The Role of Managed Futures and Commodity Funds: Protecting Wealth during Turbulent Periods

Professor John M. Mulvey
Department of Operations Research and Financial Engineering
Bendheim Center for Finance
Princeton University
Chairman, DPT Capital Management, LLC

February 2012
Abstract

Often, investors are willing to accept short-term risks in order to achieve long-term portfolio gains. A form of this tradeoff has led to a movement away from traditional equity and fixed-income investments and towards illiquid alternative categories – private equity and venture capital, real assets, and hedge funds. Leading university endowments, many public pension plans, and wealthy individual investors have embraced the shift to illiquid investments.

The nature of illiquid alternative investments poses severe challenges for protecting investor wealth during crash periods and for achieving rebalancing gains. In this paper, we discuss the advantages of highly liquid investments – such as in the managed futures domain – for protecting capital and for dynamic asset allocation.
1. Introduction

How can an investor protect his wealth against possible future adverse events? We propose three basic approaches and variants therein.

First, the investor can choose ultra conservative funds, including cash management accounts and treasury bills, as his primary investment vehicle. While protecting nominal wealth, short-term fixed-income securities will inevitably lead to low returns, especially under the current close-to-zero interest rate environment throughout much of the world.

Safe short-term cash-like instruments fail as a hedge against inflation risks. For long-term investors such as pension plans, low asset return performance will result in the need for relatively high contributions over time – which can be an expensive approach for achieving short-term protection over extended periods.

A second approach to wealth preservation is by anticipating turbulent periods. Here, the investor lowers risk dynamically by moving from risk bearing assets such as stocks to safe investments such as short-term government bonds. Such a flight-to-quality approach can be difficult to implement for large institutional investors, however, due to their size, organizational structure, and shift to illiquid alternative investments (Swensen 2000). Also, dynamic asset allocation can be expensive due to market impact costs, false positive indicators, and time delays.

A third approach is to invest in assets and strategies that are likely to perform well during turbulent crash periods. There are two primary variants: a) tail risk strategies; and b) strategies or asset categories that have done well historically during turbulent periods. The former is designed to pay off during a crash, whereas the latter is not guaranteed but may be less expensive to implement.

As we discuss in this paper, managed futures in general, and commodity futures in particular, fits the third approach and accordingly should be considered an important component of a long-term investor’s portfolio.

Managed futures encompass four general asset categories: commodities (agricultural markets, energy products, and metals); currencies; bonds; and equity indices. In each of these cases, a futures (or forward) market is established by participants to either hedge or speculate on the underlying instrument. At any given time, a futures pricing curve can be constructed by plotting the prices of futures contracts expiring across the expiration spectrum.

There can be some confusion in futures/commodity nomenclature due to historical circumstances and regulatory issues. In the United States, the Commodity Trading Futures Commission (CTFC) and National Futures Association (NFA) regulate futures markets and their participants. The first futures markets were commodities markets such as grains, softs (e.g. cotton) and metals; energy products then followed.
Eventually, futures markets have expanded significantly to include currencies, fixed income instruments and equity indices. Today, professional money managers who trade primarily futures are designated as commodity trading advisors (CTAs), regardless of which sectors they trade. In this report, we differentiate the broader managed futures area from the original commodity futures markets.

Commodity investments have gained in interest by individual and institutional investors over the past decade. For example, trading volume in exchange traded commodities has increased dramatically. Furthermore, assets under management more than doubled between 2008 and 2010 to nearly $380 billion (Exhibit 1). And commodity prices have increased. Market participants attribute the recent price increases in commodities to increased demand for consumer goods, particularly from the populous countries of India and China. In contrast, the size of the world stock market was estimated at about $46.8 trillion at the end of March 2010.

As we show, for traditionally diversified investors, an allocation to a fund that invests exclusively in commodity markets offers not only a hedge against inflation, but also effective diversification because of its low correlation with traditional asset classes. In the long run, commodity investment funds show equity-like returns, but are accompanied by lower volatility and shortfall risk.
2. Where’s the Diversification?

Fundamental flaws in traditional portfolio models became apparent during the severe 2008/09 banking, real estate, and general economic crash. Among other problems, many investors had assumed that correlations in rates of return among asset categories would approximate historical values going forward. Under this assumption, the investor would be adequately and safely diversified to "protect" his capital during a crash.

Unfortunately, most asset categories suffered together and lost substantial value. The extreme level of contagion occurring during this crisis can be attributed to several factors. First, market risk soared to unprecedented levels; for example, the implied volatility of U.S. stocks exceeded 70% annualized value and correlation among asset categories trended towards 1.0 or -1.0. As we know from asset pricing, the "fair value" of a security depends upon risk adjusted discounting of future cash flows, or via risk neutral valuation (arbitrage free pricing). In both cases, if the risks increase along with much higher volatility, prices will plunge. As this crash showed, the financial sector is critical to the health of the overall economy, hence the spreading of extreme contagion throughout the equity, fixed-income, and other asset categories. The U.S. real estate crisis and a sharp drop in confidence accompanied the crisis in the financial sector.

Exhibit 2
Portfolio models often assume fixed-correlation between asset returns

<table>
<thead>
<tr>
<th></th>
<th>Liquidity</th>
<th>Fixed Income</th>
<th>Real Estate</th>
<th>Global Equity</th>
<th>Absolute Equity</th>
<th>Private Equity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquidity</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fixed Income</td>
<td>0.30</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Real Estate</td>
<td>0.25</td>
<td>0.40</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Global Equity</td>
<td>0.10</td>
<td>0.01</td>
<td>0.40</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absolute Return</td>
<td>0.00</td>
<td>0.60</td>
<td>0.30</td>
<td>0.35</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Private Equity</td>
<td>0.15</td>
<td>-0.10</td>
<td>0.50</td>
<td>0.80</td>
<td>0.10</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Finally, liquidity considerations caused many markets and strategies to become unstable since investors could not sell their asset in response to severe turbulence; market liquidity evaporated for many securities.

Most asset allocation and asset-liability management (ALM) models assume that the

Exhibit 3
Correlation between equities and government bond returns changes over time based on economic conditions (normal versus crash) – weekly time steps

The Role of Managed Futures and Commodity Funds

Correlations among asset returns are relatively constant. Exhibit 2, for example, depicts the assumed correlation matrix for a $140+ billion California pension plan (Collier and Olleman, 2010). Note in particular, the correlation between equities and bonds is assumed to be close to zero. As shown in Exhibit 3, however, the rolling correlation between stocks and government bond returns takes on a distinctive pattern – positive during normal business conditions, and negative during recessions and crashes.

These charts show the existence of distinct economic regimes. Including these more realistic conditions in an asset allocation study will improve investor performance.

Even absolute performance hedge funds failed to protect investor capital during 2008/9 (Exhibits 4, 5 and 6). Exhibit 4 shows the weekly correlations of the returns of hedge fund categories to FTSE U.S. equity 500 returns over the span September 2005 to August 2011. As evident, several hedge fund categories – emerging markets, multi-strategy, long-short equity, distressed, fixed-income arbitrage, and risk arbitrage -- had a higher correlation to the FTSE 500 returns than the other categories. Two categories – dedicated short bias and managed futures – stand out with very low correlation to the FTSE 500. The orange colors depict hedge-fund categories with negative returns over the target period; categories in blue have positive returns.

Exhibit 5 shows cross connections among the hedge fund categories. Most funds had relatively high cross correlations, with a couple of exceptions, and most had positive performance over 2005-11. Here again, managed futures and dedicated short stand out with relatively low or uncorrelated performance to the other hedge fund categories.
Exhibit 6 examines the recent crash period. Here we see that the correlation matrix becomes almost completely covered with ones. Of particular note: 1) most hedge-fund categories lost money during this period (even dedicated short bias funds); and 2) the precipitous drop of 51.4% in the Goldman Sachs Commodity Index (GSCI) over the specified year which includes a maximum 75% drawdown within the one-year period. This clearly calls into question the efficacy of a long-only approach to commodities as a value-added asset. The managed futures category was the sole category with positive performance.

Most investors who thought they were adequately diversified learned the hard way that this simply wasn’t the case. Even top university endowments – Harvard, Yale, and Princeton Universities – experienced losses of 25% to over 30%. This level of loss of capital usually has critical consequences for achieving the goals of long-term investors.
3. Features of Futures Markets

The managed futures category has significant advantages over traditional assets. Futures markets are some of the most liquid in the world, providing exposure to currencies, bonds, equity indices, and commodities. These instruments are readily traded, even during severe market turbulence. Importantly, the investor can go long or short without barriers typically associated with shorting stocks and bonds – no borrowing needed or searching for assets to borrow, or inverse ETFs. These markets also are exchange-traded, easily valued, and marked-to-market daily.

Second, leverage in a futures market differs from traditional leverage. An investment via futures does not require direct capital; rather, trades are designated by reference to two distinct “accounts”. The investor’s core capital is placed in a margin account, which is the depository for daily profits and losses from the futures positions. For individual investors, the margin account consists of risk-free assets such as 1-year T-bills. In contrast, it is relatively easy for an institutional investor to maintain margin capital in risk bearing liquid assets such as equities and bonds. The performance of the margin account can play a significant element in managed futures.

The second “account” tracks the return of the futures positions. Performance depends upon the characteristics of the underlying instrument – currencies, bonds, equity index, or commodities. Futures markets are overseen by regulated exchanges, thus largely avoiding counterparty risks. Exchanges require marked-to-market settlement daily. Also, the exchanges can alter the margin requirements depending upon current market conditions. For instance, the margin requirement will increase when volatility in the underlying instrument expands greatly.

Since futures markets are liquid, an investor can apply dynamic asset allocation models and strategies without incurring large market impact costs. For instance, the investor can implement drawdown constraints over short time periods (Mulvey, et al. 2011). Likewise, rebalancing gains can be exploited by resetting the asset mix to pre-determined target proportions. In these cases, liquidity provides a distinct advantage since it plays a role in improving portfolio performance.

1 Recent problems occurred with MF Global.
4. Sources of Alpha in Commodity Markets

The commodity segment of the managed futures domain can provide exceptional diversification from equities and fixed income. Commodity futures markets are among the oldest organized exchanges in the world, such as the Dojima rice futures market, which began in 1710 in Osaka Japan, and the Chicago Board of Trade, which opened in 1848.

In recent years, investors have turned to owning commodities and other real assets to protect themselves against long-term risks. First, as the world population approaches seven billion people, the demand for basic commodities bumps against limited supply constraints for land, energy supplies, and agricultural products, and so on possibly resulting in pricing disruptions. Even safe drinking water is becoming a scarce commodity in many parts of the world.

A related risk is inflation. Many countries are experiencing extraordinarily low nominal interest rates\(^2\) and massive deficit spending plans in order to overcome the fallout from the 2008/09 crash. For these countries, there is the temptation to inflate themselves out of their current monetary problems, especially if the local constituents do not understand the importance of fiscal discipline to ensure long-term financial stability. Further, the current level of negative real interest rates in a number of countries likely will contribute to future increased inflation.

Political risks, such as disruptions caused by oil embargos, wars, and terrorist attacks, present another concern. Owning raw materials can be profitable during turbulent periods caused by political factors. Further, it’s likely that equities will drop very quickly when a political crisis erupts. The 1973 oil embargo, for example, precipitated a substantial increase in energy prices, accompanied with higher inflation.

Last, there is a small, but still significant risk due to weather and catastrophic shocks such as crop freezes, hurricanes, and tsunamis. Many commodity prices will spike up when these events are present.

Investing in commodities promises to reduce the aforementioned risks. However, it’s difficult for most investors to own raw materials outright due to storage and insurance costs, depreciation, and related issues. Instead, investors have turned to futures and forward markets in the commodity domain. In addition, there are several other paths for investing in commodities, including single commodity exchange traded funds (ETFs), long-only commodity ETFs (matching indices such as the Goldman Sachs Commodity Index\(^3\)), and commodity only hedge funds such as Clive Capital\(^4\) for high net worth individuals and institutions.

There has been considerable research into the characteristics of commodity prices over extended time periods. Studies have shown the presence of trends and regime changes in commodity markets (e.g. Erb and Harvey 2006; Miffre et al. 2007; and Shen et al. 2007). These patterns are due to multiple causes, including the gradual diffusion of information, inventory conditions, the impact of weather, and political risks. In many cases, prices follow patterns consistent with trend following and momentum\(^5\). These relationships can be traced to several theories including diffusion of information and noisy traders (Chan et al. 1996; DeBondt and Thaler 1987; George and Hwang 2004; Hong and Stein 1999; and Rouwenhorst 1998). For instance, if a farmer hedges against adverse events one year and is successful, he may be inclined to hedge the next year. Likewise, neighboring farmers will often follow the successful hedger. Gradually, since commodities are employed for consumption - either final or intermediate, consumers and producers have to render hedging decisions on an ongoing basis as a function of their core businesses. Likewise, speculators will often watch the market for underlying patterns and take action in concert with these patterns. The basis for many commodity-trading strategies is sustained price swings – either positive or negative.

A second source of alpha relates to the shape of the futures curve. In most commodities,
the price of a futures contract is not determined by arbitrage arguments. Supply and demand considerations are paramount. Thus, for example, backwardation occurs when inventories are low and spikes in demand are present. Tactics based on the shape of the futures curve can lead to positive performance (Gorton et al. 2008; and Brennan et al. 1997).

There is some controversy as to whether alpha is present in managed futures funds. For instance, the study at Yale University (Bhardwaj et al. 2008) indicates that commodity trading advisors (CTAs) rarely earn much more than the risk free rate. This study was completed before the 2008 crash in which managed futures funds outperformed other hedge fund categories by a wide margin.
5. A Relative-Value Commodity Index

Passive indexing strategies have become well established over the past thirty years. These strategies are designed to match a well-defined market segment with a low cost (and possibly tax efficient) approach to investing. There is considerable evidence that passive indexing strategies are especially pertinent for large institutional investors, due to their low cost and fees as well as transparency. Passive funds typically have lower turnover than active funds.

Long-only commodity indices have done well over extended periods of time. Exhibit 7 shows the FTSE 500 alongside a popular commodity index – the Goldman Sachs Commodity Index (GSCI). The GSCI is an index of long-only investments in the most actively traded commodities and is a popular benchmark for many institutional investors.

There are several evident observations. First, the overall price patterns of the GSCI and FTSE 500 are roughly similar. The GSCI outperformed the FTSE 500 and related equity indices over the entire 1999 to 2011 time period in terms of returns, with associated higher volatility and drawdown values. Second, the GSCI experienced severe losses during the crash period 2008/09, partially due to the sharp correction in oil and other energy based commodities.

Exhibit 8 shows that spot prices of commodities rose along with equities in early 2009 until early April 2011. However, the investible version of the GSCI (an exchange traded fund with the symbol GSG) achieved much lower performance during the same period. The under performance is largely due to the presence of contango in many commodity markets, especially energy products, over the selected time periods. The commodity prices in contango lowered returns since the index is long-only.
To address the problems with long-only commodity investments – primarily large drawdowns and losses due to contango, we developed a relative-value commodity index using the following four sub-tactics: long momentum, short momentum, long futures curve, and short futures curve. Each of these tactics is based on a relative ranking of the commodities under study. Briefly, the four tactics are designed to capture alpha embedded in commodity markets, while carefully balancing the long and short positions in the portfolio – in order to minimize drawdowns and produce positive returns with excellent diversification characteristics (as compared with traditional assets). Recall that managed futures investments can be designed as an overlay strategy – providing additive performance to standard assets.

Exhibit 9 depicts the performance of our relative long and short momentum tactics. Note that the relative long-momentum tactic outperforms the relative short momentum over most of the entire span. However, during crash periods – 2001/02 and 2008/09 the short momentum tactic did much better than its long-only counterpart. The two tactics combine to provide a more stable return pattern.

A similar characteristic occurs with the long and short futures curve tactics (Exhibit 10). Here, the long futures tactic has the better long-term return as compared with the short futures tactic, but does suffer from sharp drawdowns. Again, the combined long-short tactic has superior return/risk characteristics.

Exhibit 9: Momentum tactics (long and short) and market neutral combination – 1999 to 2011

Exhibit 10: Futures curve tactics (long and short) and market neutral combination – 1999 to 2011

---

6 A dynamic long-only commodity index was created by Summerhaven, with an investible ETF whose symbol is USCI. The Summerhaven approach is long-only and employs tactics that are somewhat different than the ones described in this paper, although we suspect the motivations are similar in spirit.

7 Most commodity tactics do not depend upon a relative value approach. For example, trend followers will go long a commodity when the current price exceeds a moving average of past prices.
Exhibit 11 depicts the performance of the long-short relative-value commodity strategy, along with market neutral version over the period 1999 to 2011. The relative value approach applies regimes for determining the tilting of long and short positions. Exhibit 12 shows the results of the relative value index. In addition, we provide the empirical results of a regime detection system for U.S. equities (Guidolin and Timmermann 2007; and Mulvey et al. 2011).

Since we can gain exposure to commodities via the futures markets, we can enhance the returns of traditional assets. In this example, we couple commodities with a regime identifying equity model (Mulvey et al. 2011). The overall performance is excellent. In particular, we focus on the ratio of return to risks wherein risk is measured by the Ulcer Index - downside risks relative to drawdown. The combination of commodities and a careful, regime bases equity strategy is clearly attractive and has low correlation with the FTSE 500.

Exhibit 11
Combining long and short momentum and futures curve tactics: Relative value versus market neutral – 1999 to 2011

Exhibit 12
Combining relative value commodity and regime detecting equity tactics versus FTSE US 500 Index

8 The Ulcer index measures both the length and depth of drawdown over time.
9 In an early study,Lintner (1965) showed the advantages of commodity funds for improving performance in conjunction with traditional assets.
6. Conclusions

A fundamental lesson emerging from the 2008/09 economic-crash is that only a few strategies provide meaningful diversification from equities when severe contagion strikes. Standard risk management suffers accordingly, with substantial portfolio losses.

Even absolute return hedge funds purporting to provide positive returns failed to protect investor capital -- although losses here generally were much less than the 50+ percent plunge that occurred in equity markets. This situation led to a substantial loss of investor wealth, a reduced chance to attain investment goals (and for pension plans, to meet legal liabilities), and a wakeup call for investors who have been applying traditional portfolio models based on a relatively static framework such as the Markowitz portfolio model. Instead, a dynamic asset allocation approach would have been much better (Mulvey et al. 2006 and 2008).

This paper discusses the advantages of commodity futures, and managed futures in general, as bona fide standalone investments and as meaningful diversifiers within a portfolio of traditional assets. The managed futures category of hedge funds performed particularly well during the 2008/9 crash periods. In fact, it was the sole hedge fund category with positive performance in 2008/9.

We have seen similar results in previous crash periods including the Asian currency crisis in 1997-98, the Russian debt debacle and LTCM in 1998-99, and the technology bubble and crash and the 9/11 disaster in 2001-03. The positive performance can be attributed to several factors: 1) the ready ability to go long or short depending upon economic and other circumstances; 2) the availability of deep liquidity allowing for dynamic asset allocation; and 3) the opportunity to take advantage of volatility via rebalancing gains and regime changes. Each element provides a small advantage. When combined, however, a portfolio of commodity tactics can substantially improve overall investment performance, especially when traditional assets are doing poorly.
Appendix: Performance Attribution

The performance of a portfolio of managed futures tactics in a fund can be subdivided into three components. The first element involves return on the capital set aside for providing the margin for the futures securities. In many cases, especially for individual investors, their margin funds must be placed in risk free and highly liquid funds such as 1-year T-bills. Today, these investments are likely to remain close-to-zero performance, given the ultra-low level of interest rates across the globe. Institutional investors are allowed to post other liquid assets in their margin accounts, such as equities and fixed-income securities, with the possibility of sizeable returns (with greater risks naturally).

Second, the return of individual tactics as standalone investments is a primary component. For example, we might construct a trend following rule for investing in gold futures. The geometric mean of an index based on this tactic provides attribution of this component – about 2-4% per year over the past thirty years.

The third component involves portfolio determinatives. Accordingly, a fund that employs the fixed proportional investment rule, such as, 60% equity and 40% bonds will, in many cases, outperform a buy-and-hold (do nothing) rule. This excess return is called rebalancing gains, which can be substantial for highly volatile markets and tactics such as we have seen in the commodity arena. In other cases, the rebalancing gains will depend upon more complex rules and models such as via financial optimization models. Any excess (or shortfall) return of this dynamic portfolio over the buy-and-hold rule falls into this component. Luenberger (1998), and Mulvey and Kim (2008) provide further discussion. More recent studies in other areas have confirmed these empirical tests (e.g. Mulvey et al. 2007, and the Rydex equal weighted version of the S&P 500).

References