DIVERSIFICATION BENEFITS OF MANAGED FUTURES

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Editor's note: Thomas Schneeweis and Bhaswar Gupta work for the Center for International Securities and Derivatives Markets (CISDM) and discuss the CISDM Hedge Fund/CTA Database and indexes in this article.

Introduction

Under the Commodity Exchange Act, all individuals and firms (with certain exceptions) that intend to do business as futures professionals must register with the Commodity Futures Trading Commission (CFTC). The commission has authorized the National Futures Association (NFA), a self-regulatory organization, to receive and review applications and grant registrations. The following are two categories of futures professionals that must register:

Commodity trading adviser (CTA)—A person, who, for compensation or profit, directly or indirectly advises others as to the advisability of buying or selling commodity futures or option contracts.

Commodity pool operator (CPO)—An individual or firm that operates a commodity pool. A commodity pool is an investment trust, syndicate, or similar form of enterprise operated for the purpose of trading commodity futures or options contracts. For example, if a pool is organized as a limited partnership, its general partner typically is its CPO.

Many hedge funds, particularly those that trade futures, are registered as CTAs and even CPOs. CTAs generally can be classified as currency, financials, equity, physicals, and diversified. Most are classified as diversified (they trade several markets) and fewer are classified as physicals (they exclusively trade nonfinancial markets such as energy, metals, softs, etc.). The following better-known hedge funds or funds of funds are registered either as CTAs or CPOs or both.

- Caxton Associates, LLC
- Kingdon Capital Management, LLC
- Moore Capital Management, LLC
- Renaissance Technologies Corp.
- SAC Capital Advisors, LLC
- Tudor Investment Corporation
- Pacific Alternative Asset Management Co., LLC

Several recent articles have examined the benefits of managed futures. Lamm (2005) argued that CTAs possess overlooked performance characteristics of positive skew and excess kurtosis, attributes that are of potential value to investors. Lamm noted that positive asymmetry in CTA returns serves to offset negative asymmetry of other assets in portfolio construction. The analysis showed that when portfolio optimization techniques that consider higher moments are used rather than simple mean-variance analysis, the result was significantly higher allocations to CTAs. CISDM (2005) examined the benefits of managed futures over traditional stock and bond portfolios. The study concluded that managed futures trade in markets that offer investors the same market integrity and safety as stock and bond markets. The study also concluded that managed futures are not more risky than traditional equity investments and offer unique return opportunities. Spurgin (2005) examined the sources of returns to managed futures, framing the debate in economic rather than statistical and behavioral terms. He concluded that certain markets such as equity index futures seem unlikely to offer positive risk-adjusted

returns to trend-followers because of the absence of a class of participants willing to pay speculators to hold excess risk temporarily. Other markets such as gold seem unlikely to offer positive returns because of the absence of an economic necessity for both producers and consumers to hedge. Spurgin (2005) concluded that markets such as currencies and interest rates, and production factors such as crude oil, are likely candidates for excess returns to speculators. This is consistent with the fact that most CTAs in major databases are classified as diversified or trade multiple markets such as currencies, interest rates, and physicals.

Industry participants in general consider managed futures to be a hedge fund strategy. CISDM and Barclay Group estimate that $100 billion to $150 billion U.S. are invested in managed futures. In the past, Russell and Goldman Sachs have partnered to survey usage of alternative investments by large institutional investors. However, the increased focus and growth of alternative investments led each to produce a separate survey for 2005–2006. The Russell 2005–2006 survey examined the use of private equity, hedge funds, and real estate by 327 large organizations responsible for managing tax-exempt assets. It concluded that hedge fund use is growing: the percentage of respondents utilizing them increased, and strategic allocations to hedge funds grew across all regions (North America, Europe, Australia, and Japan) and strategic allocations are forecast to continue growing in 2007. Respondents to the Russell survey also cited commodity strategies among those being considered for future use.

In this article, we examine the diversification benefits of managed futures. We examine alternative ways of investing in managed futures, discuss data sources as well as the impact of survivorship bias, and present our results as they relate to the diversification benefits of managed futures.

Investing in Managed Futures

The following are four general ways to invest in managed futures:

- invest in a CTA using a managed account
- invest in a commodity pool operator
- invest in an active managed futures index
- invest in a passive index

The brokerage firm choice is very important: the firm must have the capacity to handle complex trades that may have a material effect on overall performance.

Investing in CTAs

Investors generally invest in CTAs using individual managed accounts. Most CTAs prescribe minimum account sizes for trading in a particular investment program. Investors are required to select a futures commission merchant (FCM), introducing a broker and/or brokerage house that will maintain their accounts. The brokerage firm choice is very important: the firm must have the capacity to handle complex trades that may have a material effect on overall performance. Although CTAs may not have authority over the choice of the FCM or arrangements between the investor and FCM, the FCM must be acceptable to the CTA. The FCM generally has custody of investor funds and is responsible for furnishing investors with confirmations of all account transactions, monthly statements of trading activity, and other account statements customarily furnished by the FCM to its customers. The CTA has authority to exercise trades in customer accounts. CTA fees usually are deducted directly from the brokerage account.

Investing in CPOs

Investors also can invest in managed futures by investing through commodity pools, which resemble mutual funds. Investments from several investors are pooled and invested in futures, either directly by the pool operator or through one or more commodity trading advisers. CPOs either may be public or private. The requirements for investing in public futures funds generally differ from state to state as well as each offering. For example, Morgan Stanley may consider a minimum net worth of $75,000 (excluding homes, furnishings, and automobiles) or a minimum annual income of $30,000 and a net worth of $30,000 (with the same exclusions) sufficient to allow investors into of certain managed futures investments.[1] However, the public

Citigroup Managed Futures fund requires a minimum net worth of $150,000 (exclusive of home, etc.) or a minimum of $45,000 income/$45,000 net worth (exclusive of home, etc.).[2] The requirements of private placement funds generally are higher and vary by offering.

Investing in Managed Futures Indexes

Managed futures indexes include the S&P Managed Futures Index provided by Standard and Poors and the BTOP50 Index provided by the Barclay Group. Credit Suisse First Boston (CSFB)/Tremont Partners offers two indexes, the CSFB Managed Futures Investable Index and the CSFB Sector Invest Index (CSFB SECT index). Each index has several distinguishing characteristics.[3] The S&P Managed Futures Index is equally weighted among 14 programs; the BTOP50 Index is equally weighted among the largest trading advisers that represent no less than 50 percent of investable assets in aggregate of the Barclay CTA Universe. The constituent weights of the CSFB SECT index, on the other hand, are calculated based on their assets under management (AUM). The S&P Managed Futures Index is a managed accounts-based index. PlusFunds Group. Inc., maintains these managed accounts and is licensed to create investment products based on it. The BTOP50 CTA Index Fund, Ltd., is managed by Asset Alliance Advisors, Inc., and is listed on the Irish Stock Exchange. A list of constituents for each of the indexes is given in table 1.

Passive Alternatives

The investment vehicles discussed above all are actively managed programs. Passively managed indexes also are available. One such passive index is the MLM™ Index.[4] The MLM Index is based on actual market prices for a basket of passively traded futures contracts consisting of commodities, global bonds, and currencies, and thus it can be replicated in real time. In 1993, Federal Express became the first institutional client to invest in the MLM Index. Today Mount Lucas Management (MLM) replicates more than $1 billion of this index for a variety of investors, including more than twenty tax-exempt institutional investors. However, when the MLM Index is viewed as a proxy for CTAs, the tracking error can be quite large (Schneeweis and Spurgin

TABLE 1

List of Constituent Funds

S&P MANAGED FUTURES INDEX

Aspect Diversified Fund
Chesapeake Diversified Program
Drury Capital Inc. Diversified Trend Following Program
DUNN Combined Financial
Eclipse Global Monetary Program
Graham Global Investment Fund Ltd. (Diversified Portfolio)
Hyman Beck & Company (Global Portfolio)
John W. Henry & Company, Inc. Global Financial & Energy Portfolio
Millburn International (Cayman) Limited - The Diversified Portfolio
R. G. Niederhoffer Capital Management, Inc.
Rotella Polaris Fund, Ltd.
Willowbridge Argo Trading System

BTOP50 INDEX

Trading Advisor Programs that represent no less than 50 percent of the investable assets in the Barclay CTA Universe.

CSFB MANAGED FUTURES INVESTABLE INDEX

Aspect Diversified Fund Ltd (USD)
Campbell Global Assets Fund Ltd (Class A)
Graham Global Investment Fund (Proprietary Matrix Portfolio)
JWH Global Strategies
Roy G. Niederhoffer Fund (Ireland) Plc
Winton Futures Fund Ltd.

CSFB SECTOR INVEST INDEX

Admiralty Fund Ltd.
Aspect Diversified Fund Ltd. (USD)
Campbell Global Assets Fund Ltd. (Class A)
D.QUANT Fund/Ramsey Futures Trading
Graham Global Investment Fund (Proprietary Matrix Portfolio)
JWH Global Strategies
MLM Index Fund
Roy G. Niederhoffer Fund (Ireland) Plc
Sunrise Capital Diversified Ltd.
Winton Futures Fund

TABLE 2

Managed Futures Databases

DATABASE	NUMBER OF FUNDS REPORTING
Barclay Group	700+
CISDM	700+
ITRNet	400+
Stark	600+

1997). Other passive indexes are discussed in Lequeux and Acar (1998) and Waksman (2000). The managed futures securities based (MFSB) indexes are discussed in Spurgin (1999) and the saisGroup Futures Index (sGFI) is discussed in Jaeger, Cittadini, and Jacquemai (2002).

Data, Backfill, and Survivorship Bias

The following four databases provide data on CTAs and CPOs; all four companies provide both databases and indexes:

- Barclay Group (http://www.barclaygrp.com)
- CISDM Hedge Fund/CTA Database (http://www.cisdm.org), the largest and oldest database in the marketplace
- International Trader's Research (ITR) ITRNet (http://www.managedfutures.com)
- Stark (http://www.starkonline.com)

The CISDM Database, formerly known as MAR/Hedge, began tracking CTAs and CPOs in 1979. The Barclay Group was founded in 1985. The total number of active funds/trading programs in each of the databases is given in table 2.

We would be remiss if we did not discuss some of the negative empirical evidence. Malkiel and Saha (2005) used the TASS database[5] to conclude that, correcting for backfill bias, hedge funds in general have lower returns than commonly supposed. Funds often start reporting to databases after they have developed a positive record over a certain period. When they start reporting, the positive history is included in the database, which creates a bias known as backfill bias. (It is important to note that backfill bias as well as survivorship bias affects databases only, not indexes). The TASS database, however, is one of the most recently established databases (it dates to 1994; CSFB purchased the TASS database in 1999). The CISDM database, on the other hand, has been tracking managed futures funds since 1979 and therefore provides much more comprehensive coverage. Furthermore, Malkiel and Saha (2005) did not break down the backfill bias estimates by strategy, so it is unclear what the estimates for managed futures would be in their study. Barry (2003), discussed below, has a similar issue. Edwards and Caglayan (2001) used the CISDM database and data until August 1998 and found this bias to be 1.2 percent per annum.

The CISDM database, however, has eliminated survivorship bias. Survivorship bias in a database arises when poorly performing funds drop out of the database and therefore are excluded from future performance analysis. Such exclusions may lead to an overestimation of returns because the impact of poorly performing funds is eliminated. The CISDM database includes a dead funds component that provides data on CTAs and CPOs that have failed or stopped reporting. Some funds, however, may stop reporting because they have reached capacity or are closed to new investments even

TABLE 3

CTA Survivorship Bias Estimates as of December 31, 2005

PORTFOLIOS	AVERAGE ANNUALIZED RETURNS (%)	AVERAGE ANNUALIZED VOLATILITIES (%)
Live CTAs	11.86	18.76
All CTAs	9.95	21.42
Bias	**1.91**	**–2.66**

TABLE 4

CPO Survivorship Bias Estimates as of December 31, 2005

PORTFOLIOS	AVERAGE ANNUALIZED RETURNS (%)	AVERAGE ANNUALIZED VOLATILITIES (%)
Live CPOs	9.13	18.00
All CPOs	6.58	18.43
Bias	**2.56**	**–0.43**

if their performance is stellar. This may lead to an underestimation of returns because the impact of their strong performance is eliminated. This could create a significant bias as well. In addition, prominent funds such as Caxton do not report to any database. This is significant because the asset sizes of these funds are among the largest in the industry.

Tables 3 and 4 provide estimates of survivorship bias in CTAs and CPOs. The estimates here are much lower than the estimates provided in Barry (2003). The differences between the annualized returns of reporting funds and all funds are 1.91 percent for CTAs and 2.56 percent for CPOs. The differences, however, are not surprising. Barry (2003) used the TASS database and the sample included 259 managed futures funds for the period 1994–2001. The CISDM database as of December 31, 2001, reported data on more than 400 CTAs and CPOs.

As noted earlier, CISDM started tracking managed futures funds in 1979 and the CISDM CTA Asset Weighted and Equal Weighted Indexes were established in 1980. The performances of these indexes are calculated monthly with actual reported figures from constituent managers. Hence if a fund were established in June 1980 but started reporting to the database in October 1981, the index would incorporate the managers' performance from October 1981. The historical data for the index always remains unchanged. In short, the performance of the CISDM CTA Indexes reflect the dollar-weighted or equal-weighted performance of managers reporting a performance figure in any given month and hence is free of backfill bias or survivorship bias. This property actually is true of all indexes in general. Indexes once created do not contain any survivorship bias or backfill bias although they may contain selection bias. The *pro forma* data for indexes, however, may contain these biases.

It also is important to note again that survivorship bias affects databases only. It does not affect actively managed indexes. It is true that pro forma data for indexes may contain survivorship bias. However, once launched, they are free of survivorship bias. Indexes, however, are prone to selection bias and investors must note the differences in construction methodologies. Asset-weighted indexes can be unduly influenced by large managers while equal-weighted indexes can be unduly influenced by funds with high volatilities.

Diversification Benefits

In this section on the diversification benefits of managed futures, we concentrate on the period 1990–2005 and use the CISDM managed futures indexes.[6] These indexes are composites of actively traded managed futures programs.

Performance: 1990–2005

Table 5 reports various summary statistics for the period 1990–2005. All managed futures indexes had lower volatility than the S&P 500 over that period. However, the skew for the CTA indexes was positive in all cases as opposed to negative skew for the S&P 500. The

TABLE 5

Summary Statistics 1990–2005

	ANNUALIZED RETURN (%)	STANDARD DEVIATION (%)	SKEW	KURTOSIS	CORRELATION WITH S&P	CORRELATION WITH LEHMAN
CISDM CTA Asset Weighted Index	10.47	9.77	0.71	2.28	0.08	0.28
CISDM CTA Equal Weighted Index	8.89	9.43	0.52	0.66	–0.14	0.26
CISDM CTA Asset Weighted Currency Index	8.87	11.53	1.55	5.34	0.06	0.15
CISDM CTA Asset Weighted Diversified Index	8.86	11.26	0.44	0.63	–0.12	0.27
CISDM CTA Asset Weighted Financials Index	11.94	12.62	1.02	3.63	–0.08	0.33
CISDM CPO Asset Weighted Index	8.23	9.42	0.73	2.81	–0.12	0.30
CISDM CPO Asset Weighted Index	6.71	10.41	0.42	0.50	–0.13	0.31
S&P 500 Total Return	10.55	14.32	–0.45	0.73	1.00	0.13
Lehman Govt/Corp	7.42	4.42	–0.44	0.77	0.13	1.00

FIGURE 1

COMPARISON OF ANNUAL RETURNS 1990–2005

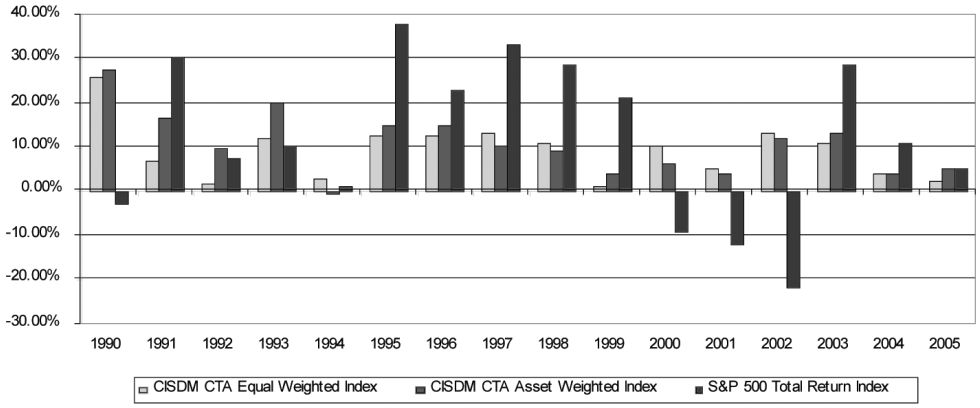

TABLE 6

Portfolio Allocations, Stocks, and CTA 1990–2005*

	ANNUALIZED RETURN (%)	STANDARD DEVIATION (%)	SKEW	KURTOSIS	MAXIMUM (%)	MINIMUM (%)
100% Stock	10.55	14.32	–0.45	0.73	11.437	–14.458
90% Stock, 10% CTA	10.70	12.84	–0.38	0.66	11.740	–12.475
80% Stock, 20% CTA	10.82	11.45	–0.26	0.67	12.043	–10.492
70% Stock, 30% CTA	10.90	10.20	–0.07	0.88	12.347	–8.509
60% Stock, 40% CTA	10.95	9.13	0.22	1.48	12.650	–6.527
50% Stock, 50% CTA	**10.96**	**8.32**	**0.58**	**2.61**	**12.953**	**–4.841**
40% Stock, 60% CTA	10.93	7.84	0.95	3.99	13.257	–4.689
30% Stock, 70% CTA	10.87	7.76	1.14	4.79	13.560	–4.537
20% Stock, 80% CTA	10.77	8.09	1.11	4.45	13.863	–4.845
10% Stock, 90% CTA	10.64	8.79	0.92	3.37	14.167	–5.217
100% CTA	10.47	9.77	0.71	2.28	14.470	–6.000

** Stocks are represented by the S&P 500 and CTAs by the CISDM CTA Asset Weighted Index.*

TABLE 7

Alternative Asset Classes and Diversified Portfolios 1990–2005

	ANNUALIZED RETURN (%)	STANDARD DEVIATION (%)	SKEW	KURTOSIS	MAXIMUM (%)	MINIMUM (%)
CTA	10.47	9.77	0.71	2.28	14.470	–6.000
Hedge Funds	15.13	6.97	–0.34	3.35	8.372	–8.816
Commodities	8.15	19.65	0.49	1.28	22.940	–14.411
Real Estate	12.43	12.86	–0.48	1.49	9.964	–15.264
Private Equity	12.34	36.46	–0.21	0.90	34.000	–31.850
S&P 500	10.55	14.32	–0.45	0.73	11.437	–14.458
Portfolio I	12.93	10.73	–0.33	0.92	9.058	–11.000
Portfolio II	13.30	10.80	–0.17	0.89	9.692	–10.309

S&P 500 posted an annualized return of 10.55 percent while the CISDM CTA Asset Weighted Index posted an annualized return of 10.47 percent. Table 5 also displays the correlations of various CTA and CPO indexes with the S&P 500 and Lehman Govt/Corp Index. All of the CTA and CPO indexes, with the exception of the CISDM CTA Asset Weighted Currency Index, exhibited negative correlations with the S&P 500 Total Return Index.

It is interesting to compare the annual performance of the S&P 500 to the CISDM CTA Asset Weighted Index and CISDM CTA Equal Weighted Index. While the S&P 500 posted four negative years during this period, the CISDM CTA Asset Weighted Index posted only one and the CISDM CTA Equal Weighted Index did not post any. Figure 1 compares annual returns of the CISDM CTA Asset- and Equal-Weighted indexes to the S&P 500 index. It is clear from figure 1 that CTAs provided significant diversification benefits over this period. The negative correlations with the S&P 500 in table 6 attest to this as well. For all four years that the S&P 500 posted negative returns, the CISDM CTA Asset Weighted Index and CISDM CTA Equal Weighted Index posted positive returns.

Portfolio Allocations

We now examine various allocations[7] to commodity trading advisers and stock portfolios. Table 6 presents performance results for portfolios ranging from 100-percent stocks (S&P 500) to 100-percent CTAs (CISDM CTA Asset Weighted Index). An allocation of 50-percent stocks and 50-percent CTAs produces the highest possible return of 10.96 percent whereas an allocation of 30-percent stock and 70-percent CTAs produces the lowest possible standard deviation of 7.76 percent. The 30–70 combination also produced the highest possible skew and kurtosis.

Role of Alternative Investments in Portfolio Diversification

Table 7 reports performance results for various areas of alternative investments for the period 1990–2005. The following indexes were used to represent the different asset classes. Descriptions for each of these indexes are given in appendix 2.

- CTA: CISDM CTA Asset Weighted Index
- Hedge Funds: CISDM Equal Weighted Hedge Fund Index
- Commodities: Goldman Sachs Commodity Index
- Real Estate: NAREIT Total Return Index
- Private Equity: An Equally Weighted Portfolio of the Wilshire Leveraged Buyout Index, Wilshire Mezzanine Debt Index, and Wilshire Venture Capital Index

We constructed two equally weighted portfolios to examine the performance of a diversified alternative investment portfolio with and without the S&P 500. Portfolio I is an equally weighted portfolio of hedge funds, CTAs, real estate, private equity, commodities, and the S&P 500. Portfolio II is an equally weighted portfolio of hedge funds, CTAs, real estate, private equity, and commodities. A comparison shows that a diversified portfolio of managed futures, hedge funds, real estate, commodities, and private equity with or without the S&P 500 performed much better than an all-equity portfolio with less volatility. Although it is important to note that these results are time-specific, it is clear that over the past fifteen years alternative investments have offered substantial diversification potential.

Conclusions

In this article we examined the managed futures industry as well as its impact on traditional portfolios. We first discussed the various vehicles through which one can access the managed futures industry. We also presented evidence on survivorship bias. Using the CISDM database, we found that the impact of survivorship bias is not as strong as that found in prior studies. This is explained by the fact that the CISDM database is the largest and oldest database in the industry covering managed futures. This affirms the notion that any empirical study will be impacted by the database used and hence database characteristics and limitations should be carefully understood when evaluating results. Finally we examined the diversification benefits of managed futures. We found that in the sixteen-year period 1990–2005, while the S&P 500 index experienced four down years, the CISDM CTA Asset Weighted Index experienced only one. We also found that a diversified portfolio that included the major alternative asset classes such as hedge funds, real estate, private equity, commodities, and managed futures had

performance characteristics that enhanced those of an S&P 500-only portfolio.

APPENDIX 1
Description of CISDM Indexes

The CISDM Indexes are calculated from reported returns every month. Hence survivorship as well as backfill biases do not exist in these indexes because the history remains intact.

CISDM CTA Asset Weighted Index

The CISDM CTA Asset Weighted Index reflects the dollar-weighted performance of commodity trading advisers (CTAs) reporting to the CISDM Hedge Fund/CTA Database. CTAs trade a wide variety of over the counter (OTC) and exchange traded forward, futures, and options markets (e.g., physicals, currency, financial) based on a variety of trading models. To be included in the asset weighted index universe, a CTA must have at least $500,000 under management and at least a twelve-month track record. The index dates to January 1980. The weights are revised monthly. The weight of a fund each month is its assets under management at the end of the month divided by the total assets under management of all qualifying funds.

CISDM CTA Equal Weighted Index

The CISDM CTA Equal Weighted Index reflects the average performance of CTAs reporting to the CISDM Hedge Fund/CTA Database. CTAs trade a variety of OTC and exchange traded forward, futures, and options markets (e.g., physicals, currency, financial) based on a variety of trading models. To be included in the equally weighted index universe, a CTA must have at least $500,000 under management and at least a twelve-month track record. The index dates to January 1980.

CISDM CTA Asset Weighted Currency Index

The CISDM CTA Asset Weighted Currency Index reflects the dollar-weighted performance of currency CTAs reporting to the CISDM Hedge Fund/CTA Database. Currency CTAs trade currency futures/options and forward contracts based on a variety of trading models. To be included in the currency universe, a currency CTA must have at least $500,000 under management and at least a twelve-month track record. The index dates to January 1990.

CISDM CTA Asset Weighted Diversified Index

The CISDM CTA Asset Weighted Diversified Index reflects the dollar-weighted performance of diversified CTAs reporting to the CISDM Hedge Fund/CTA Database. Diversified CTAs trade a variety of financial futures/options, currency futures/options, and forward contracts as well as physical futures/options based on a variety of trading models. To be included in the diversified universe, a diversified CTA must have at least $500,000 under management and at least a twelve-month track record. The index dates to January 1987.

CISDM CTA Asset Weighted Financials Index

The CISDM CTA Asset Weighted Financials Index reflects the dollar-weighted performance of financials CTAs reporting to the CISDM Hedge Fund/CTA Database. Financials CTAs trade a wide variety of financial futures/options based on a variety of trading models. To be included in the financials universe, a financials CTA must have at least $500,000 under management and at least a twelve-month track record. The index dates to January 1987.

CISDM CPO Asset Weighted Index

The CISDM CPO Asset Weighted Index reflects the dollar-weighted performance of public and private commodity pool operators (CPOs) reporting to the CISDM Hedge Fund/CTA Database. CPOs are firms responsible for investing commodity pool assets in commodity-futures and options positions. To be included in the CPO Asset Weighted Index universe, a fund or pool must have at least $500,000 under management and at least a twelve-month track record. The index dates to January 1990.

CISDM CPO Equal Weighted Index

The CISDM CPO Equal Weighted Index reflects the average performance of public and private CPOs reporting to the CISDM Hedge Fund/CTA Database. To be included in the CPO Asset Weighted Index universe, a

fund or pool must have at least $500,000 under management and at least a twelve-month track record. The index dates to January 1990.

APPENDIX 2
Description of Alternative Investment Indexes

CISDM CTA Asset Weighted Index

The CISDM CTA Asset Weighted Index reflects the dollar-weighted performance of commodity trading advisers (CTAs) reporting to the CISDM Hedge Fund/CTA Database. CTAs trade a variety of OTC and exchange traded forward, futures, and options markets (e.g., physicals, currency, financial) based on a variety of trading models. To be included in the asset weighted index universe, a CTA must have at least $500,000 under management and at least a twelve-month track record. The index dates to January 1980. The weights are revised monthly. The weight of a fund each month is its assets under management at the end of the month divided by the total assets under management of all qualifying funds. For more information visit http://www.cisdm.org.

CISDM Equal Weighted Hedge Fund Index

The CISDM Equal Weighted Hedge Fund Index reflects the average performance of hedge fund managers reporting to the CISDM Hedge Fund/CTA Database. Its objective is to provide an estimate of the rate of return to an equally weighted portfolio of hedge fund managers who trade a variety of hedge fund strategies that are based on a variety of trading models. The index dates to January 1990. For more information visit http://www.cisdm.org.

Goldman Sachs Commodity Index (GSCI)

The GSCI is designed to provide investors with a reliable and publicly available benchmark for investment performance in the commodity markets comparable to the S&P 500 or FT equity indexes. As such, the GSCI is a composite index of commodity sector returns representing an unleveraged, long-only investment in commodity futures that is broadly diversified across the spectrum of commodities. The returns are calculated on a fully collateralized basis with full reinvestment. The combination of these attributes provides investors with a representative and realistic picture of realizable returns attainable in the commodities markets.

Individual components qualify for inclusion in the GSCI on the basis of liquidity and are weighted by their respective world production quantities. The principles behind the construction of the index are public and designed to allow easy and cost-efficient investment implementation. Possible means of implementation include the purchase of GSCI-related instruments, such as the GSCI futures contract traded on the Chicago Mercantile Exchange or over-the-counter derivatives, or the direct purchase of the underlying futures contracts. For more information visit http://www.gs.com/gsci.

NAREIT Total Return Index

NAREIT is the National Association of Real Estate Investment Trusts®. It is the trade association for REITs and publicly traded real estate companies with an interest in the U.S. property and investment markets. Members are REITs and listed companies that own, operate, and finance income-producing real estate, as well as those firms and individuals that advise, study, and service these businesses. NAREIT's responsibilities include industry representation before policymakers affecting the REIT and publicly traded real estate community and outreach to the investment community. The NAREIT Total Return Index tracks the performance of all publicly traded REITs. For more information visit http://www.nareit.com.

Wilshire Private Equity Indexes

Wilshire Associates uses three indexes to benchmark the performance of its private equity funds: The Wilshire Leveraged Buyout Index, the Venture Capital Index, and the Mezzanine Index. All three are factor-based. The Wilshire Leveraged Buyout Index is constructed on the assumption that the market index is bought out. A buyout is accomplished by restructuring the assets of the companies. Typical transactions of a buyout include purchasing of the assets of the company. The transactions are financed by debt. This index only accounts for structural changes. Intentions of the buyout or changes in

future companies due to a change in management are not valued. This method of index construction generates analysis of data without the ability to perform statistical correction techniques, as mentioned previously. For more information visit http://www.wilshire.com.

ENDNOTES

1. See "Investor Suitability" at http://www.morganstanleyindividual.com/investmentproducts/managedfutures/why/.

2. See "Introduction to Managed Futures," Citigroup Managed Futures, (December 2003). Available on the World Wide Web at http://www.smithbarney.com/pdf/Intro_toMF_1203.pdf.

3. To view more details on these indexes and how they are constructed, see the respective Web sites: S&P (http://www.standardandpoors.com), Barclay Group (http://www.barclaygrp.com), and CSFB (http://www.hedgeindex.com).

4. To learn more about the MLM™ Index, visit http://www.mtlucas.com.

5. The Lipper TASS hedge fund database delivers data for over 3,900 hedge funds and 300+ CTA programs. In total, the TASS database carries over 7,000 funds. For more information, visit the Lipper Web site at http://www.lipperweb.com/products/tass.asp.

6. Descriptions of these indexes are given in appendix 1.

7. See "The Benefits of Managed Futures," an annual series published by CISDM about detailed efficient frontier analysis. Available on the World Wide Web at http://cisdm.som.umass.edu/research/benefits.shtml.

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