, the trend follower stops out of or exits stale positions and begins to put on new ones for which the profit expectation is greatest. This often results in a mean-reversion or "rubber band" effect which manifests itself as a sudden burst of positive performance after an extended drought of opportunities during which the program's money management system strived to preserve capital. Experienced investors often choose to add to trend followers in a drawdown in anticipation of this effect. Likewise, inexperienced or impatient investors all too often redeem at the bottom of a manager's drawdown, only to witness the surge in performance shortly thereafter.

Managers generally do not make material changes to their strategies or models for this same reason, especially during drawdowns, since this would be tantamount to redeeming in the same way as in the example. Initial research and testing are critical, however, to ensure robustness and performance persistence, as are ongoing efforts to refine the program and ensure it evolves with markets over time. Evolution and research have always been essential to successful trend followers, and any perceived "shifts" typically involve incremental improvements or innovations designed to enhance the program rather than depart from it materially (Fischer and Bunge 2007, 2).

Other Managed Futures Strategies

Although the majority of quantitative CTAs employ some variation of trend following strategies, other managed futures quantitative strategies abound, many of which exhibit no statistical relationship whatsoever with trend following programs. Counter-trend strategies attempt to capitalize on the often rapid and dramatic reversals that take place at the end of trends. Some quantitative traders employ econometric analysis of fundamental factors to develop trading systems. Others use advanced quantitative techniques such as signal processing, neural networks, genetic algorithms, and other methods borrowed and applied from the sciences. Recent advances in computing power and technology as well as the increased availability of data have resulted in the proliferation of short-term trading strategies. These employ statistical pattern recognition, market psychology, and other techniques designed to exploit persistent biases in high frequency data. Toward the end of 2008, short-term strategies were in high demand among fund of funds and institutional investors searching for sources of return which appeared to be statistically independent from the factors driving performance across both the traditional and alternative investments universes.

The very short holding periods of short-term traders allow them to rapidly adapt to prevailing market conditions, making it easy for them to generate returns during periods which are difficult for traditional and alternative investments. The countless combinations and permutations of portfolio holdings that these trading managers may hold over a limited period of time also tend to result in returns that are not correlated to any other investment, *including other short-term traders*.

Managed Futures Equal Black Box Trading?

The quantitative nature of many managed futures strategies makes it easy for casual observers to mistakenly categorize them as black box trading systems. In actual fact, many CTAs offer a high degree of transparency into the strategy behind their models and on an ongoing basis will provide daily position transparency. With managed accounts, this is standard. It is true, however, that managers will (understandably) not offer model transparency at the level of algorithms or source codes. Investors, in fact, should not expect them to.

Hermes BBK Partners, in their paper "CTAs: Shedding Light on the Black Box", point out that "Going back to the 1970's and 1980's, CTAs as a strategy have been very willing to run managed accounts for clients." The authors, Tommasso Sanzin and Larry Kissko, say that "with these vehicles clients have full position level transparency on a daily basis. Every trade made by a program can be seen by a client so as an allocator, it is difficult to achieve a more granular level of transparency. In addition, many CTAs are willing to disclose their portfolio positioning together with P&L attribution to non-managed account investors, making them possibly one of the most transparent strategies according to hedge fund standards."

The Hermes BBK paper goes on to distinguish between "good and bad transparency: we we would argue that knowing when a CTA is risk on or risk off is both critical and entirely achievable. A straightforward risk-return attribution by sector should not be difficult to access. Compare this to managers in the equity or credit space who may give you their exposures but don't always reveal the attribution."

Furthermore, any systematic or algorithmic trading system has a large human element. Namely, in the coding of this system, several decisions were made concerning the techniques invoked. What limits should be used? Should there be a component of optimization? There are countless questions and decisions that go into the codification of a systematic trading program that are qualitative in nature – after all, the coding and creation was done by humans! Those who are not quantitatively minded often completely overlook this fact. There are both pros and cons in systematic trading, as well as in discretionary trading, thus discriminating purely on the basis of systematic or discretionary is not warranted; indeed many managed futures programs are a hybrid of both.

Discretionary Trading

Not all CTAs employ quantitative or systematic trading approaches. In fact, some of the most unique alternative investment programs consist of discretionary CTAs and niche sector or market specialists. Like their systematic counterparts, discretionary CTAs may use fundamental and technical inputs to make trading decisions and may trade one or many markets across a continuous domain of time horizons. Some discretionary CTAs do analyze chart patterns or other technical indicators, but many discretionary CTAs employ fundamental analysis of supply and demand as the basis for their programs. The most successful discretionary traders tend to have clearly defined, well-articulated risk management coupled with unique experience and background relevant to the market or markets they trade. The fact that most discretionary managers have the flexibility to trade in a completely opportunistic fashion often results in returns which tend to be uncorrelated to trend following, managed futures and other hedge fund styles, as well as passive long-only commodity indices.

Manager Selection

Peer analysis is often complicated by the blending of managed futures sub-styles or other subtle differences that frustrate the creation of peer groups of managers. The exception tends to be the rule. It might be difficult to categorize an eclectic manager who combines a price-based model with fundamental analysis to discretionarily arrive at trading decisions, or a grain trader whose returns are 0.9 correlated with a number of trend followers. It is possible to overcome these hurdles, however, by taking a quantitative approach to peer analysis. Managers whose returns are correlated likely have similar risk factors or exposures embedded in their programs or trading styles. Creating peer groups of highly correlated managers simplifies the basis for comparison across metrics of interest, and facilitates the analysis of programs which have historically tended to perform similarly in different market environments. The implications of quantitative peer group analysis of this sort for manager selection are obvious.

The importance of manager selection varies somewhat depending upon the objectives of the managed futures investor.

MANAGED FUTURES RISK, RETURN, AND THE POTENTIAL FOR ENHANCED DIVERSIFICATION

The exploitation of trends or other price behaviors that tend to accompany large macro dislocations or events by CTAs produces both a positive return expectation and uncorrelated variance, making them additive to most portfolios. Although CTAs tend to have high volatility and lower Sharpe ratios relative to other alternative investments, the addition of an uncorrelated element which often contributes positive gamma, enhances the return and decreases the variance of most portfolios. (It is important to recall that this volatility comes from large, infrequent positive returns and that the Sharpe ratio is flawed as a measure of risk-adjusted performance, as we will soon demonstrate.) The fact that an investment is volatile on a stand-alone basis does not necessarily mean that it will increase the volatility of the entire portfolio. Modern Portfolio Theory suggests that adding uncorrelated variance actually decreases overall portfolio variance. The addition of uncorrelated variance may also help investors reduce other important measures of risk, including drawdown, semideviation, and kurtosis in the left tail.

Lintner's paper found that the low and occasionally negative correlations between futures portfolios and traditional equity and fixed income portfolios enable the creation of portfolios with substantially less variance at every possible level of expected return relative to traditional portfolios consisting solely of stocks or mixtures of stocks and bonds (Lintner 1996, 105-106). He alludes to the growing interest of institutional investors in alternative investments as means to tap additional sources of uncorrelated return, pointing to real estate, venture capital investments and "diversified holdings of oil-well exploration pools" as examples before turning to managed futures (Lintner 1996, 102).

Since then, the importance of alternative investments to institutional investors as sources of absolute return and portfolio diversification has grown tremendously, especially over the past 15 years. Managed futures strategies should continue to play a prominent role in the increasingly important alternative portion of institutional portfolios, due not only to their role in dampening portfolio variance, but also their ability to improve other important performance statistics, including semideviation, drawdown, skewness, kurtosis and the Omega performance measure, which incorporates all of the information embedded in the distribution of returns of an investment, as well as an investor-determined threshold of loss.

Lintner performed his analysis on mean-variance portfolios of traditional and managed futures investments using stock and bond indices, and two sets of managed futures account and fund investment returns, likely due to the paucity of managed futures performance data. This study employs index data exclusively, due to its wide availability, as well as to minimize selection bias. It also attempts to maximize robustness and statistical validity by calculating all statistics using as many observations as possible, resulting in comparisons across heterogeneous time horizons when historical index data is not available. As such, the number of observations used for calculations varies.

RISK AND RETURN: OMEGA – A BETTER APPROACH

Popular culture and the media often portray futures trading as one of the riskiest and most speculative forms of investment. Several intrinsic characteristics of futures contracts make them substantially less risky, however, than investments in other instruments which have not been branded with many of the same negative characteristics. Most casual observers and even many experienced practitioners attribute this volatility to the underlying instruments traded, but such a conclusion would be fallacious.

Futures garnered their reputation as risky largely due to the volatility of individual commodity markets, which many observers closely associate with the futures markets. The volatility of the passive long-only commodity indices, such as the Goldman Sachs Commodity Index (GSCI), also explains in part the perception of high risk. The nearly 20 percent annualized volatility of the GSCI, combined with its maximum historical drawdown of more than 60 percent certainly justifies this perception. However, it is important to make a number of critical distinctions here. First, there are fundamental and substantial differences between *passive* long-only indices like the GSCI and *actively managed* trading strategies like those which this paper highlighted earlier. "Commodities," loosely defined, are also different than futures contracts, which are nothing more than exchange traded instruments linked to the prices of a diversified variety of global markets.

Those assessing risk must also carefully define it. Modern Portfolio Theory equates risk with variance (or volatility as measured by standard deviation), which measures the dispersion of outcomes from the mean. Using volatility to measure risk, however, penalizes those outcomes which are greater than the expected, or upside volatility. Outcomes which exceed expectations (most rational investors would not select investments for which the return expectation is negative), or exceed a necessary or desired threshold, cannot truly be said to be risky in the sense that they do not imply loss or failure to meet an objective. In other words, volatility ignores the skewness and kurtosis of a manager's distribution of returns.

Managed futures may be more volatile than long/short equity or equity market neutral hedge funds, but not necessarily more risky. Measuring risk by volatility is dangerous to do in the alternatives space since the distributions are typically non-Gaussian.

Moreover, from a practical point of view, there is an obvious difference between upside volatility and downside volatility.

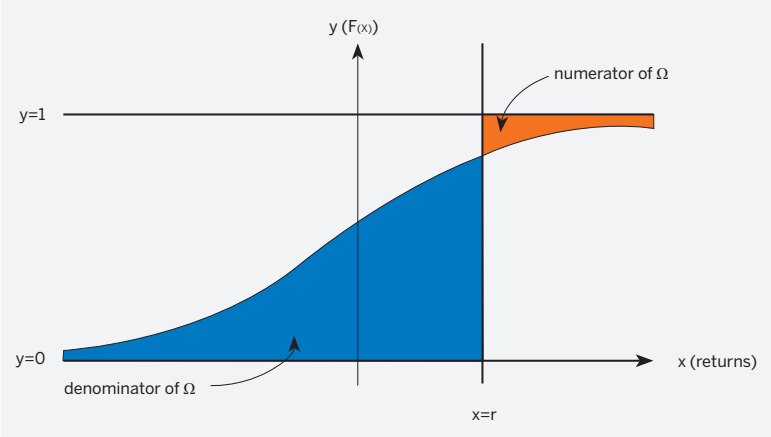
The Omega function and performance measure, first presented by Con Keating and William Shadwick, overcome the shortcomings of the mean-variance framework and allow investors to refer to the risk-reward characteristics of portfolios with respect to a reference point or threshold other than the mean. Omega fully incorporates the impact of all of the higher moments of the distribution of returns into an intuitive performance measure that allows practitioners to assess risk and return in the context of their own loss threshold without burdensome utility functions (Keating and Shadwick 2002, 2). Investors specify what they constitute as their own loss threshold or minimum acceptable return, which serves as the benchmark return. The Omega function makes a probability-weighted comparison of "profits" and "losses", however defined, relative to this investor-determined threshold. The Omega function is defined as:

$$\Omega(r) := \frac{\int_r^b [1-F(x)]dx}{\int_a^r F(x)dx}$$

where $F(x)$ is the cumulative distribution function for the returns, bounded by the endpoints a and b, with a threshold of r (Keating and Shadwick 2002, 12). Exhibit 3 illustrates the cumulative distribution function for an investment, along with depictions of the threshold and profit and loss integrals.

Omega provides practitioners with an extremely useful tool since it accounts for the non-normal distributions of returns which are commonplace in finance, particularly for alternative investments. *Despite the apparent intuitiveness of the Sharpe ratio, the fact that it ignores skewness and kurtosis and penalizes upside volatility essentially renders it useless for investment performance analysis.*

EXHIBIT 3: Cumulative Distribution and Omega Functions



Source: Bhaduri and Kaneshige, 2005

The Omega function is a powerful tool in the risk toolbox [Bhaduri and Kaneshige, 2005]. Furthermore, the selection of a threshold as the focus dovetails well with the needs of pensions. Pensions typically view investments through an asset-liability lens. Consequently, the return they seek is a function of the liabilities they face. The Omega function lends itself well to this framework since a natural threshold for a pension to select is a return which will at least cover its liabilities.

Exhibit 4, "Statistics: Traditional and Alternative Investment Benchmarks," illustrates the shortcomings of evaluating investment performance solely through the lens of mean and variance, particularly for managed futures. The Barclays Capital BTOP 50 returns display more variance than those of the Hedge Fund Research, Inc. (HFRI) Fund Weighted Composite Index, or the HFRI Equity Hedge (Total) Index, as measured by standard deviation (10.13 percent compared to 6.87 percent and 9.06 percent). The variance of all negative observations of the BTOP 50 and HFRI hedge fund indices in question, however, were comparable (semideviation of 4.62 percent versus 5.14 percent and 6.13 percent), as were worst drawdowns (-13.31 percent versus -21.42 percent and -30.59 percent).

The BTOP 50 Index, HFRI Fund Weighted Composite Index, and HFRI Equity Hedge Index all exhibit excess kurtosis, or "fat tails" in their distributions of returns as well (3.02, 2.55, and 1.90, respectively), consistent with the vast majority of hedge fund strategies.

The fact that a given investment or strategy displays fat tails is not as important as the location of the extreme deviations which cause them. Skewness describes the relative length of the tails or the degree of asymmetry of a distribution of outcomes. Positive skewness suggests that a number of relatively large positive deviations inflate the mean of the distribution, resulting in a fat right tail. Conversely, negative skewness occurs when a number of relatively large negative deviations pull the mean down, resulting in a fat left tail.

The BTOP 50 displays large positive skewness (1.07) relative to the HFRI Fund Weighted Index (-0.68) and HFRI Equity Hedge Index (-0.25). The positive skewness exhibited by most CTAs explains the majority of the differences in variance between the BTOP 50 and HFRI hedge fund indices. This paper explores the reasons for excess kurtosis in hedge fund returns, and , in a later section, for differences in skewness for different hedge fund strategies.

EXHIBIT 4: Statistics: Traditional and Alternative Investment Benchmarks

	Barclay BTOP 50 Index	S&P 500 Total Return Index	MSCI World Daily Total Return Net (USD)	Barclays Capital Bond Composite US Index	Barclays Capital Bond Composite Global Index	GSCI TR	DJ UBS Commodity Index	HFRI Fund Weighted Index	HFRI Equity Hedge Index	LPX Buyout Index	S&P/Citigroup World REIT TR Index	Newedge Short-Term Traders Index
Annualized ROR	8.15%	11.74%	9.88%	5.81%	8.52%	5.95%	4.63%	10.86%	12.62%	8.39%	9.12%	0.26%
Annualized Standard Deviation	10.13%	15.31%	15.21%	3.40%	6.17%	19.26%	14.78%	6.87%	9.06%	25.98%	16.42%	4.03%
Annualized Semideviation	4.62%	11.39%	11.40%	2.21%	3.60%	13.52%	11.02%	5.14%	6.13%	19.60%	14.56%	2.27%
Worst Drawdown	-13.31%	-50.95%	-54.03%	-3.67%	-12.43%	-67.65%	-54.26%	-21.42%	-30.59%	-80.95%	-67.56%	-14.03%
Sharpe Ratio (Risk Free Rate = 0%)	0.80	0.77	0.65	1.71	1.38	0.31	0.31	1.58	1.39	0.32	0.56	0.06
Sortino Ratio (Risk Free Rate = 0%)	1.76	1.03	0.87	2.62	2.37	0.44	0.42	2.11	2.06	0.43	0.63	0.11
Skewness	1.07	-0.66	-0.67	-0.37	1.06	-0.22	-0.56	-0.68	-0.25	0.21	-1.25	0.27
Excess Kurtosis	3.02	2.20	1.63	1.46	7.15	2.54	2.72	2.55	1.90	5.16	8.27	-0.25
Omega (3% Threshold)	1.53	1.59	1.46	1.79	2.07	1.21	1.15	2.28	2.18	1.32	1.44	0.63
Months	327	411	411	197	409	411	278	291	291	195	291	75
Positive Months	184	264	255	139	277	232	164	207	202	123	179	32
Negative Months	143	147	156	58	131	179	114	84	89	71	112	43
Percent Winning Months	56.27%	64.23%	62.04%	70.56%	67.73%	56.45%	58.99%	71.13%	69.42%	63.08%	61.51%	42.67%
Average Month	0.70%	1.03%	0.89%	0.48%	0.70%	0.64%	0.47%	0.88%	1.03%	0.95%	0.85%	0.03%
Average Positive Month	2.54%	3.53%	3.51%	0.96%	1.52%	4.24%	3.10%	1.83%	2.32%	4.90%	3.46%	1.10%
Average Negative Month	-1.67%	-3.46%	-3.40%	-0.68%	-1.03%	-4.02%	-3.31%	-1.46%	-1.90%	-5.87%	-3.32%	-0.77%
Modern Portfolio Theory												
Correlation to S&P 500 Total Return	-0.04	1.00	0.88	-0.11	0.18	0.18	0.31	0.74	0.73	0.75	0.61	-0.41
R Squared	0.00	1.00	0.77	0.01	0.03	0.03	0.09	0.54	0.53	0.56	0.37	0.17
Beta	-0.02	1.00	0.87	-0.03	0.07	0.22	0.31	0.34	0.45	1.22	0.68	-0.09
Alpha	0.72%	0.00%	-0.01%	0.50%	0.62%	0.41%	0.20%	0.59%	0.65%	0.22%	0.28%	0.09%

Sources: Bloomberg, LPX GmbH. All statistics calculated to maximize number of observations; as such, number of observations used for calculations varies (Starting Dates: BTOP 50 - Jan 1987, S&P 500 Total Return Index - Jan 1980, MSCI World - Jan 1980, Barclays Capital Bond Composite US Index - Sep 1997, Barclays Capital Bond Composite Global Index - Feb 1980, GSCI TR - Jan 1980, DJ UBS Commodity Index - Feb 1991, HFRI Fund Weighted Index - 1990, HFRI Equity Hedge Index - Jan 1990, LPX Buyout Index - Jan 1998, S&P/Citigroup World REIT TR Index - Jan 1990, Newedge Short-Term Traders Index - Jan 2008). All statistics calculated through Mar 2014 with the exception of the Barclays Capital Bond indices, which did not report returns for Sep 2008 or Oct 2008.

HIDDEN RISK: THE IMPORTANCE OF LIQUIDITY, TRANSPARENCY AND CUSTODY

Model risk always exists, as no model is perfect by definition. What is less appreciated by many in the investment community is that model risk and liquidity risk are entangled. There are no valuation issues with exchange-traded instruments, and model risk is magnified when dealing with illiquid instruments. In general, the less liquid the instruments traded, the more hidden risk, and the more dangerous model risk becomes. The historic 2008 financial meltdown is a vivid example of this statement [Bhaduri and Art, 2008].

Most managed futures programs by definition trade exclusively exchange-listed futures or options on futures. Settlements on all futures contracts are determined by the various exchanges at the end of each trading day, compelling managers to mark their books to market. Some CTAs also trade the inter-bank FX forward market, where the process of price discovery takes place 24 hours a day. It is also one of the deepest and most liquid in the world. These qualities enable hedge fund investors to mitigate or completely eliminate some of the more deleterious risks associated with investing in alternatives. The liquidity of the underlying instruments traded as well as the high level of transparency available through managed account investments with CTAs facilitates tactical asset allocation. Investors and CTAs alike can easily exit unprofitable positions, or positions that they expect to become unprofitable in the near future, with minimal slippage, usually in a matter of minutes.

Ironically, the liquid, transparent, marked-to-market nature of the instruments traded by liquid hedge funds may make their returns appear more volatile or risky than those of many hedge funds trading esoteric or illiquid instruments, which trade infrequently and are therefore marked to a stale price or a model. As a result, these hedge funds often intentionally or unintentionally smooth their returns, artificially dampening their volatility and depth of their drawdowns.

The lack of transparency and difficulty involved in pricing illiquid instruments magnifies model risk. Infrequent pricing of instruments obfuscates the relationships among market price and the different factors or variables used in pricing or trading models, complicating their testing and design. Lack of transparency and illiquidity substantially reduce the margin of error during the research and development of trading or risk models. The losses that will ensue in the event that models fail to account for a critical piece of information will be of an order of magnitude many times larger for illiquid instruments due to the relative thinness of these markets. The seller will likely have to accept a deep discount in price to exit an illiquid position, particularly during a "fire sale" or crisis event. The credit debacle of 2007-2008, for example, exposed many hedge funds and other sophisticated investors who had invested in structured debt products whose models failed to incorporate many of the hidden risks. The investors and portfolio managers holding these instruments suffered deep losses as they struggled to find liquidity in thin markets, or watched other positions go to zero due to poor assumptions made by the rating agencies.

Conversely, risk managers can monitor and control risk with relative ease due to the transparency and liquidity of futures contracts. Instead of relying on complex models with numerous assumptions, risk managers are free to focus on monitoring margin to equity, counting contracts and testing for disaster scenarios, such as correlation convergence with a multiple standard deviation shock. Transparency and constant price discovery facilitates simple, no nonsense testing and monitoring. Investing via separately managed accounts, a common practice among managed futures investors, facilitates risk management tremendously by providing the investor with full transparency and in extreme cases, the ability to intervene against the trading manager by liquidating or neutralizing positions.

Hidden sources of risk that many hedge fund investors do not fully appreciate are the structural and operational risks associated with investing directly into a fund vehicle. Fund investments require the investor to transfer money to the trading manager with an implicit guarantee that it will be returned at some future date. Wiring money to the manager exposes the investor to the risk of fraud or theft of the investment. Managed account investments mitigate this risk by giving the manager limited power of attorney to trade on behalf of the investor, who maintains legal custody of the cash and instruments at his FCM. Wiring money to a manager also exposes the investor to operational risks, and requires expensive and time-consuming due diligence on the manager's middle and back office processes, as well as its service providers. Fund investments, including those in liquid instruments, often attempt to impose lockups, gates, or onerous redemption terms on investors. Most fund documents also give the general partner the right to suspend redemptions, in effect providing the manager with a call option on the liquidity it had previously offered investors. There is no real value added by having the money housed with the manager who is being paid to try and provide an attractive risk-adjusted return over time with proper risk controls. Managers who refuse to grant managed accounts are in essence refusing to give transparency and are subjecting their clients to additional risks.

Returning to the ever-important topic of liquidity, it is worth pointing out that from a behavioral finance point of view, it is easy for investors to underestimate the value of liquidity [Bhaduri and Whelan, 2007]. If a hedge fund is trading illiquid instruments and has a long lock-up, then simply comparing its return statistics to a CTA that is trading exchange-traded instruments and does not have a lock-up is incorrect, since it does not assign a value to liquidity [Bhaduri and Art, 2008]. Lock-ups by private equity funds and hedge funds trading illiquid instruments cost the investor in terms of reduced flexibility, and they should be rewarded with higher returns to compensate for this. There are not yet many measures or instruments to deal with this problem [Bhaduri, Meissner, and Youn, 2007].

THE LACK OF CORRELATION AND POTENTIAL FOR PORTFOLIO DIVERSIFICATION

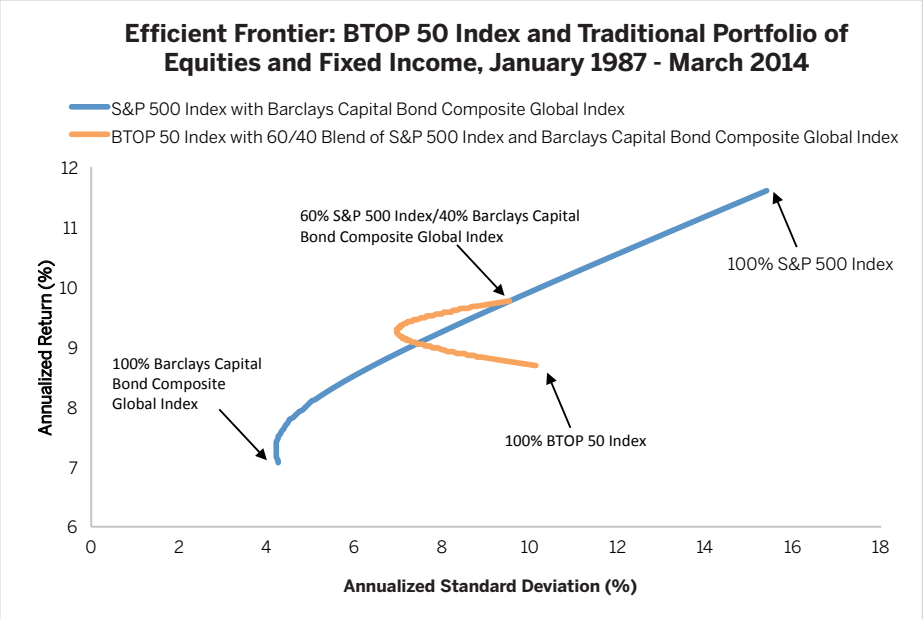
After highlighting the attractive risk and return properties of managed futures, Lintner turns to a discussion of the lack of correlation of managed futures strategies with other investments. He then concludes his paper by presenting evidence of the substantial improvements in risk and return that managed futures strategies contribute as part of a diversified portfolio of equities and fixed income (Lintner 1996, 105). The absence of correlation between managed futures, traditional investments, and other alternative investments creates a prominent role for this liquid, transparent hedge fund strategy in institutional portfolios.

The long-term correlations among equities, fixed income and managed futures remain low more than 30 after Lintner's study, suggesting a continuing relevance to investors interested in attaining the "free" benefits of diversification.

Exhibit 7 on page 20, "Correlation Matrix: Traditional and Alternative Investment Benchmarks," illustrates the low and occasionally negative correlations between managed futures and other investments. The highest of these were 0.52 with the Newedge Short-Term Traders Index and 0.22 with each of the bond indices, and the lowest was -0.20 with the Listed Private Equity (LPX) Buyout Index, suggesting that significant benefits would accrue to investors who added managed futures strategies to portfolios including some or all of these investments. These correlations will be explored in more detail later in this section.

Exhibit 5 demonstrates that managed futures improve the efficient frontier from a mean-variance framework. This is congruent with the earlier findings of Lintner.

Exhibit 5: Efficient Frontier: BTOP 50 Index and Traditional Portfolio of Equities and Fixed Income January 1987 – December 2014



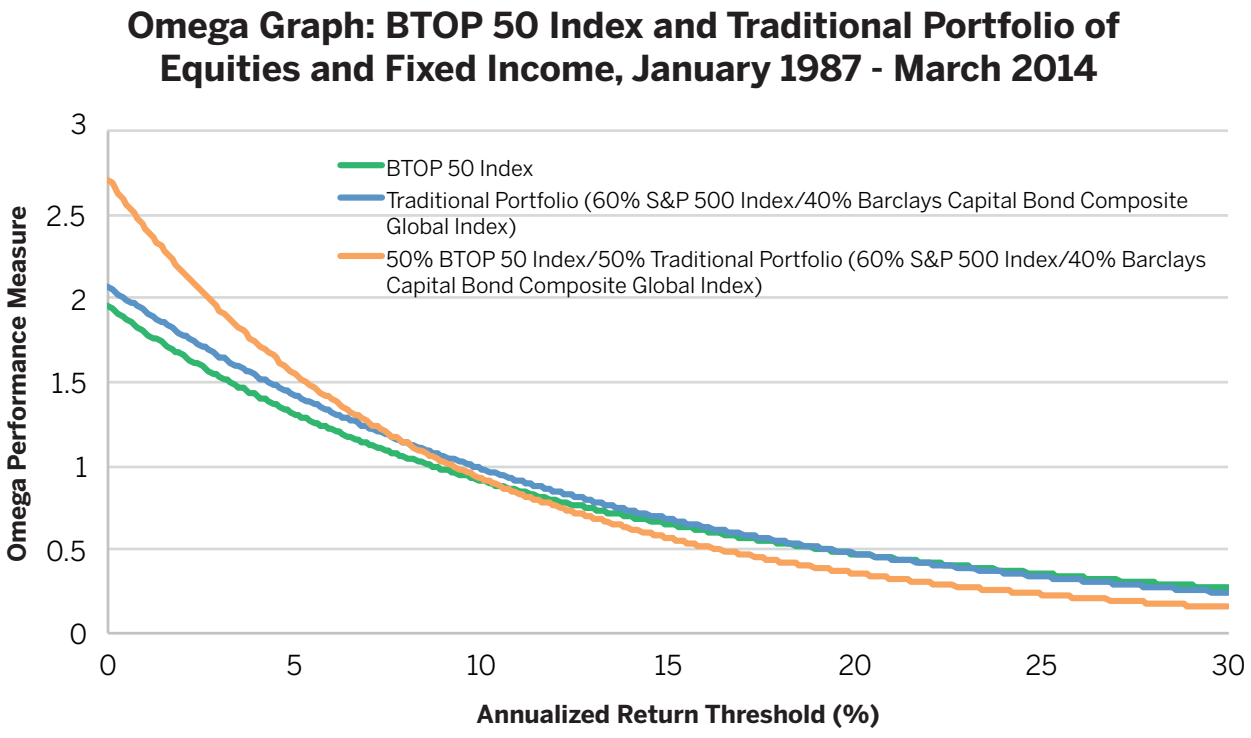
Source: Bloomberg. Barclays Capital Bond Composite Global Index did not report returns for Sep or Oct 2008

Recall that when the Omega score drops below one, the quality of the investment with respect to achieving the threshold is poor. (For a review of Omega graphical analysis, please refer to Ranjan Bhaduri and Bryon Kaneshige, "Risk Management – Taming the Tail," Benefits and Pensions Monitor, December 2005.) Studying the potential role of managed futures strategies in traditional portfolios of stocks with the Omega lens for risk-adjusted performance is taking a enhanced and modern approach to the Lintner study. As stated earlier, Lintner did not have the benefit of the Omega tool during the time he conducted his work, and the Omega function encodes all the higher statistical moments and distinguishes between upside and downside volatility.

The Omega graph in Exhibit 6 indicates that for low thresholds, the combination of managed futures strategies and a traditional portfolio is optimal, and for higher thresholds, the more concentrated portfolios dominate. This is, likely because their higher volatilities allow for a greater likelihood of exceeding the annualized return threshold Investors may be able to maintain the higher Omega scores available at lower return thresholds at higher return thresholds, however, through the thoughtful and prudent use of leverage.

These Omega results yield a very compelling argument for the inclusion of managed futures in an institutional portfolio.

EXHIBIT 6: Omega Graph: BTOP 50 Index and Traditional Portfolio of Equities and Fixed Income January 1987 – December 2014



Source: Bloomberg. The Barclays Capital Bond Composite Global Index did not report Sep or Oct 2008

Correlations Between Managed Futures and Other Investments

The variety of trading sub-styles within managed futures and the lack of correlation among them, as well as to other traditional and alternative investments, makes it possible to enhance the return or diminish the risk of portfolios through the addition of managed futures "alpha" strategies. These include sub-styles such as short-term trading, niche discretionary strategies, relative-value, etc. These qualities make it possible to construct diversified, liquid, transparent fund of funds and portfolios by combining uncorrelated programs. Lintner's pioneering research demonstrated that there are substantial benefits which accrue from "selective diversification" across a number of different futures managers and funds due to the "rather moderate" correlations among them (Lintner 1996, 105). The astronomically high number of combinations and permutations of portfolio holdings and investment horizons of short-term traders, and accordingly, the unique and uncorrelated returns which result, make them a fascinating case for revisiting Lintner's analysis of diversification among futures managers.

Lintner analyzed the portfolio benefits of combining managed account investments in fifteen different futures programs using different weighting schemes. For our purposes, the weighting schemes are not important since these may vary according to the portfolio manager's objectives. Instead, this section will focus on the correlations among managers since these provide the most information about potential benefits to be had from diversification. For simplicity, it also will distill correlations among managers into average pair-wise correlation.

This section also draws upon the performance of the constituents of the Newedge Short-Term Traders Index, a theoretical index of 10 trading programs whose holding period is less than ten days on average, trade two or more market sectors, and which are open for investment (Burghardt et.al. June 9, 2008, 4). There is some risk of survivorship bias since all of the constituent programs remain open for investment. Selection bias appears to be less of a concern since this index contains managers of all trading styles, track records of various lengths, and various levels of assets under management. Regardless, while the constituents of the index do not provide an exhaustive sample, it is likely that they provide one which is representative of short-term trading and its correlation properties.

EXHIBIT 7: Correlation Matrix of Traditional Alternative Investment Benchmarks

	Barclay BTOP 50 Index	S&P 500 Total Return Index	MSCI World Index	Barclays Capital Composite US Index	Barclays Capital Bond Composite Global Index	GSCI TR	DJ UBS Commodity Index	HFRI Fund Weighted Index	HFRI Equity Hedge Index	LPX Buyout Index	S&P/Citigroup World REIT Index	Newedge Short-Term Traders Index
Barclay BTOP 50 Index	1.00											
S&P 500 Total Return Index	-0.04	1.00										
MSCI World Index	-0.02	0.88	1.00									
Barclays Capital Composite US Index	0.22	-0.11	-0.09	1.00								
Barclays Capital Bond Composite Global Index	0.22	0.18	0.23	0.90	1.00							
GSCI TR	0.12	0.18	0.25	-0.03	0.00	1.00						
DJ UBS Commodity Index	0.16	0.31	0.41	0.03	0.12	0.89	1.00					
HFRI Fund Weighted Index	0.00	0.74	0.75	-0.07	0.07	0.32	0.44	1.00				
HFRI Equity Hedge Index	-0.02	0.73	0.73	-0.07	0.06	0.36	0.44	0.95	1.00			
LPX Buyout Index	-0.20	0.75	0.76	-0.09	-0.13	0.29	0.31	0.77	0.77	1.00		
S&P/Citigroup World REIT Index	-0.01	0.61	0.64	0.21	0.28	0.22	0.36	0.51	0.49	0.60	1.00	
Newedge Short-Term Traders Index	0.52	-0.41	-0.40	0.07	0.05	-0.17	-0.11	-0.27	-0.34	-0.37	-0.33	1.00

Sources: Bloomberg, LPX GmbH. All statistics calculated to maximize number of observations; as such, number of observations used for calculations varies (Starting Dates: BTOP 50 - Jan 1987, S&P 500 Total Return Index - Jan 1980, MSCI World - Jan 1980, Barclays Capital Bond Composite US Index - Sep 1997, Barclays Capital Bond Composite Global Index - Feb 1980, GSCI TR - Jan 1980, DJ UBS Commodity Index - Feb 1991, HFRI Fund Weighted Index - 1990, HFRI Equity Hedge Index - Jan 1990, LPX Buyout Index - Jan 1998, S&P/Citigroup World REIT TR Index - Jan 1990, Newedge Short-Term Traders Index - Jan 2008). All statistics calculated through Dec 2011 with the exception of the Barclays Capital Bond indices, which did not report returns for Sep 2008 or Oct 2008.

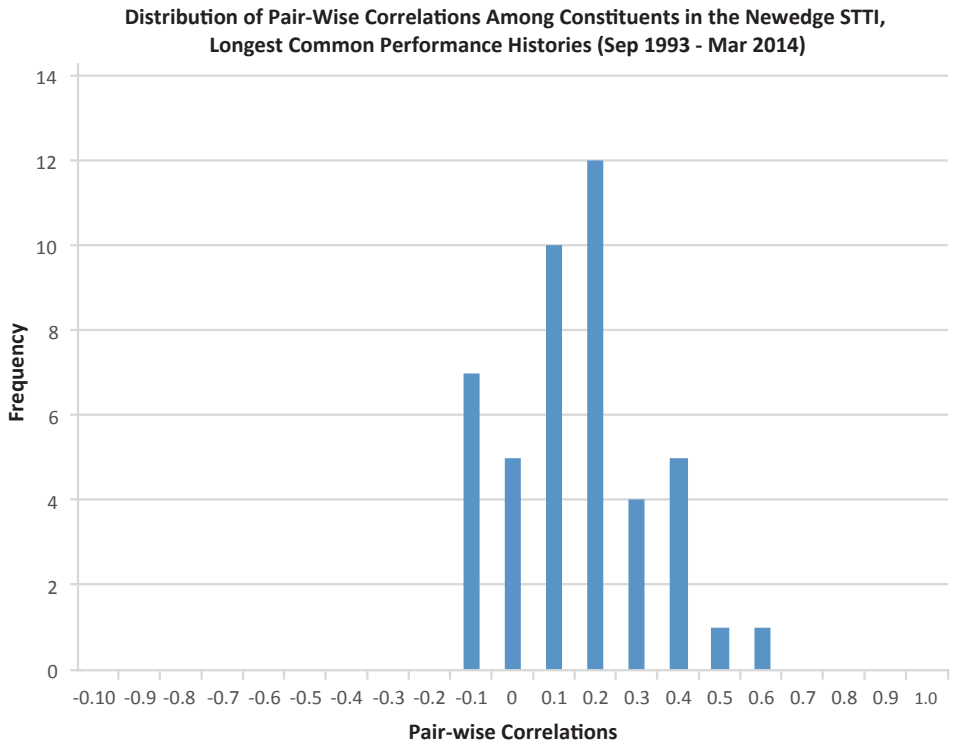
Lintner found that the "average correlation between the monthly returns of each manager with those of every other manager," or average pair-wise correlation, among the fifteen managers in his sample was 0.285, with a minimum of 0.064 and a maximum of 0.421 (Lintner 1996, 110). This extremely low average pair-wise correlation, and the sample maximum of 0.421 suggests that the trading programs Lintner analyzed would generally have contributed to a portfolio in which any of them were part of the whole.

The average pair-wise correlation among the constituents of the Newedge Short-Term Traders Index was 0.107, another very low value which supports the conclusion that short-term traders, like those managed futures programs in Lintner's sample, generally exhibit low correlations to one another (Burghardt et.al. June 9, 2008, 4).

The minimum pair-wise correlation within the sample was -0.166 and the maximum was 0.562, comparable to the results from Lintner's sample albeit with slightly wider dispersion. Pair-wise correlations are displayed in Exhibit 8.

The lack of correlation among managed futures strategies, as well as with traditional and other alternative investments, allows them to contribute constructively to most portfolios. The analysis of pair-wise correlation also provides an illuminating example of how futures trading programs can be combined to create a portfolio of diversified, liquid, transparent "alpha" strategies. If managed futures consisted solely of trend following strategies, this would be a more difficult exercise, given the tendency toward high correlation among trend followers. The diverse and uncorrelated investments offered by CTAs, however, allow institutional investors access to an entire universe of liquid, transparent hedge fund strategies.

EXHIBIT 8: Distribution of Pair-Wise Correlations Newedge Short-Term Traders Index



Source: Newedge Alternative Investment Solutions

MANAGED FUTURES AND PERFORMANCE DURING FINANCIAL MARKET DISLOCATIONS

The volatility and market dislocation that accompanied the subprime mortgage crisis, credit crunch, and explosion and collapse of commodities prices during the second half of 2007 and 2008, was briefly alluded to earlier in this paper. The diversified mix of investments many institutional investors had relied upon failed to generate returns. The major U.S. and Global equities market indices, the S&P 500 and MSCI World, performed dismally, returning -35.87 percent and -39.44 percent, respectively, from August 2007 when the credit crisis began, through December 2008.

Most alternative investments, which had promised absolute returns, disappointed investors as well. The HFRI Fund Weighted Composite Index, an equally weighted index designed to represent the returns of hedge funds across all strategies, returned -17.19 percent from August 2007 through December 2008. The HFRI Equity Hedge (Total) Index, which includes hedge funds whose core holdings consist of equities and therefore does not benefit as much from diversification as the HFRI Fund Weighted Composite Index, returned -25.11 percent. Private Equity and Real Estate Investment Trusts, represented by the LPX Buyout Index and the S&P/Citigroup World REIT Index, returned an atrocious -70.42 percent and -47.23 percent, respectively, from August 2007 through December 2008. CTAs, however, capitalized on the market dislocations of 2007 and 2008, providing managed futures investors with returns of 17.69 percent over the same period, as measured by the BTOP 50 index.

Managed futures strategies tend to capture massive flows of capital as markets reestablish equilibrium in the wake of new information or in the transition from one economic cycle to another. It cannot be emphasized enough that managed futures *are not and should not* be treated as a portfolio hedge, but rather as an additional source of non-correlated returns, as this paper has demonstrated.

Although managed futures returns tend to be uncorrelated to other investments *over the long run,* correlations are non-stationary over shorter time horizons and may temporarily converge during crisis conditions. Not all market dislocations are the same, making CTAs vulnerable to rapid reversals or the sudden onset of volatility. The reaction of managed futures strategies to price action is path-dependent, and the response of the program to prevailing price action during a crisis determines performance, at least in the short- term.It is important to distinguish between exogenous and endogenous market shocks. When there is a major exogenous shock, i.e., one caused by factors external to the market, CTAs may be positioned favorably or unfavorably in a variety of asset classes. The same is true of managers in most strategies. The notion that CTAs provide a tail risk 'hedge' is overly specific, but over time these strategies can provide diversification benefits that reduce the impact of tail risk events. The difference between tail risk management via diversification and hedging is the main idea here.

Certain generalizations about CTA returns and the market conditions that generate them do tend to result in bouts of strong, positive performance during certain kinds of market dislocations. The majority of CTAs employ strategies that many describe as "long volatility" , which tend to produce a positively skewed distribution of monthly returns. This is a figurative description, as in most cases there is no direct use of options products; the positions are taken in futures contracts. The long option/positive gamma return profile originates from the tight control of downside risk relative to less frequent outsized returns, suggesting that these managers generate the majority of their returns during lower frequency, high impact events. In contrast, most hedge fund strategies have fat left tails in their distributions of returns since they perform well under normal conditions but suffer infrequent, large losses under highly volatile conditions and should therefore be considered short volatility strategies.

A historically accurate picture of CTAs' collective long-term performance when crises strike financial markets is stated well in a paper from Commonfund (James Meisner, Kristofer Kwait, John Delano): "CTA returns have demonstrated substantial long-term diversification properties in the context of a broad, multi-asset class policy portfolio. They also represent one of the few investment strategies that have the potential for outsized positive returns during extended periods of market stress."

Exhibit 9, "Performance of BTOP 50 During Worst 15 Quarters of S&P 500 Index," illustrates that CTAs have historically capitalized on the various forms of volatility which accompany market dislocations, be they sustained trends consistent with a flight to or from quality, shorter-term choppy price action, or sudden reversals associated with rapid swings in sentiment explained by market psychology and behavioral finance. Exhibit 9 provides a compelling reason to include managed futures in a diversified portfolio.

"Black Monday" in 1987, the events leading up to the Persian Gulf War in 1990, Long Term Capital Management and the Russian Crisis in 1998, the burst of the tech bubble and ensuing recession in 2000-2002, the credit crunch and commodity run-up of 2007-2008, and the European Sovereign Debt Crisis, all serve as examples of market dislocations during which the performance of equities suffered and managed futures strategies performed well.

EXHIBIT 9: Performance of the BTOP 50 Index During 15 Worst Quarters of S&P 500 (Total Return) Index

Period	Event	S&P 500 Total Return Index	Barclay BTOP 50 Index	Difference
Fourth Quarter 1987	Black Monday - Global Stock Markets Crash	-22.53%	16.88%	39.41%
Fourth Quarter 2008	Bear Market in U.S. Equities led by Financials	-21.95%	9.14%	31.08%
Third Quarter 2002	WorldCom Scandal	-17.28%	9.41%	26.69%
Third Quarter 2001	Terrorist Attacks on World Trade Center and Pentagon	-14.68%	4.12%	18.79%
Third Quarter 1990	Iraq Invades Kuwait	-13.75%	11.22%	24.97%
Second Quarter 2002	Continuing Aftermath of Technology Bubble Bursting	-13.39%	8.52%	21.92%
First Quarter 2001	Bear Market in U.S. Equities led by Technology	-11.86%	5.97%	17.83%
Second Quarter 2010	European Sovereign Debt Crisis, "Flash Crash"	-11.42%	-1.94%	9.48%
First Quarter 2009	Credit Crisis Continues	-11.01%	-1.75%	9.26%
Third Quarter 1998	Russia Defaults on Debt, LTCM Crisis	-9.94%	10.54%	20.48%
First Quarter 2008	Credit Crisis, Commodity Prices Rally	-9.45%	6.43%	15.88%
Third Quarter 2011	European Sovereign Debt Crisis	-8.90%	0.44%	9.34%
Third Quarter 2008	Credit Crisis, Government-Sponsored Bailout of Banks	-8.37%	-4.11%	4.26%
Fourth Quarter 2000	DotCom Bubble Bursts	-7.82%	19.78%	27.60%
Third Quarter 1999	Anxiety during Run Up to Y2K	-6.24%	-0.67%	5.57%

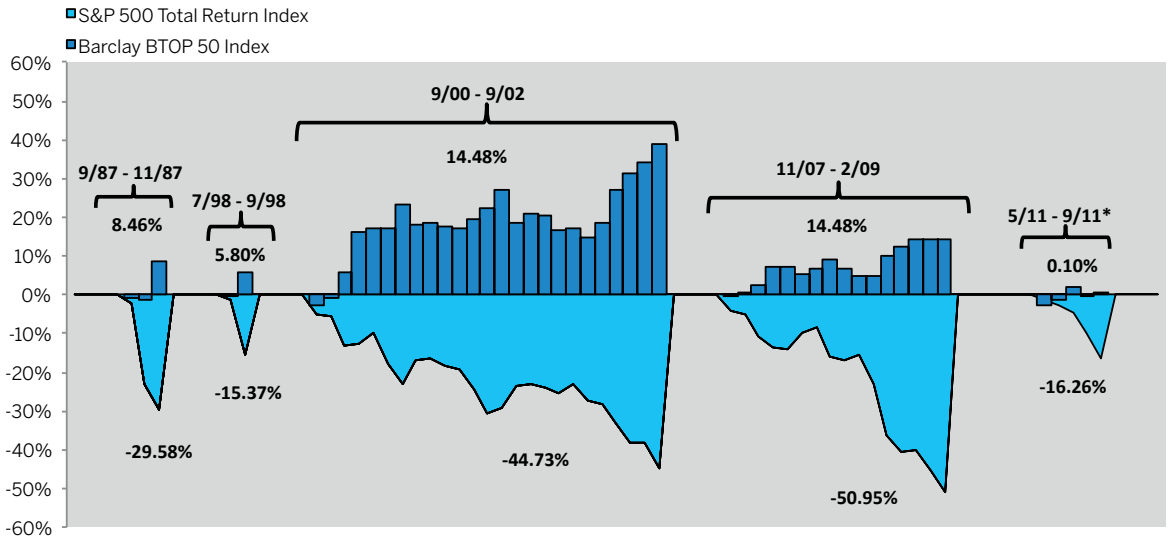
Source: Bloomberg

Performance of the BTOP 50 Index During 15 Worst Quarters of S&P 500 (Total Return) Index

Exhibit 10, "BTOP 50 vs. S&P 500 During S&P 500's Worst Five Drawdowns Since 1987," illustrates the tendency of CTAs to perform well during periods which are difficult for equity markets, albeit through a different lens. It illustrates the performance of the BTOP 50 Index from peak to valley during the five worst drawdowns of the S&P 500, each associated with a different financial market dislocation.

The quarter-by-quarter analysis provides a high level of granularity, and also provides further evidence that managed futures strategies tend to perform well during extended dislocations, but do not always do so. It is also worth noting that the historic quarters referred to in Exhibit 9 all are referencing periods *after the Lintner study*, and thus further corroborate his important findings.

EXHIBIT 10: BTOP 50 vs. S&P 500 Total Return Index's Worst Five Drawdowns since 1987



Source: Bloomberg

* S&P 500 Total Return Index had not completely recoved from its drawdown beginning in 11/07, due in part to its depth and severity; the drawdown beginning 5/11 is included because it would have qualified as one of the worst had the index recovered to its previous highs

Similarly, Exhibit 11, "Performance of the BTOP 50 in Worst 10 Quarters of HFRI Fund Weighted Composite Index," suggests that managed futures have historically tended to perform well when the performance of many other hedge fund strategies suffers. This lends credence to the idea that the tail events which drive CTA performance tend to coincide with the left tail events of hedge funds, suggesting that managed futures should complement most alternative investment portfolios.

EXHIBIT 11: Performance of the BTOP 50 Index During Worst 10 Quarters of HFRI Fund Weighted Index

Period	Event	HFRI Fund Weighted Index	BTOP 50 Index	Difference
Third Quarter 2008	Credit Crisis, Government-Sponsored Bailout of Banks	-9.60%	-4.11%	5.49%
Fourth Quarter 2008	Bear Market in U.S. Equities led by Financials	-9.19%	9.14%	18.33%
Third Quarter 1998	Russia Defaults on Debt, LTCM Crisis	-8.80%	10.54%	19.34%
Third Quarter 2011	European Sovereign Debt Crisis	-4.14%	0.44%	4.58%
Third Quarter 2001	September 11th Terrorist Attacks	-4.03%	4.12%	8.15%
Third Quarter 1990	Saddam Hussein invades Kuwait, Oil Price Shock	-3.92%	11.22%	15.15%
Third Quarter 2002	WorldCom Scandal	-3.85%	9.41%	13.27%
First Quarter 2008	Credit Crisis, Collapse of Bear Stearns	-3.44%	6.43%	9.88%
Second Quarter 2012	European Sovereign Debt Crisis Continues	-3.28%	0.42%	3.70%
Fourth Quarter 2000	DotCom Bubble Bursts	-3.26%	19.78%	23.03%

Source: Bloomberg

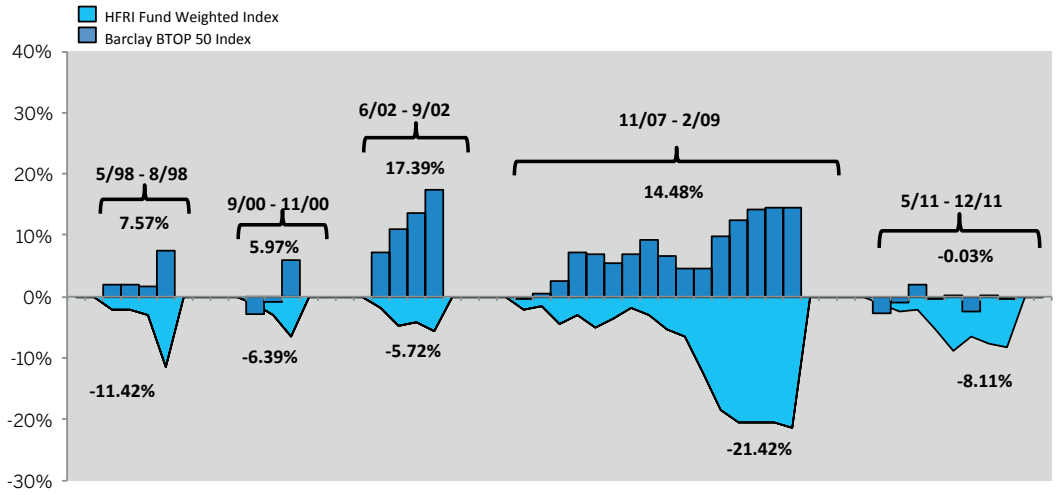
Exhibit 12, "BTOP 50 vs. HFRI Fund Weighted Composite Index's Worst Five Drawdowns Since 1990," provides an additional perspective as before. Once again it seems that the performance of managed futures complements other actively managed strategies during periods of market dislocation or duress.

While managed futures strategies have proven to be great diversifier during equity drawdowns, it is incorrect to assume that they are necessarily a pure hedge for equities. It is true that good trend-followers are supposed to catch trends, so during a prolonged bear market, a good trend-following program should be able to generate returns. However, that does not mean that if there is a quick and sudden drop in the equity market, that a trend-following CTA will necessarily be positive. As stated earlier, the universe of managed futures is diverse, with many different types of trading strategies – not just trend followers.

Short-term traders are usually engineered to perform better during a higher volatility regime, although of a different type than that which is conducive to trend following. Volatility describes only the dispersion of changes in price around the mean, not the manner in which they unfold. Proper, rigorous due diligence always necessary, but there are many excellent CTAs of various strategies that should do well on a risk-adjusted basis over the long-run.

It is also essential to highlight the fact that certain dislocations or events may produce market environments which are difficult for most hedge fund strategies, including certain managed futures strategies. The diversity within and the lack of correlation among alternative investments, and within and among managed futures in particular, suggests that it is highly likely that at least a few alternative strategies will outperform during any given environment. Again, it may be helpful to think of different alternative investments and market environments in terms of the radio signal and receiver analogy.

EXHIBIT 12: BTOP 50 vs. HFRI Fund Weighted Index's Worst Five Drawdowns since 1990



Source: AlphaMetrix Alternative Investment Advisors, Bloomberg

Managed futures present very real risks for investors just like any other hedge fund style. Investors can potentially experience volatility and substantial drawdowns, especially if the trading manager has set a higher return objective and is taking more risk to try to obtain it. Investors should always conduct thorough due diligence to properly understand the potential risks and weaknesses of trading programs before investing. This is especially important because the trading methodologies employed by CTAs, the level of risk and return that is targeted, and the quality of the operational infrastructure of trading managers may vary tremendously across the space. As such, it is critical that the investor takes the time to properly understand the nuances of the trading manager's investment strategy, risk management, as well as the domain of instruments traded and potential concentration risks. The investor should also be acutely aware of operational risks and should make every effort to understand the relationship between the trading manager, associated entities, patterns in personnel turnover, trade execution and order flow, and compliance and operational policies and procedures. The investor should also take care to understand any disclosure documents, prospectuses, and offering memoranda prior to investing in a manager's fund in order to understand additional risks and relevant disclosures. It is also important to make sure that proper governance and separation of duties exists within the trading manager as well as among the trading manager, its fund, and service providers. Only by conducting proper due diligence and vetting of the trading methodology and manager's credentials can the investor determine the suitability and potential risks of the investment.

Managed futures strategies can provide an additional source of uncorrelated absolute return that complements other alternative investment strategies by demonstrating a proclivity for outperformance during periods which tend to be difficult for many other actively managed investments.

An analysis of the semicorrelations provides further insight into the performance of managed futures during financial market dislocations. Semicorrelation provides a clear picture of the relationship between the returns of two investments when one of them experiences losses. Exhibit 13 shows the semicorrelations among the BTOP 50 Index and various other traditional and alternative benchmarks. Like the correlations in Exhibit 7, all of the coefficients of semicorrelation are less than 0.43, and many of them are negative. The fact that all semicorrelations are bounded between -0.32 and 0.43 does not provide evidence of any strong relationships among the BTOP 50 Index and the other indices on the downside. The signs of the coefficients, however, are congruent with intuition and the hypothesis that managed futures perform well during financial market dislocations. The semicorrelation coefficient between the BTOP 50 Index and each of the investments that tend to be cyclical in nature, namely equities, hedge funds, and private equity, is weak negative. Conversely, the semicorrelation coefficient between the BTOP 50 Index and each of those investments which tend to be counter-cyclical, such as fixed income and commodities, is weak positive. Others still are so close to zero that it appears there is no relationship.

The lack of strong negative semicorrelation with cyclical investments provides further evidence that a managed futures strategy is not a portfolio hedge. The weak negative semicorrelation, however, may suggest that managed futures do offer an uncorrelated investment style that tends to perform well during financial market dislocations; rolling analysis may provide deeper insight into this question.

Paradoxically, the tremendous diversity of trading styles and methodologies within managed futures and the lack of correlation among many of them does not appear to preclude them from sharing a penchant for most kinds of volatility or apparent resistance to it. Trend following conjures up the archetypal image of the long gamma strategy that thrives during financial market dislocations, but trading managers across the entire space tend to generate strong performance in difficult environments for other investments. The tendency toward high correlation among trend followers suggests that investors can typically maximize the benefits to their portfolios with a relatively small number of them. Other managed futures strategies, however, successfully exploit the sustained massive flows of capital that create trends in different ways, resulting in distinct and uncorrelated returns profiles. Still others exploit altogether distinct phenomena that tend to accompany financial market dislocations or are independent of them.

EXHIBIT 13: Semicorrelations of BTOP 50 Index and Various Traditional and Alternative Investment Benchmarks
January 1980 - March 2014

	S&P 500 Total Return Index	MSCI World Daily Total Return Net (USD)	Barclays Capital Composite US Index	Barclays Capital Bond Composite Global Index	GSCI TR	DJ UBS Commodity Index	HFRI Fund Weighted Indexx	HFRI Equity Hedge Index	LPX Buyout Index	S&P/Citigroup World REIT Index	Newedge Short-Term Traders Index
Barclay BTOP 50 Index	-0.24	-0.24	0.15	0.13	0.09	-0.03	-0.32	-0.21	-0.32	-0.09	0.43

Sources: Bloomberg, LPX GmbH. All statistics calculated to maximize number of observations; as such, number of observations used for calculations varies (Starting Dates: BTOP 50 - Jan 1987, S&P 500 Total Return Index - Jan 1980, MSCI World - Jan 1980, Barclays Capital Bond Composite US Index - Sep 1997, Barclays Capital Bond Composite Global Index - Feb 1980, GSCI TR - Jan 1980, DJ UBS Commodity Index - Feb 1991, HFRI Fund Weighted Index - 1990, HFRI Equity Hedge Index - Jan 1990, LPX Buyout Index - Jan 1998, S&P/Citigroup World REIT TR Index - Jan 1990, Newedge Short-Term Traders Index - Jan 2008). All statistics calculated through Dec 2011 with the exception of the Barclays Capital Bond indices, which did not report returns for Sep 2008 or Oct 2008.

Discretionary macro traders who utilize the liquid, transparent futures markets to express their views tend to capture many of the same sustained capital flows as trend followers. Unlike trend followers, however, these trading managers retain the flexibility to quickly reduce risk or reverse their positions, often resulting in completely unique and uncorrelated returns for their investors. Other discretionary CTAs focus on relative value relationships or on a niche market or sector which may not be sensitive to global systematic events. As such, these trading managers often generate strong returns during shocks or dislocations to the system and display non-correlated properties to trend followers and other investments.

Short-term traders thrive on many kinds of volatility, including the sustained variety that generates trends, but also on choppy, range-bound activity and rapidly shifting volatility regimes where volatility of volatility is high. Other short-term traders appear to generate returns independent of volatility or the prevailing volatility regime. The highly flexible nature of short-term traders enables them to quickly reposition themselves within rapidly changing market environments. As such, they often perform very well during market dislocations since they adapt quickly to take advantage of the opportunities these shock events present.

Exhibit 14 illustrates the semicorrelations between the Newedge Short-Term Traders Index (Proforma) and different traditional and alternative benchmarks over the life of the index.

The short track record of this theoretical index may result in some spurious correlations, but in the tradition of Professor Lintner, we attempt to make due with the data available.

EXHIBIT 14: Semicorrelations of Newedge Short-term Traders Index and Various Traditional and Alternative Investment Benchmarks
January 1980 - March 2014

	Barclay BTOP 50 Index	S&P 500 Total Return Index	MSCI World Daily Total Return Net (USD)	Barclays Capital Composite US Index	Barclays Capital Bond Composite Global Index	GSCI TR	DJ UBS Commodity Index	HFRI Fund Weighted Index	HFRI Equity Hedge Index	LPX Buyout Index	S&P/Citigroup World REIT Index
Newedge Short-Term Traders Index	0.22	-0.46	-0.55	0.19	0.15	-0.36	-0.42	-0.48	-0.54	-0.34	-0.32

Sources: Bloomberg, LPX GmbH, Newedge. All statistics calculated to maximize number of observations; as such, number of observations used for calculations varies (Starting Dates: BTOP 50 - Jan 1987, S&P 500 Total Return Index - Jan 1980, MSCI World - Jan 1980, Barclays Capital Bond Composite US Index - Sep 1997, Barclays Capital Bond Composite Global Index - Feb 1980, GSCI TR - Jan 1980, DJ UBS Commodity Index - Feb 1991, HFRI Fund Weighted Index - 1990, HFRI Equity Hedge Index - Jan 1990, LPX Buyout Index - Jan 1998, S&P/Citigroup World REIT TR Index - Jan 1990, Newedge Short-Term Traders Index - Jan 2008). All statistics calculated through Dec 2011 with the exception of the Barclays Capital Bond indices, which did not report returns for Sep 2008 or Oct 2008.

BENEFITS TO INSTITUTIONAL INVESTORS

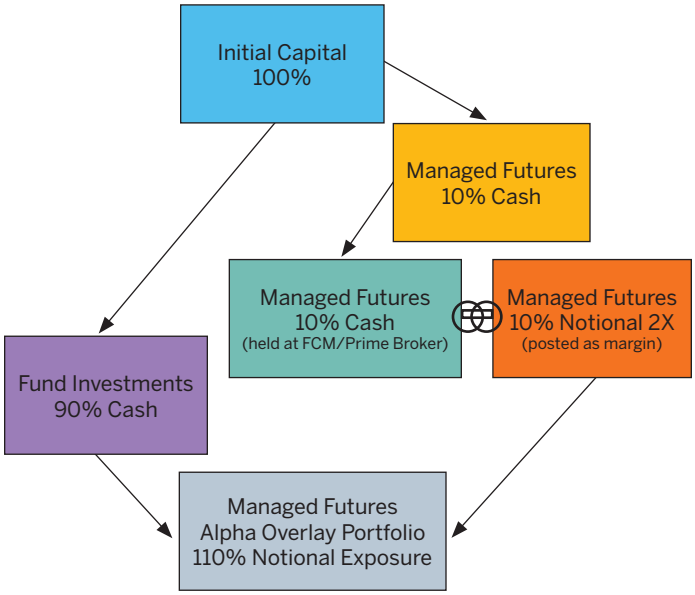
Managed futures strategies can provide institutional investors with a variety of liquid, transparent investment programs that do not exhibit correlation to traditional or alternative investments, and often, one another. Though not a hedge, they often provide robust performance in unfavorable environments for equities and most alternative investments. The exchange-listed nature of the underlying instruments traded facilitates risk management and mitigates many of the dangers associated with model risk. Additionally, institutional investors who access the space via separately managed accounts substantially minimize operational risks and the possibility of fraud, maintain custody of assets, and have access to full transparency of positions. This section attempts to shed insight into other intrinsic features of managed futures which enable institutional investors to capitalize on these desirable characteristics.

One of the unique advantages managed futures offer institutional investors is the ability to notionally fund investments, allowing investors to efficiently deploy cash to gain increased exposure or for allocation elsewhere in the portfolio. Due to the low margin requirements for most futures contracts, only a small fraction of the cash deposited at the manager's futures commission merchant is deployed as margin for trading. The remainder sits in cash equivalent instruments, earning interest and serving as a reserve in the event of trading losses.

Rather than allowing cash to sit idle, many futures investors prefer to deploy part of this cash to increase their trading level and notional exposure. For instance, if an investor buys a theoretical futures contract with a notional value of $100,000 and a margin requirement of $10,000, $10,000 will be deployed as margin and $90,000 will remain in cash. If the investor chooses to do so, he could double his notional exposure from $100,000 to $200,000 by posting an additional $10,000 as margin on the purchase of a second futures contract. The investor now holds a notional position of $200,000 on his $100,000 cash. This position will be able to withstand losses of 40 percent before all of the investor's cash is consumed, triggering a margin call (a 40 percent loss on two $100,000 contracts equals $80,000. Any losses surpassing this level would dip below the margin requirement on this position of $20,000).

EXHIBIT 15: Managed Futures Alpha Overlay – How It Works

- Begin with initial capital outlay (100%).
- Invest 10% of the cash in managed futures. Since futures require only a small cash deposit, it is easy and prudent to use notional funding to increase exposure to the managed futures component to 20%.
- Invest remaining 90% of cash in fund investments.
- Result is enhanced portfolio diversification for small cash outlay.



The liquidity and transparency of these instruments tremendously facilitates risk management since the notional exposure, margin usage, and prices of the instruments are all known. The risk manager can therefore easily determine and monitor portfolio risk.

The low margin requirements of futures contracts in effect allow for free leverage. Whereas leverage typically involves borrowing funds or instruments at LIBOR plus a spread, the only cost associated with leverage via notional funding is the opportunity cost of interest income foregone on the idle cash. Aside from utilizing idle cash to increase notional exposure, many investors choose to reallocate it to other parts of their portfolio, effectively allowing them to create an alpha overlay for a relatively small fraction of the total investment capital, as explained in Exhibit 15. Strategies like this allow for substantial increases in portfolio diversification for a relatively small cash outlay.

Many institutional investors also appreciate the fact that managed futures offer favorable 60 percent long-term, 40 percent short-term capital gains tax treatment, despite the fact that the holding period for the underlying instruments is typically less than what would qualify as "long-term" under U.S. tax laws.

The question of asset-liability mismatch is an important consideration for many institutional investors, particularly those who manage pension funds, endowments, or who otherwise meet recurring obligations by making periodic payments. The liquidity of managed futures and other highly liquid hedge fund strategies alleviates asset-liability mismatch, allowing institutional investors for whom it is an issue to mitigate the effects of illiquid investments elsewhere in their portfolio. In the event that the investor needs to suddenly liquidate assets to meet an unanticipated obligation, it could easily do so from this part of its book without foregoing the opportunity to attain absolute returns.

CONCLUSION

Managed futures strategies have evolved tremendously since the first iterations of long-term trend following in the late 1940s. Advances in technology, computing power, and telecommunications have opened up heretofore inconceivable and inaccessible possibilities in futures trading, not only for quantitative or systematic managers, but also for niche and discretionary experts whose access to critical information has been facilitated by these developments.

Quantitative scientists and researchers have been able to apply highly technical and sophisticated methods to the markets for the first time since the clean, high quality data which they require has only recently become available at accessible prices. Short-term traders are scouring tick databases which took years to build for persistent statistical aberrations whose exploitation has been made possible by the meteoric ascent of electronic markets and decreased transactions costs. Short-term traders are at the frontiers of interfacing trading with technology. Trend following has emerged from its naive, primarily rules-based beginnings to a highly sophisticated group of strategies whose ability to generate robust returns has been enhanced, while more closely controlling risk and drawdown. Some trend followers employ armies of scientists and mathematicians, and have formed alliances with top universities. If these developments are any indication, the future of managed futures strategies is bright. Incredible opportunities lay ahead for the next generation of traders and investors alike.

While recent years have certainly been difficult, with an unusually small number of trading opportunities, the industry has seen difficult periods before. Throughout the history of the industry, CTAs of all persuasions have offered institutional investors significant potential sources of uncorrelated returns to enhance the diversification of portfolios. The fact that managed futures strategies as a whole have historically performed well in environments that tend to be difficult for most other investments provides additional benefits to portfolios.

While it is important to remember that managed futures are not a portfolio hedge, the mechanics of trend following, short-term trading, discretionary macro, and statistical pattern recognition explain their respective intrinsic proclivities for different kinds of volatile markets. The prolonged dislocation in the global financial markets of 2007 and 2008 serves as only the latest example in a canon of many.

While the growth of managed futures has been impressive, it has paled in comparison with that of other alternative investments (hedge funds that are non-managed futures, private equity, and real estate). There are hedge funds on the entire liquidity continuum between mutual funds and private equity funds, and managed futures should be regarded as liquid alpha, as opposed to the more limited characterization of simple trend follower. The space of managed futures is rich and fertile, with a very broad range of strategies and styles.

The liquidity and transparency of the underlying instruments substantially mitigate the hidden risks which often accompany investing in hedge funds and alternative investments. Price discovery takes place constantly in futures markets, and settlements on all futures contracts are determined by the various exchanges at the end of each trading day, facilitating the pricing of portfolios and the measurement and management of risk. Investors often underestimate the value of liquidity. History shows that the performance of hedge funds that trade illiquid instruments have under-performed hedge funds that have better liquidity terms [Bhaduri and Art, 2008].

Indeed one might argue that the space of managed futures has become so diverse with so many different types of risk-adjusted return possibilities to legitimately target, that it is perhaps questionable why anyone would invest in alternatives that have onerous lock-ups and trade illiquid or non-exchange traded instruments. A portfolio manager who is performing his or her fiduciary duty must justify that the investments that they are making are getting a proper liquidity premium. This in turn means that if they make an investment in an illiquid vehicle, then they are in essence stating that they could not have achieved that risk-adjusted return through more liquid investments in managed funds. The excellent breadth and liquidity of CTAs, or portfolios of CTAs, lends itself well as the engine of structured products. It is important to realize that due diligence is needed in selecting good CTAs. Like anything else, there are both good and bad CTAs, and only rigorous and proper due diligence will help to differentiate them. In addition, in recent years, 40 Act Funds have been introduced that mimic managed futures strategies. These funds have attracted a good amount of attention and a significant amount of assets.

The predisposition of managed futures toward positively skewed distributions of returns also suggests that few trading programs are susceptible to the risk of infrequent, potentially catastrophic losses. The mean-variance framework and Sharpe ratio rarely capture these effects, suggesting that deep analysis of the higher statistical moments or the application of the Omega function present superior approaches to the assessment of investment performance, risk, and return.

As plan sponsors, endowments and foundations reacquaint themselves with managed futures – or as the case may well be, truly discovers them for the first time – they should consider it an eclectic amalgamation of liquid alpha strategies. Managed futures offers institutional investors actively managed exposure to a truly global and diversified array of liquid, transparent instruments. The returns of many of these do not display correlation and do not appear to be easily explained by traditional or alternative investments, and oftentimes, one another. Institutional investors should view managed futures not only as means to enhance portfolio diversification, but also as absolute return vehicles with intuitive risk management.

For more information on Managed Futures, visit www.cmegroup.com.

CONCLUSION IN CONTEXT OF LINTNER

It is not without some trepidation that the objective of this paper was set—namely, a modern day Lintner paper. John Lintner's work concerning the role of managed futures in a portfolio is considered a classic.

The famous quote by Sir Isaac Newton, *"If I have seen further it is only by standing on the shoulders of giants,"* is in some sense an understatement for our particular case as Lintner laid out the entire road map.

It is remarkable just how solid Lintner's long-term argument has remained through the test of time even when the performance of the recent challenging years is included in the analysis, as it has been here, through 2013.The inclusion of managed futures in an institutional portfolio leads to better risk-adjusted performance (either through the mean-variance framework, or through the more modern Omega analysis). The results are so compelling that the board of any institution, along with the portfolio manager, should be forced to articulate in writing their justification in not having an allocation to the liquid alpha space of managed futures.

It is also fitting that during the silver anniversary of John Lintner's fine work, it survived the ultimate litmus test through the historic financial meltdown of 2008. In the depths of the crisis, managed futures strategies, collectively,were one of the very few bright spots for investments (both alternative and traditional). While the post-crisis environment has been especially challenging, the instrinsic properties of these strategies could again play a vital role in protecting portfolios in future crises and beyond, as they have done during each sustained crisis over the last several decades.

One might argue that Lintner saved his very best work for last.

Acknowledgements

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*All charts, graphs, statistics, and calculations were generated using data from Bloomberg, the Barclays Capital Alternative Investment Database, LPX GmbH, and Manager Reported Returns.

Data sources: CME Group unless otherwise noted

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