

The Benefits of Commodities

ORIGINAL VERSION: June I, 2002

CURRENT UPDATE: August II, 2009

ABSTRACT

For many investors, commodity investment has been achieved primarily indirectly through equity-based firms for which commodities are a primary source of their business. While various direct commodity investment vehicles have existed for decades, only recently has direct commodity investment been seen as an alternative to indirect equity-based investment with the rapid surge in energy prices and the increasing global demand for commodities. In this annual update, the return and risk characteristics of various commodity indices are reviewed. Results show that traditional market factors have little correlation with a

wide variety of commodity sectors (energy, metals and agriculture) and commodities may provide both a return opportunity as well as risk diversification for portfolios comprised principally of traditional stock and bond investments and/or portfolios comprised of traditional stock and bonds as well as alternative investments such as private equity, real estate, hedge funds and managed futures. In addition, results also show that commodity returns may be accessed through an increasing array of product structures, some of which are designed to reduce the historical drawdowns often associated with commodity investment.

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The Benefits of Commodity Investment

INTRODUCTION

Historically, direct commodity investments have been a minor part of an investor's asset allocation decision. In contrast, indirect investments (e.g., equity or debt ownership of firms specializing in direct commodity market production) remain the principal means by which many investors obtain exposure to this asset class. However, in recent years, the number of investible commodity indices and commodity-linked investments has increased dramatically.

While it is impossible in a short synopsis to convey all of the benefits of commodity investments, the following sections support commodity investments as a means to provide additional return enhancement as well as risk reduction opportunities relative to stock and bond investments and non-traditional investments such as private equity, real estate, hedge funds and managed futures, as well as to portfolios of traditional assets and various alternative investments. First, we briefly discuss various ways in which investors can gain direct exposure to commodities. Second, the theoretical basis for commodity investment is reviewed. Academic research suggests that commodity indices have sources of risk and return (e.g. roll return) that are distinct from traditional assets such as stocks and bonds as well as many other alternative investments (i.e., hedge funds, managed futures, real estate or private equity). Third, we evaluate the performance of commodity investment both on a standalone basis, as part of traditional stock and bond portfolios as well as part of portfolios including traditional assets and various alternative investments. We also report on performance of direct commodity investment at both the overall index level, as well as at the sub-sector level (e.g., energy, industrial metals, precious metals, agriculture, and livestock) and provide evidence on different aspects of direct commodity investment, including the impact of roll return, inflation protection, and relative performance of equity based commodity investment. Finally, we examine unique issues and current research in the area of commodity investments.

INVESTING IN COMMODITIES

Commodity indices attempt to replicate the returns available to holding long positions in agricultural, metal, energy, or livestock investment. Since returns on a fully invested futures contract reflect that of an investment in the underlying deliverable, commodity indices based on the returns of futures/forward contracts offer an efficient means to obtain commodity exposure.

A number of commodities indices offer access to commodity investment. These indices may differ in a number of ways, such as the commodities included in the index, the weights of the individual commodities, as well as a number of operational trading issues (e.g., roll period, rebalancing ...). For a brief review of the characteristics of various commodity indices see Schneeweis et al. [2007]. In this review, a composite commodity index is used which is the weighted average of three commodity indices: the S&P-GSCI (Standard and Poor's Goldman Sachs Commodity Index), the DJ-UBS commodity index and the Bache Commodity Index. The three indices differ slightly in their construction, with the Goldman Sachs Index following primarily a production weighted methodology and the DJ-UBS Index using a combination of production, liquidity, and limits on sector/commodity weights. The BCI Index employs both upper and lower bounds on investment in each sector and each commodity and includes a commodity momentum model, which results in a rebalance of individual commodities within the BCISM each day to maintain the desired exposure to each commodity market.

SOURCE OF RETURNS

Investor benefits of commodity or commodity-based products lie primarily in their ability to offer risk/return trade-offs that cannot be easily replicated through other investment alternatives. Academic research, including Williams [1986], has examined the economic determinants of returns to commodity investment. As with any futures based investment, returns are determined by both the expected return on the deliverable and the expected cost of carry returns, as well as other storage and deliverable options. For example, as expected, Fama and French [1988] and Schneeweis, Spurgin, and Georgiev [2000] identified a strong business cycle component in industrial metals based futures contracts, a finding that is consistent with the business cycle variation of spot and futures prices of industrial metals. Fama and French [1987, 1988] also perform tests of the theory of storage and present empirical evidence that in periods of increasing volatility and risk, convenience yields increase for a wide variety of metals prices (e.g., aluminum, copper, nickel and lead).

The theory of storage splits the difference between the futures price and the spot price into the forgone interest from purchasing and storing the commodity, storage costs and the convenience yield on the inventory. Convenience yield reflects an embedded consumption timing option in holding a storable commodity.¹ Furthermore, the theory of storage predicts an inverse relationship between the level of inventories and convenience yield – at low inventory levels convenience yields are high and vice versa. A related implication is that the term structure of forward price volatility generally declines with time to expiration of the futures contract – the so-called “Samuelson effect”. This is caused by the expectation that, while at shorter horizons, mismatched supply and demand forces for the underlying commodity increase the volatility of spot prices, these forces will fall into equilibrium at longer horizons. For a full discussion of pricing and modeling commodities and commodity derivatives returns see Geman [2005]. Lastly, Schneeweis et al. [2008] has explored the degree to which commodity prices follow various momentum patterns, for which their analysis provides evidence and summarizes research results.

EMPIRICAL RESULTS

Results in Exhibit I show the risk and return performance of a composite commodity index (CCI: average of the BCI, S&P-GSCI, and DJ-UBS commodity indices), traditional U.S. equity and bond indices, and other alternative investments such as the CASAM/CISDM Equal Weighted Hedge Fund and CTA indices, the FTSE All REITs Index, and a private equity index (based on the S&P Private Equity Index²). Portfolio combinations which include traditional assets, alternative investments (hedge funds, CTAs, private equity and real estate) and the Composite Commodity Index (CCI) for the eighteen year period of 1991-2008 are also reviewed. Over the period of analysis, the Composite Commodity Index reported lower annualized return but slightly higher volatility than the S&P 500. Compared to the returns of the Barclays Capital Bond Aggregate Index, the Composite Commodity Index reported similar rates of return albeit with higher volatility, whereas when looking at the returns of the CASAM/CISDM Hedge Fund and CTA indices, the Composite Commodity Index reported lower return to risk tradeoffs than the CASAM/CISDM Hedge Fund Index and the CASAM/CISDM CTA Index. Relative to private equity and real estate (REITS), the Composite Commodity Index had lower returns and volatility.

¹ Litzenger and Rabinowitz [1995] observe that oil futures prices are often below current spot prices; that is, futures markets are backwardated. Strong backwardation occurs when futures prices are below current spot prices. In weak backwardation, discounted futures prices are below current spot prices. Litzenger and Rabinowitz explain the phenomenon with the existence of “real options” under uncertainty. They show that production occurs only if discounted futures are below spot prices and strong backwardation emerges if the risk of future prices is sufficiently high. A major consequence of a declining term structure of forward prices for investment in commodity futures is the opportunity to capture a positive roll return as investment in expiring contracts is moved to cheaper new outstanding contracts.

² Monthly returns are based on the S&P Private Equity Index from December 2003 onward. For the period prior to December 2003, firms which were listed in the June 2007 report were used to create an equal weighted monthly returns private equity index back to 1991. Other research has shown a moderate correlation between this constructed index and other private equity indices (e.g., Cambridge) which are based on non-public reported private equity returns which are published quarterly.

Exhibit 1: Index Performance 1991-2008

Stock, Bond and Commodity Performance	S&P 500	Barclays Capital Bond Aggregate		Composite Commodity Index
Annualized Total Return	7.93%	6.96%		6.07%
Annualized Standard Deviation	14.37%	3.86%		15.67%
Information Ratio	0.55	1.81		0.39
Maximum Drawdown	-44.73%	-5.15%		-48.81%
Correlation with Commodities	0.14	0.03		1.00
Alternative Asset Performance	Hedge Funds	CTA	Real Estate	Private Equity
Annualized Total Return	12.93%	8.65%	9.88%	7.65%
Annualized Standard Deviation	7.42%	9.18%	16.57%	25.13%
Information Ratio	1.74	0.94	0.60	0.30
Maximum Drawdown	-21.12%	-9.35%	-58.79%	-70.33%
Correlation with Commodities	0.32	0.19	0.14	0.26

The historical return and risk relationship between the traditional stock and bond and alternative investment asset classes reported in Exhibit I is shown graphically in Exhibit 2. As shown in Exhibit 2, the positive relationship between return and risk is generally evident. It is important to point out, however, that modern portfolio theory emphasizes that the real benefits of individual assets depend not on their stand alone performance, but also on how they impact an investor’s portfolio’s return and risk. Results in Exhibit I show that little to no correlation exists between the Composite Commodity Index and traditional stock and bond investments as well as between the Composite Commodity Index and hedge funds, CTAs, private equity or real estate. In brief, the weak correlations between the CCI and hedge funds, CTAs, private equity, real estate and traditional asset classes suggest additional diversification benefits can be obtained by adding commodities to an already diversified portfolio.

Exhibit 2: Risk and Return Characteristics 1991-2008

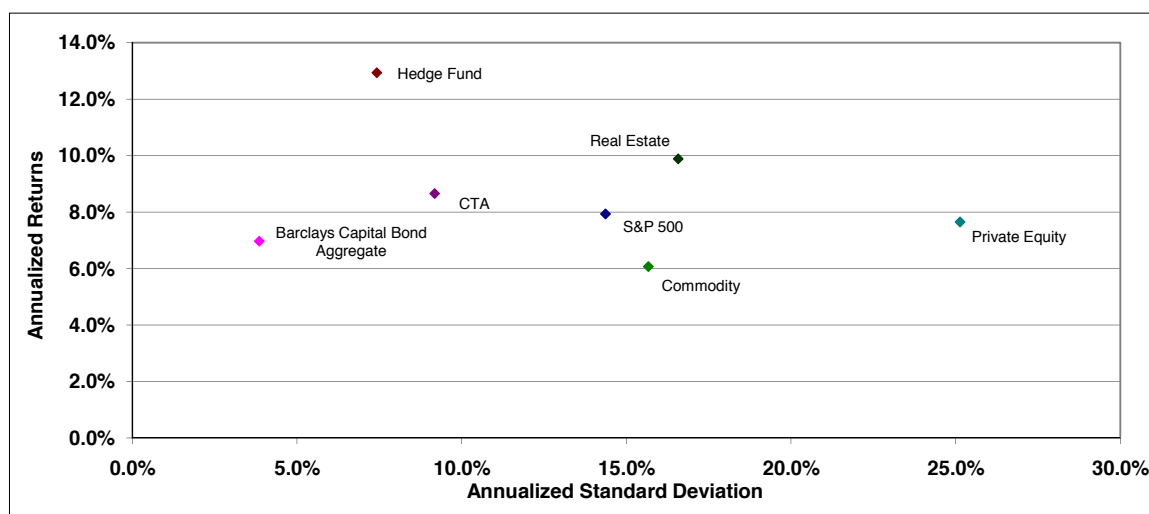


Exhibit 3 shows the diversification benefits achievable by adding commodities to a traditional stock/bond portfolio. Portfolio B (with the CCI) has almost an equal return at a lower standard deviation and slightly higher drawdown than the pure stock and bond Portfolio A. When commodities are added to a stock/bond/hedge fund/CTA/real estate/private equity portfolio (Portfolio C), return is lower, as standard deviation and drawdown are reduced (see Portfolio D). The information ratios for portfolios (Portfolio B and D), which include at least a 10% investment in commodities, are found to dominate those that invest solely in stock and bond investments and/or stock and bond portfolios with private equity, real estate, hedge funds and CTAs (Portfolio A and C). This is illustrated in Exhibit 3 and graphically in Exhibit 4. The relevant information ratios for the comparison portfolios are as follows: Portfolio A versus Portfolio B (1.01 and 1.06), Portfolio C versus Portfolio D (1.11 and 1.14).

Exhibit 3: Portfolio Performance 1991-2008

Portfolios	A	B	C	D
Annualized Returns	7.73%	7.70%	8.51%	8.39%
Standard Deviation	7.64%	7.25%	7.66%	7.38%
Information Ratio	1.01	1.06	1.11	1.14
Maximum Drawdown	-20.98%	-21.19%	-24.84%	-24.69%
Correlation with CCI	0.13		0.21	
Portfolio A	Equal Weights S&P 500 and Barclays Capital Bond Aggregate			
Portfolio B	90% Portfolio A and 10% Commodities			
Portfolio C	75% Portfolio A and 25% HF/CTA/Private Equity/Real Estate			
Portfolio D	90% Portfolio C and 10% Commodities			

Exhibit 4: Portfolio Information Ratio 1991-2008

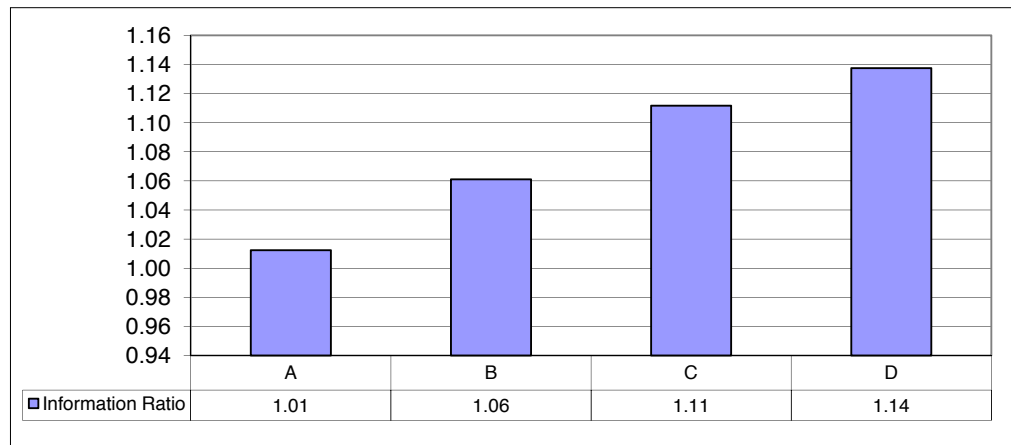
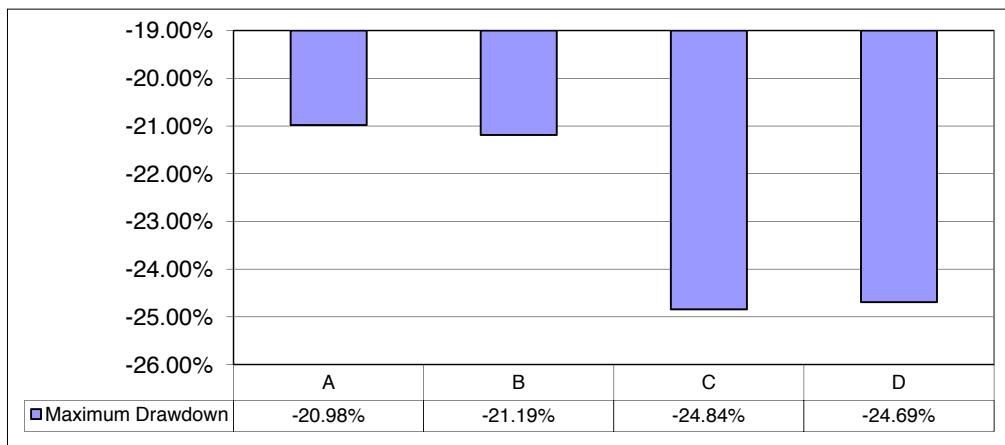


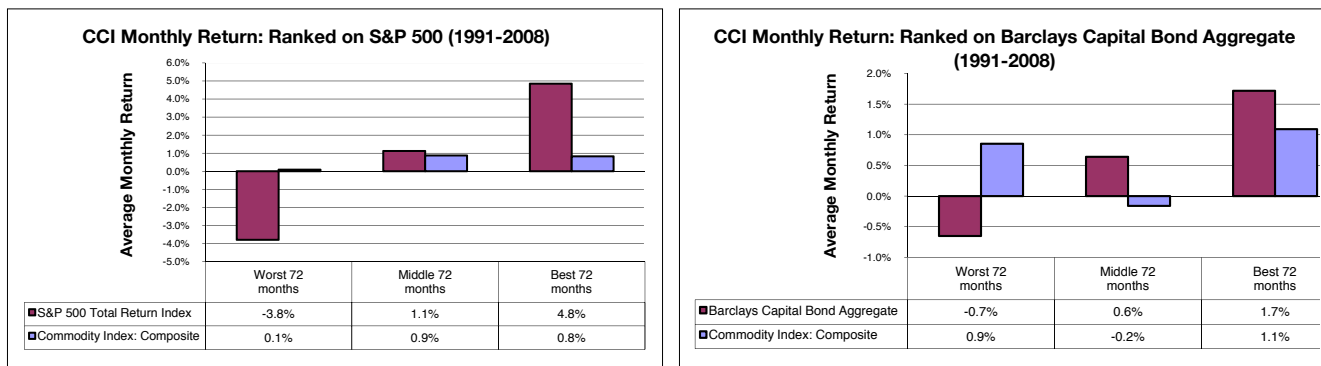
Exhibit 5: Portfolio Maximum Drawdown 1991-2008



COMPOSITE COMMODITY INDEX RETURN RANKED ON TRADITIONAL ASSETS, 1991-2008

Exhibit 6 depicts Composite Commodity Index returns ranked on the S&P 500 and Barclays Capital Bond Aggregate returns. The ranked returns are grouped into three buckets (worst, middle and best) of 72 months each, with the average returns for each of the groups being presented. Results show that, while the Composite Commodity Index reported positive returns over a range of equity market environments as well as extreme positive and negative bond market environments, it reported negative returns for moderately positive and moderately negative bond markets. In contrast, it is important to note that, as shown later in this report, when compared to the performance of a related equity index, a sector-based commodity index generally has a negative return in down markets for the related equity index and a positive return in up markets for the related equity index. Thus, to some extent, the benefit of commodities as a diversifier is based on the commodity sector invested in and the characteristics of the alternative asset.

Exhibit 6: CCI Returns: Ranked on S&P 500 and Barclays Capital Bond Aggregate



ANNUAL COMMODITY PERFORMANCE

In this section, we provide a review of the relative performance by year of the Composite Commodity Index versus the performance of the S&P 500. Results in Exhibit 7 again show that over the entire period, the annual returns of the S&P 500 and the composite index varied, even though the assets moved in similar directions in many years. Lastly, Exhibit 8 displays the relative standard deviation of the Composite Commodity Index and the S&P 500 by year, while Exhibit 9 provides the intra-year correlation. Again, the relative volatility and intra-year correlation of the S&P 500 and the Composite Commodity Index vary significantly from year to year. In short, investors should be aware that results from longer time frames may not reflect results for the individual years.

Exhibit 7: S&P 500 and CCI Annual Correlation (1991-2008)

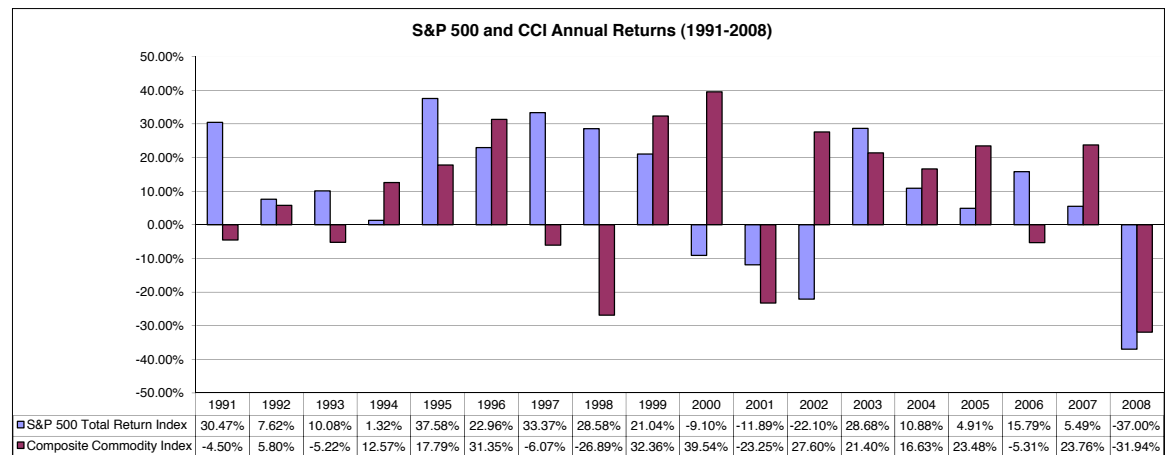


Exhibit 8: S&P 500 and CCI Annual Volatility (1991-2008)

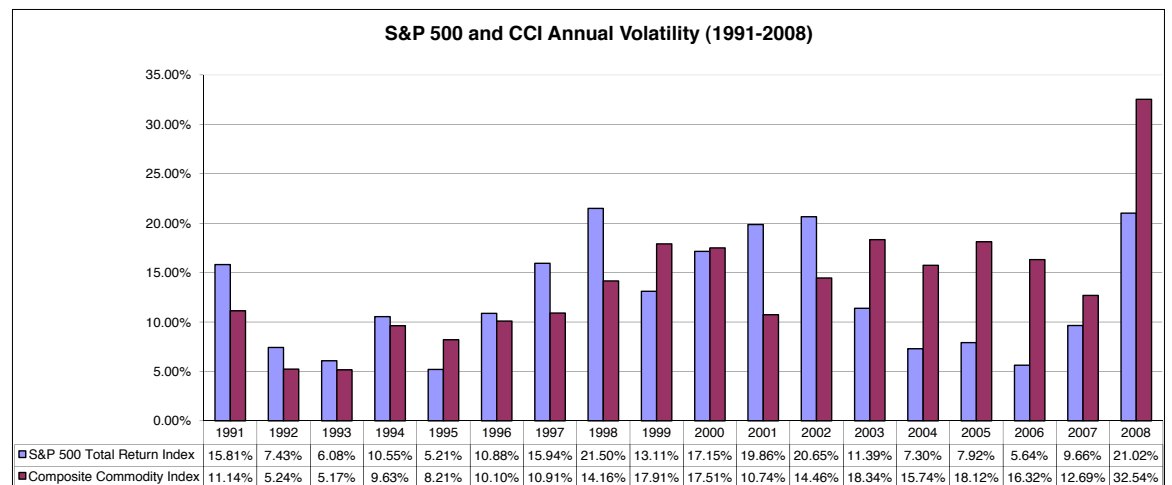
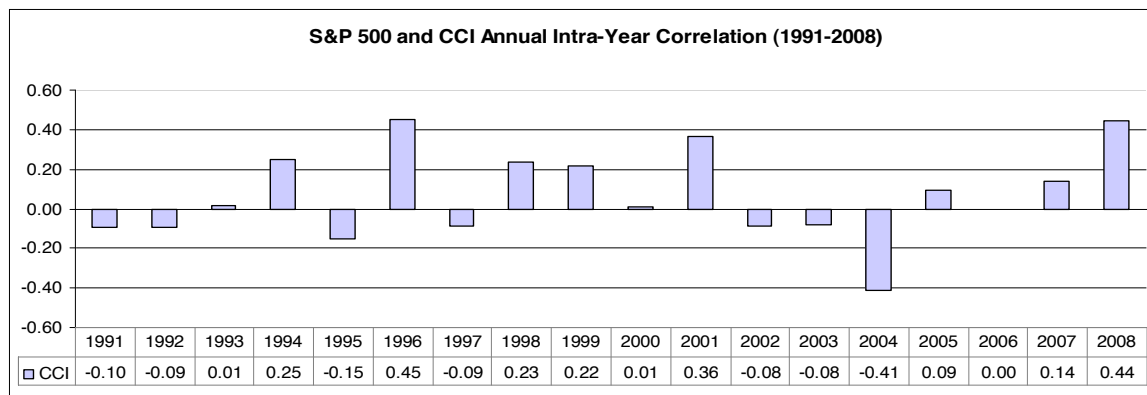


Exhibit 9: S&P 500 and CCI Annual Correlation (1991-2008)



PERFORMANCE IN 2008

Results in Exhibit 10 show the risk and return performance of the Composite Commodity Index, hedge funds, CTAs, real estate, private equity and traditional U.S. stocks and bonds for 2008. In 2008, the Composite Commodity Index, similar to the S&P 500 and other equity related alternative assets (real estate and private equity), was impacted by the subprime crisis (the negative equity market performance and the rise in credit spreads including a decline in high yield bond returns for example). For commodities, cumulative return for the Composite Commodity Index was negative for the whole year. However, for the first six months of the year, the Composite Commodity Index had a positive return of 32.95%, while in the second six months, the Composite Commodity Index had a negative return of -48.81%, as commodity markets responded to the declining drop in demand associated with declining global activity.

Exhibit 10: Index Performance 2008

Stock, Bond and Commodity Performance	S&P 500	Barclays Capital Bond Aggregate	Composite Commodity Index	
Annualized Total Return	-37.00%	5.24%	-31.94%	
Annualized Standard Deviation	21.02%	6.09%	32.54%	
Maximum Drawdown	-37.66%	-3.83%	-48.81%	
Correlation with Commodities	0.44	0.07	1.00	
Alternative Asset Performance	Hedge Funds	CTA	Real Estate	Private Equity
Annualized Total Return	-19.16%	21.76%	-37.34%	-64.15%
Annualized Standard Deviation	11.04%	10.64%	43.40%	38.07%
Maximum Drawdown	-19.92%	-4.42%	-49.20%	-64.15%
Correlation with Commodities	0.73	0.26	0.33	0.54

COMMODITY SECTOR INDICES

In Exhibit II, performance statistics for the composite index as well as the general commodity sector indices are reported. Similar to stock and bond indices, a wide range of commodity sector indices with different qualitative and quantitative attributes, as well as sub-indices within these sectors, are available. The performance statistics for the BCI, GSCI and DJ-UBS sector indices for the period of 1991-2008 are given in Appendix I. Appendix IV shows the performance characteristics of individual commodity indices for January 2007 to May 2009. Among the sector indices, there is a moderate relationship between return and risk as seen in Exhibit I2, with the indices which report the highest returns (energy and metals) also reporting the highest volatilities. The relatively greater return for energy and metals based commodity investment is consistent with the economic argument that an underlying long-term positive return is more likely to exist for commodities for which supply may be constrained, such as energy and metals.

The diversification potential of combining the various sector indices into a composite commodity index is reflected in Exhibit II. Note that the Composite Commodity Index (a weighted portfolio of the commodity sector indices and, therefore, of the commodity sub-indices) reports one of the highest information ratios in Exhibit II. However, regardless of the commodity chosen or the combinations of commodities, the various commodity groupings have a diversification impact on a traditional stock and bond portfolio, as indicated by the low correlations of the underlying commodity sector indices with market factors in Exhibit I3.³

Exhibit 11: Performance of the Commodity Composite Index and Commodity Sector Indices (1991-2008)

Performance 1991-2008	Annualized Return	Standard Deviation	Information Ratio	Maximum Drawdown	Skew	Kurtosis
Commodity Index: Composite	6.1%	15.7%	0.39	-48.8%	-0.37	1.77
Commodity Index: Agriculture	1.7%	14.1%	0.12	-48.5%	-0.05	1.69
Commodity Index: Energy	7.6%	28.1%	0.27	-59.7%	0.23	0.79
Commodity Index: Industrial Metals	5.8%	18.6%	0.31	-51.6%	0.23	1.98
Commodity Index: Precious Metals	4.9%	14.1%	0.35	-30.6%	0.09	1.92
Commodity Index: Livestock	1.4%	12.6%	0.11	-35.6%	-0.27	-0.03
S&P 500 Total Return Index	7.9%	14.4%	0.55	-44.7%	-0.75	1.76
Barclays Capital Bond Aggregate	7.0%	3.9%	1.81	-5.1%	-0.30	0.83
Barclays Capital High Yield	7.5%	8.7%	0.86	-33.3%	-1.59	11.35

³ As important, the overall performance of the composite indices may not reflect the actual performance of any single underlying commodity index. As reported in Appendix I and IV, commodity sector and market segment indices may have high intra-correlations with other commodity indices within the same sector and/or market segment but differ significantly in terms of reported return and risk.

Exhibit 12: Return and Risk Tradeoff of the Commodity Composite Index and Commodity Sector Indices (1991-2008)

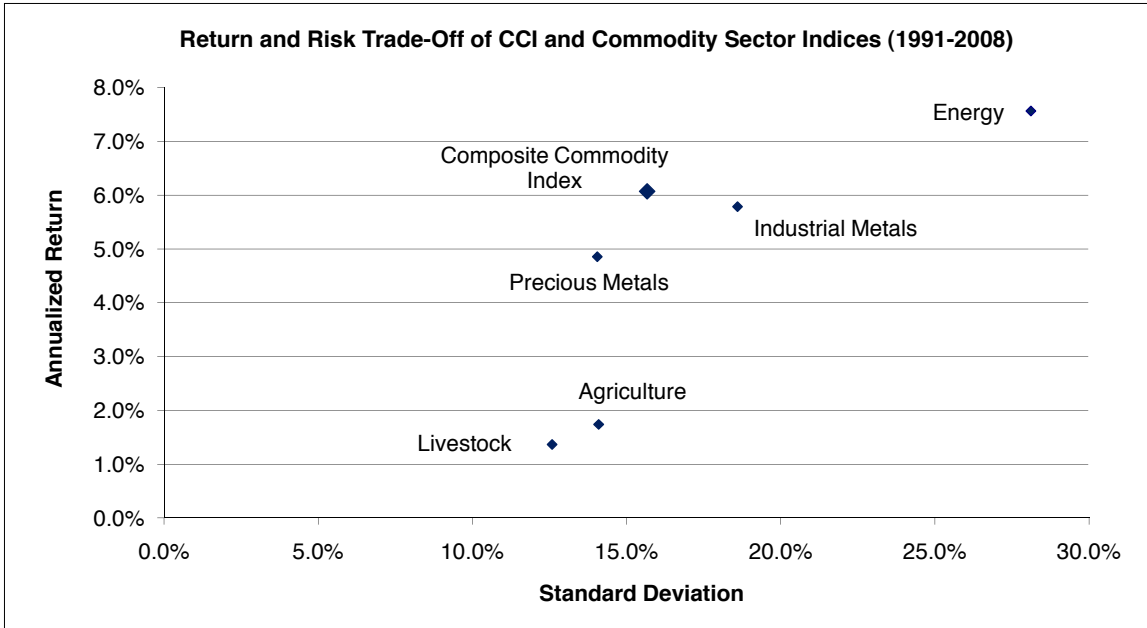


Exhibit 13: Correlations between the Commodity Composite Index and Commodity Sector Indices (1991-2008)

Correlations between CCI and Sector Indices (1991-2008)	Composite	Agriculture	Energy	Industrial Metals	Precious Metals	Livestock
Commodity Index: Composite	1.00					
Commodity Index: Agriculture	0.40	1.00				
Commodity Index: Energy	0.93	0.12	1.00			
Commodity Index: Industrial Metals	0.45	0.29	0.24	1.00		
Commodity Index: Precious Metals	0.32	0.24	0.16	0.36	1.00	
Commodity Index: Livestock	0.14	0.13	0.04	0.08	-0.01	1.00
S&P 500 Total Return Index	0.14	0.20	0.05	0.29	-0.01	0.06
Barclays Capital Bond Aggregate	0.03	0.05	0.03	-0.11	-0.12	0.02
Barclays Capital High Yield	0.21	0.21	0.12	0.27	-0.11	0.09

RANKED RETURNS OF COMMODITY SECTOR INDICES

Exhibit 14 and 15 depict the performance of commodity sectors compared to the S&P 500 Index and the Barclays Capital Bond Aggregate Index. The ranked returns are grouped into three buckets (worst, middle and best) of 72 months each, with the average returns for each group being presented. Results show that the composite commodity sector indices have little relationship with the ranked S&P 500 or the ranked Barclays Capital Aggregate Bond Index (Exhibit 13). In contrast, when compared to the performance of a related equity index, the commodity index generally has negative returns in down markets for the related equity index and generally has positive returns in up markets for the related equity index (Exhibit 24b).

Exhibit 14: Commodity Sector Monthly Returns: Ranked on S&P 500 (1991-2008)

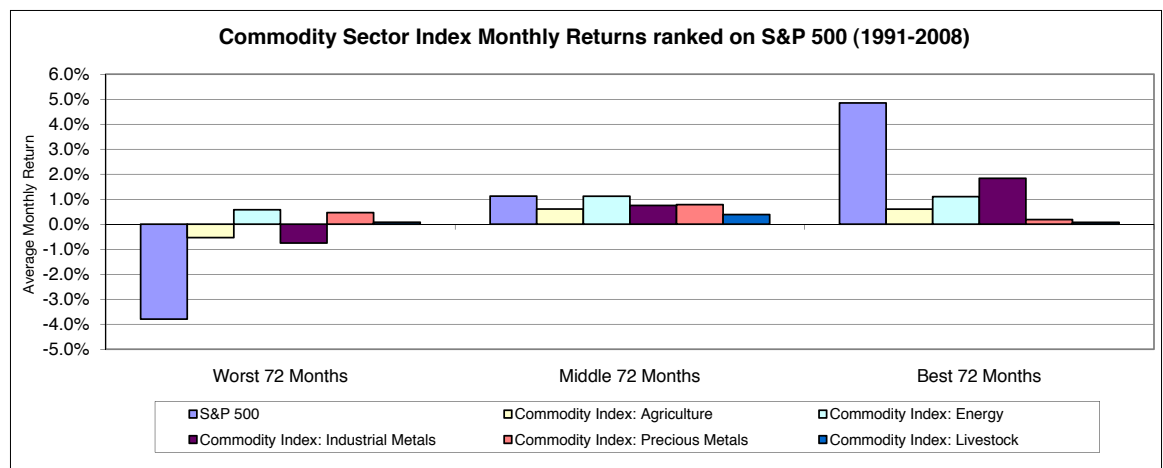
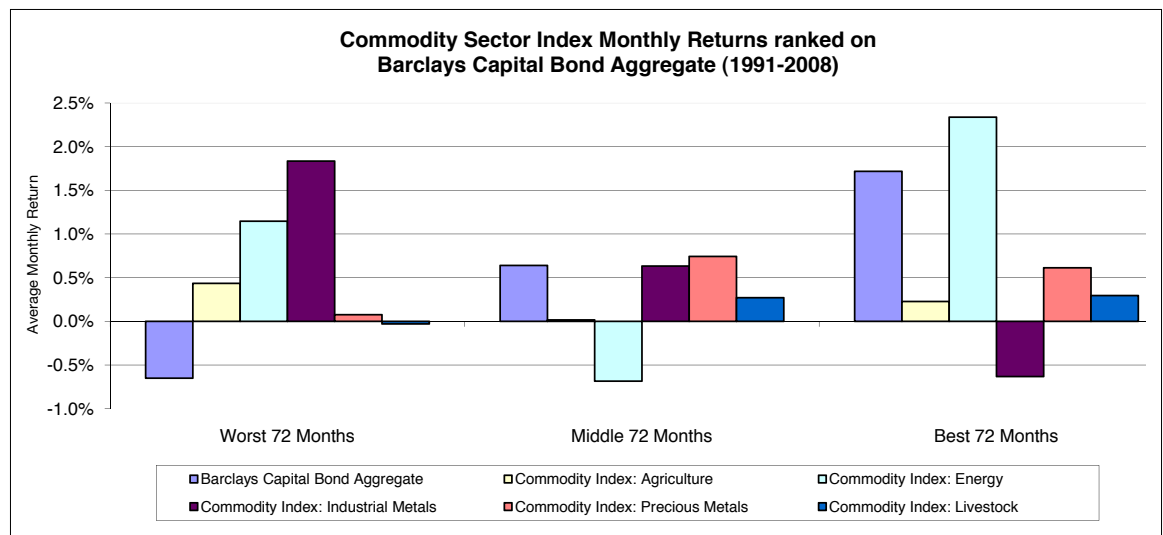


Exhibit 15: Commodity Sector Monthly Returns: Ranked on Barclays Capital Bond Aggregate (1991-2008)



ANNUAL COMMODITY SECTOR INDICES PERFORMANCE

In this section, we provide a review of the annual relative performance of the commodity sector indices used to construct the Composite Commodity Index. Results again show that the returns of the sector indices varied over the entire period, even though they moved in the same direction in many of the years (Exhibit I6). It can also be observed that, on an annual basis, the relative standard deviations of the sector indices vary a great deal from year to year (see Exhibit I7). However, energy volatility seems to dominate the yearly volatility of the other sector indices. In addition, it is shown in Exhibit I8 and I9 that the correlations of the indices with the S&P 500 vary widely as do their information ratios.

Exhibit 16: Annual Returns of Commodity Sector Indices (1991-2008)

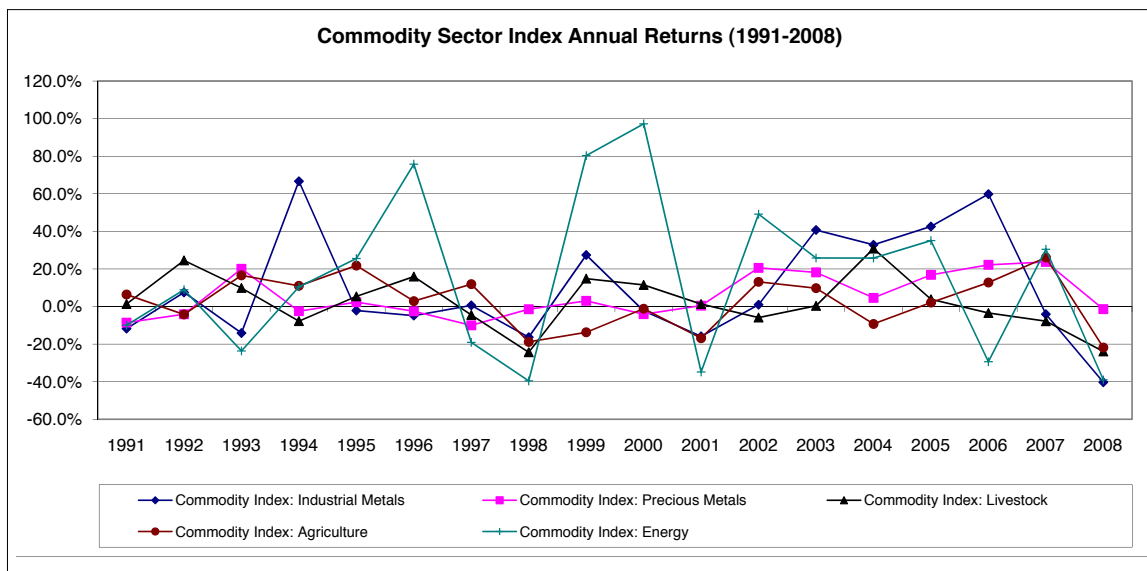


Exhibit 17: Annual Volatility of Commodity Sector Indices (1991-2008)

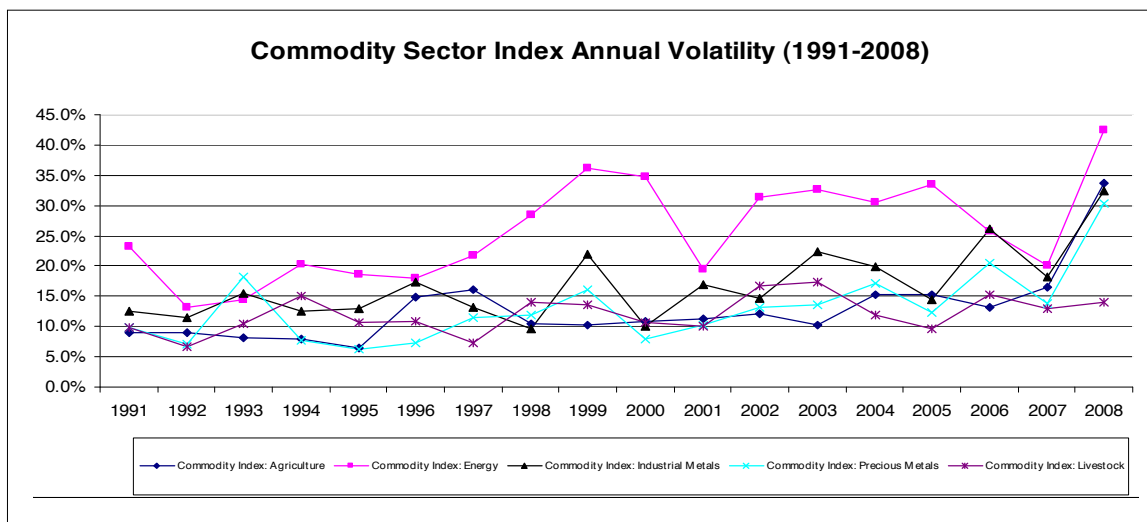


Exhibit 18: Annual Intra-Year Correlation of Commodity Sector Indices with S&P 500 (1991-2008)

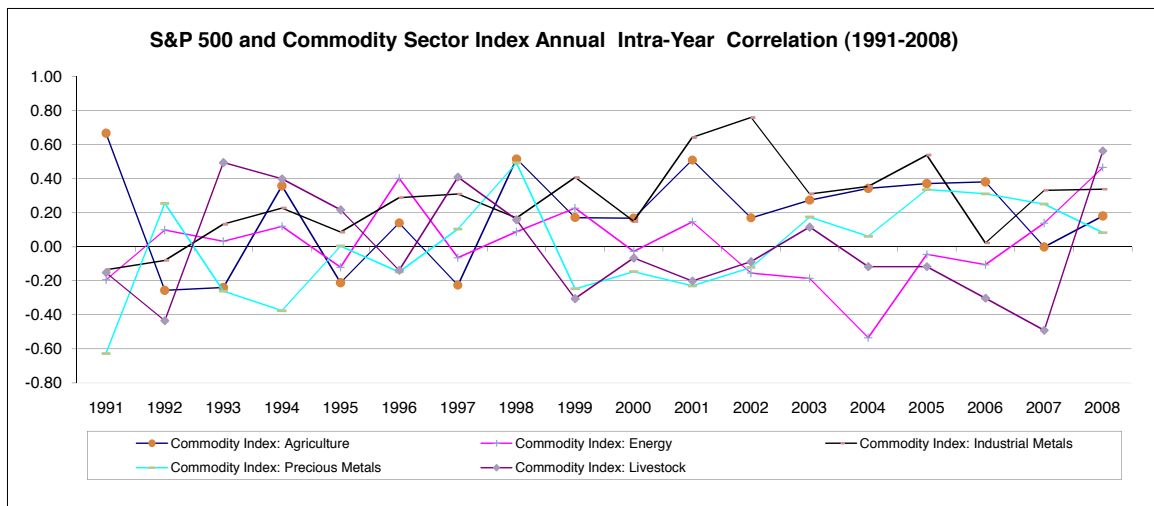
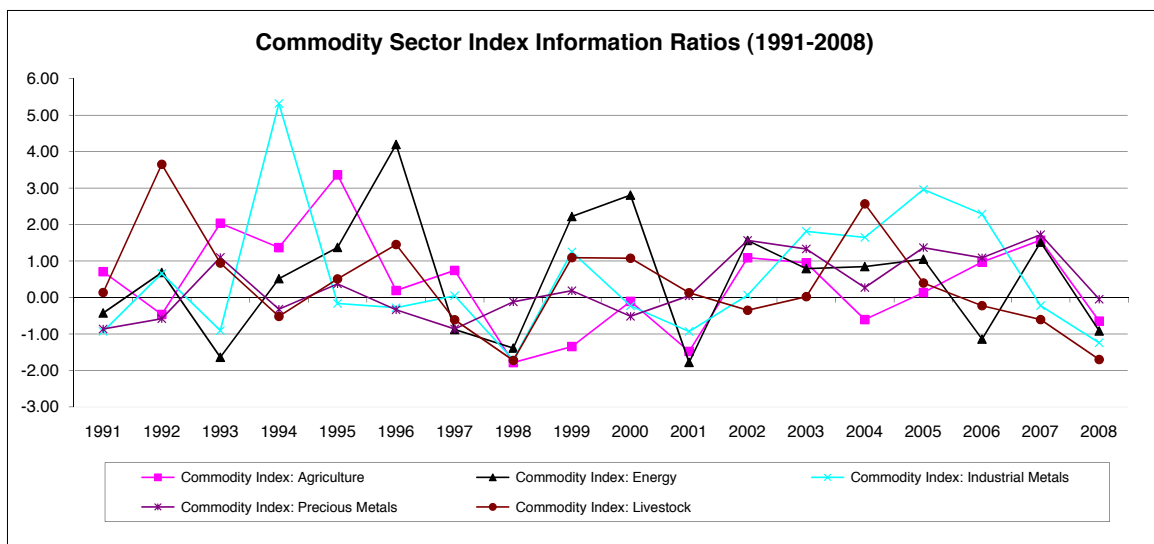


Exhibit 19: Annual Information Ratios of Commodity Sector Indices (1991-2008)



Special Issues in Commodity Investment

GREEN COMMODITY INVESTMENT

There is currently a surge in investor interest in investment in various ‘green investment areas’. Several approaches to investing in the green economy are available.⁴ The dominant green investment strategy involves buying equities. A number of indices track different sectors of the green equity markets. Similarly, there are various means of investing in ‘green’ commodity products from various biofuel based investments to more specific carbon related commodity products. (Investment choices in the carbon economy include trading carbon credits, investment in carbon reduction projects, and investment in corporations that are developing carbon reduction and sequestration technology.) In this report, we provide a brief overview of direct commodity investments in the biofuel area. In the commodity area, biofuel indices provide exposure to agricultural products used to create fuel in an environmental-friendly way. These indices include commodities like corn and sugar, which are used in the production of ethanol.

There are a range of alternatives to investing in various aspects of green commodity investment. In the following paragraphs, a number of important green indices are listed.

BCGI

The BCGISM provides a benchmark for green commodity investments as well as a diversified investment vehicle. It offers a multi-faceted approach to holding commodities and materials needed in the production of renewable energy and the reduction of carbon emissions. The BCGISM is comprised of eleven commodities that are traded on major exchanges and through over-the-counter markets located in the US, Canada, UK, France, and Malaysia. The BCGISM is primarily comprised of commodities traded via futures contracts, but includes commodities that are traded over-the-counter directly or through forward contracts. The primary objective of the BCGISM is to provide a multi-faceted approach to holding commodities needed in the production of renewable energy and the reduction of carbon emission.

BUNGE

This index holds B100 and B20 biodiesel as well as E25 and E85 gasoline. The commodities included in the index include gasoline, heating oil, corn, sugar, and oilseeds.

MLCX BIOFUELS INDEX™

The index applies the Merrill Lynch Commodity Index methodology to futures contracts on physical commodities. Futures contracts on physical commodities that are either biofuels themselves or feedstock commonly used in the production of biofuels are considered for eligibility in the index. Biofuels are transportation fuels derived from non-fossilized biological sources.

S&P GSCI BIOFUEL INDEX™

The S&P GSCI Biofuel Index reflects the total returns that are potentially available through an unleveraged investment in an index of four commodity contracts (corn, soybean oil, wheat and sugar) with specific weights applied to each of these contracts.

UBS DIAPASON GLOBAL BIOFUEL INDEX™

The index covers a range of commodities used in the production of ethanol and biodiesel. Composed of various commodity futures, it is weighted to reflect the importance of each individual commodity used in the production of ethanol and biodiesel as well as the liquidity of the underlying futures.

⁴ For a more extensive review of the green index investment universe, see the “Green Commodity Index Comparison” (AIA 2009).

EQUITY INDICES

S&P GLOBAL CLEAN ENERGY INDEX™

The S&P Global Clean Energy Index includes 30 of the largest publicly traded stocks from companies involved in clean energy from around the world. The index is comprised of a diversified mix of Clean Energy Production and Clean Energy Equipment and Technology companies.

WILDERHILL CLEAN ENERGY INDEX™

The Wilderhill Clean Energy Index is comprised of approximately 54 companies which are publicly traded in the United States and engaged in a business or businesses which the Clean Energy Index Selection Committee believes stand to benefit substantially from a societal transition toward use of cleaner energy and conservation.

In the period of January 2007 to March 2009 (see Exhibit 20), the performance of the green indices described above has been volatile, with equity-oriented indices experiencing the highest risk. With an annualized standard deviation of 27.4%, the BCGISM has had among the lowest volatility of all of these green indices. In terms of other measures of risk, such as maximum drawdown, the BCGISM has had a maximum drawdown based on monthly observations of -48.7%, which is comparable to other biofuel indices. The Clean Energy composite (the average of the S&P Global and the Wilderhill Clean Energy Indices) had a drawdown of -75.9%, which was significantly greater than any of the other green indices.

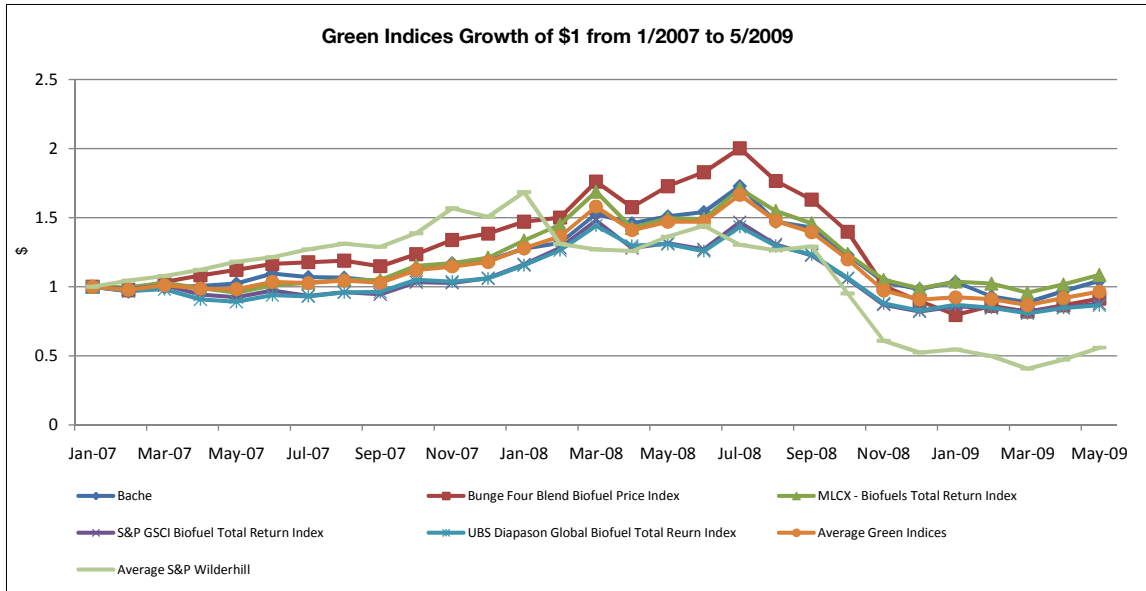
Exhibit 20: Performance of Green Indices (January 2007 - May 2009)⁵

Green Indices Jan 07-May 09	Annualized Return	Standard Deviation	Information Ratio	Maximum Drawdown	Correlation with	
					S&P 500	Barclays Capital Bond Aggregate
Bache Commodity Green Index	5.8%	27.4%	0.21	-48.7%	0.54	0.35
Biofuel Indices						
Bunge Four Blend Biofuel Price Index	1.8%	33.9%	0.05	-60.2%	0.48	0.09
MLCX - Biofuels TR Index	8.1%	29.2%	0.28	-44.0%	0.38	0.30
S&P GSCI Biofuel TR Index	-1.8%	28.6%	-0.06	-44.5%	0.29	0.34
UBS Diapason Global Biofuel TR Index	-2.0%	27.1%	-0.07	-44.1%	0.34	0.37
Average Biofuel Indices						
Avg. of S&P Global/Wilderhill Clean Energy Index	1.5%	29.7%		-48.2%	0.37	0.27
Avg. of S&P Global/Wilderhill Clean Energy Index	-17.6%	44.9%	-0.39	-75.9%	0.89	0.29

⁵ Note: For the period we are looking at in this section, the relatively high correlations between the commodity indices and S&P 500 arise from the fact that commodity and equity markets went down together at the end of 2008. Correlations would most probably lower if we looked at a longer time frame.

Exhibit 21 provides a chart of the cumulative growth of the sample green commodity indices over this time period. In this relatively brief period, there was a substantial run-up and then collapse in prices across green commodities and equities. The Clean Energy composite experienced a boom earlier than the indices offering direct biofuel exposure, but also suffered an earlier and more substantial decline.

Exhibit 21: Green Indices Growth of \$1 from 1/2007 to 5/2009



The biofuel indices (Bunge, MLCX, S&P GSCI and UBS Diapason) are highly correlated with each other (0.76 to 0.99), whereas they have had relatively low correlation with the Clean Energy Average. The BCGISM has had among the green indices one of the highest correlations with the Clean Energy Average at 0.60, which may reflect the mutual exposure of Clean Energy Average and the BCGISM to clean air related assets.

Exhibit 22: Correlations of Green Indices (January 2007 - May 2009)

Green Indices Correlations Jan 07-May 09	Bache Commodity Green Index	Bunge Four Blend Biofuel Deviation	MLCX - Biofuels TR Index	S&P GSCI Biofuel TR Index	UBS Diapason Global Biofuel TR Index	Average Green Indices	Average S&P/Wilderhill
Bache Commodity Green Index	1.00						
Bunge Four Blend Biofuel Price Index	0.78	1.00					
MLCX - Biofuels TR Index	0.89	0.81	1.00				
S&P GSCI Biofuel TR Index	0.88	0.78	0.97	1.00			
UBS Diapason Global Biofuel TR Index	0.89	0.76	0.97	0.99	1.00		
Average Biofuel Indices	0.91	0.90	0.97	0.97	0.96	1.00	
Avg. of S&P Global Clean Energy and Wilderhill Clean Energy Index	0.60	0.61	0.48	0.38	0.43	0.99	1.00

COMMODITIES AS AN INFLATION HEDGE

A significant part of the benefits direct commodity investments provide is said to evolve from unique fluctuations of commodity values as a function of shifting economic forces. One such aspect of the commodity return pattern is that commodity cash prices may benefit from periods of unexpected inflation, whereas stocks and bonds may suffer. This premise is tested by calculating the correlation of commodity index returns with both inflation and CPI acceleration (calculated as the growth rate of inflation). Exhibit 23 suggests that there is a slight positive correlation between the Composite Commodity Index and reported inflation/CPI acceleration. Results also show that the level of correlation between inflation and various commodities depends on the individual commodity sector, with the energy and metals sectors exhibiting the greatest correlations with inflation and changes in inflation.

Exhibit 23: Inflation Factor and Commodity Sector Correlation (1991-2008)

Inflation Factor and Commodity Sector Correlation 1991-2008	Inflation	CPI Acceleration
Commodity Index: Composite	0.27	0.29
Commodity Index: Agriculture	0.05	0.09
Commodity Index: Energy	0.23	0.25
Commodity Index: Industrial Metals	0.19	0.15
Commodity Index: Precious Metals	0.11	0.31
Commodity Index: Livestock	0.12	-0.02
S&P 500 Total Return Index	0.04	0.05
Barclays Capital Bond Aggregate	-0.11	0.03
Barclays Capital High Yield	0.14	0.16

COMPARISON BETWEEN DIRECT AND EQUITY-BASED COMMODITY INVESTMENT

Exhibit 24a shows that, with the exception of energy, the information ratios of direct commodity investments compare favorably with the information ratios of the related equity investments in similar commodity sectors. It also shows that direct investment in equity securities which specialize in particular commodity sectors have moderate correlations with the related commodity index. At the composite level, the correlation between the Composite Commodity Index and a portfolio of equity sector indices is 0.61. The correlation between Composite Commodity Index Energy and the various S&P Energy sub-sectors is 0.50. Similarly, the correlation between the Composite Commodity Index Precious Metals and Industrial Metals and the related S&P sub-sectors are all above 0.50.

Exhibit 24a: Comparison of Commodity Returns to Commodity-Based Equities (1991-2008)

Comparison of Commodity Returns to Commodity-Based Equities (1991-2008)	Annualized Total Return	Standard Deviation	Information Ratio	Maximum Drawdown	Correlation w/ Commodity Sector Index
Composite Commodity Indices (Energy, Industrial Metals, Precious Metals)	7.3%	14.5%	0.50	-42%	
Composite S&P 500 Indices (Energy, Metals, Gold)	4.9%	23.0%	0.21	-52%	0.61
Commodity Index: Energy	7.6%	28.1%	0.27	-60%	
S&P 500 Energy Index	8.4%	18.1%	0.46	-41%	0.50
Commodity Index: Industrial Metals	5.8%	18.6%	0.31	-52%	
S&P 500 Metals & Mining Index	2.0%	28.2%	0.07	-67%	0.52
Commodity Index: Precious Metals	4.9%	14.1%	0.35	-31%	
S&P 500 Gold Index	0.1%	36.3%	0.00	-71%	0.70

However, it is important to point out that correlation represents the standardized average co-movement over the period of analysis. The impact of commodity price changes on firm profitability is most likely to be evident when commodity prices exhibit extreme movements. Therefore, a review of the relative performances of various commodity sector indices and their corresponding equity-based commodity investments may indicate a more significant relationship between the two asset groups. As shown in Exhibit 24b, when composite commodity sector indices are ranked on the returns of their related equity-based commodity index, the commodity index has negative returns in the down equity sector markets as well as positive returns in the positive equity sector markets. Thus, while direct commodity investment does offer access to a different source of returns than equity-based commodity investments, they do show common return movements in extreme equity market environments.

Exhibit 24b: Composite Commodity Sector Monthly Returns: Ranked on S&P Sector (1991-2008)

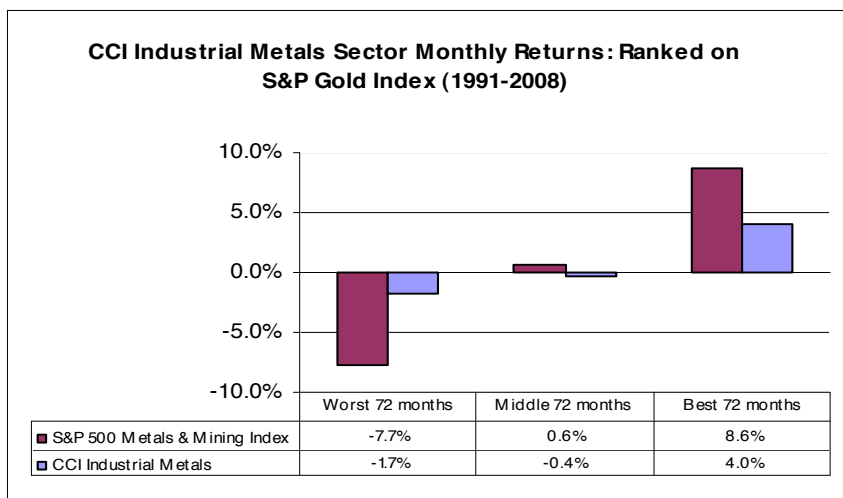
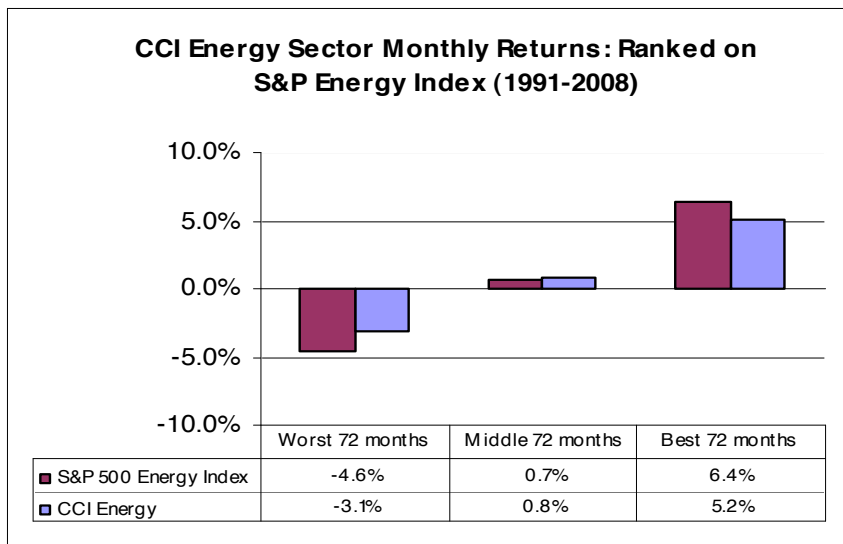
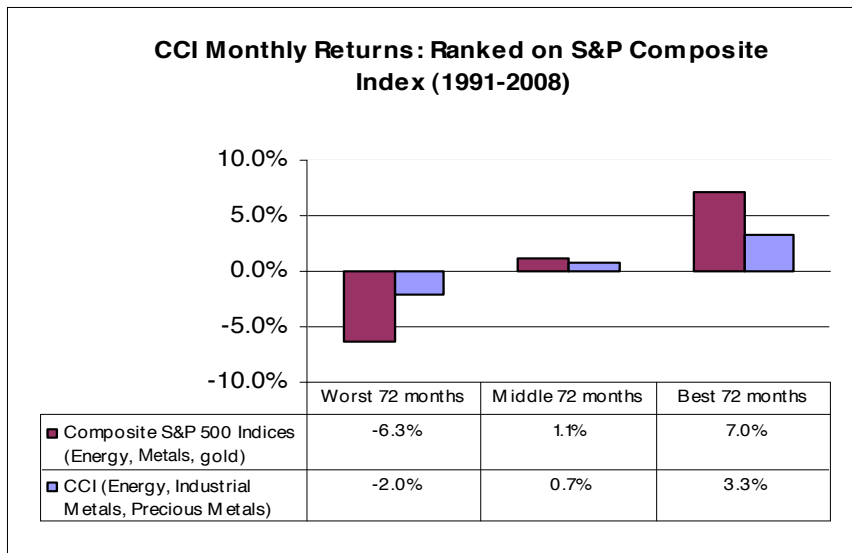
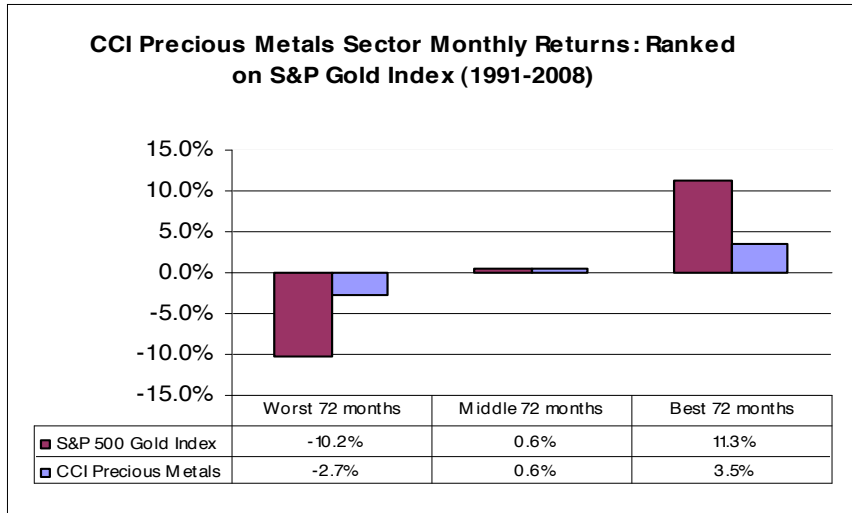


Exhibit 24b: *continued*



ROLL RETURN

The roll return measures the return from investing in short-term futures and rolling them forward each month to keep the investments in short-term futures. In Exhibit 25, the mean roll returns and standard deviations for five GSCI and DJ-UBS sector indices and the composite index for the period 1991-2008 are provided⁶. To the degree that the various index providers trade similar commodities and futures contracts and have similar roll methodologies, one may expect that the roll return performance of each index would be similar. The relatively moderate correlation between the roll returns of the two index providers is indicative that both indices differ somewhat in terms of the underlying contracts, weightings and roll methodology. However, the similarity in annualized returns, volatility and maximum drawdown indicates that the driving forces (e.g., backwardation and/or contango) of the overall roll return of the composite index and sector indices are basically the same, despite periods of differential returns as reflected in the less-than-perfect correlations in roll returns. As shown in Exhibit 26, for several of the periods, the roll return provided significant positive returns. However, for many other periods, the roll return is negative.

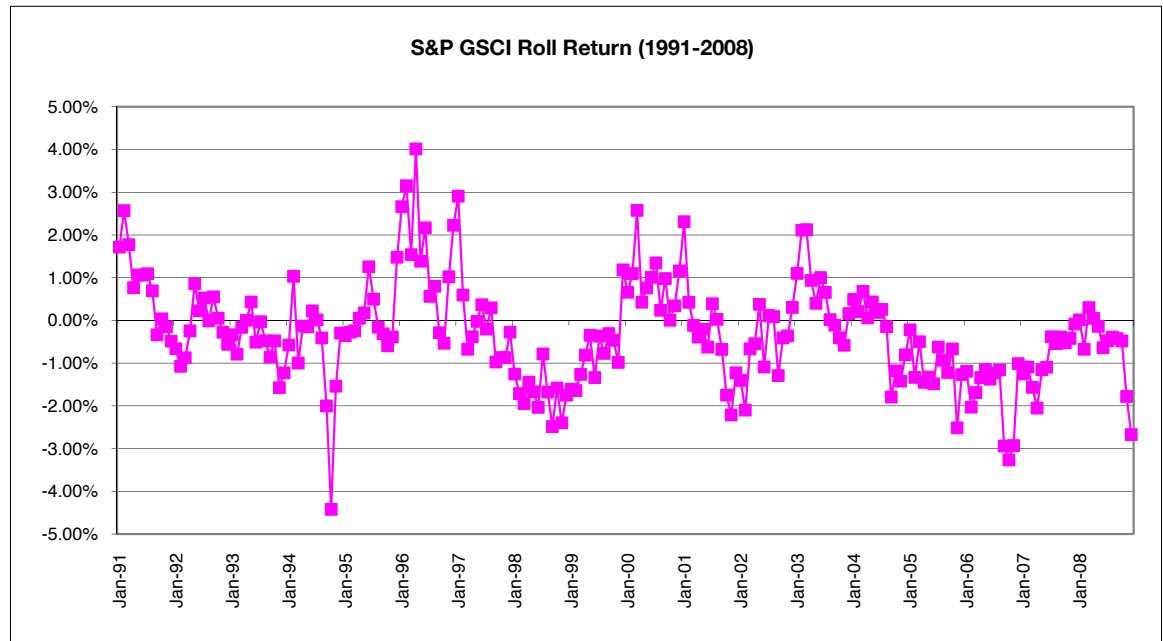
Exhibit 25: Roll Return Performance of DJ-AIG and SP-GSCI Composite and Commodity Sector Indices (1991- 2008)⁷

Performance of Composite and Commodity Sector Indices (1991-2008)	Annualized Roll Return	Standard Deviation of Roll Return	Maximum Drawdown of Roll Return	Correlation of Roll Return within a Sector
Dow Jones - UBS Commodity Index Return	-4.5%	3.5%	-57.3%	0.65
SP GSCI Return Index	-3.7%	4.1%	-56.4%	
Dow Jones - UBS Agriculture	-7.7%	4.5%	-76.3%	0.89
SP GSCI Agriculture	-7.7%	5.0%	-77.7%	
Dow Jones - UBS Energy	-4.1%	9.5%	-66.0%	0.62
SP GSCI Energy	-3.5%	6.4%	-56.3%	
Dow Jones - UBS Industrial Metals	-1.2%	1.9%	-22.1%	0.52
SP GSCI Industrial Metal Commodity	-1.8%	1.3%	-34.8%	
Dow Jones - UBS Precious Metal	-3.8%	1.1%	-50.4%	0.93
SP GSCI Precious Metal	-3.4%	1.3%	-46.3%	
Dow Jones - UBS Livestock	-6.9%	9.1%	-78.6%	0.79
SP GSCI Livestock	-5.1%	6.9%	-69.8%	

⁶ For purposes of this paper, it is important to note the BCI commodity index used in this paper also includes a systematic approach to daily roll (constant maturity) and asset allocation (e.g., momentum models at the contract level) such that the BCI index may differ from commodity indices, such as the GSCI, which are constructed not to reflect a constant maturity or which do not involve contract reweighting consistent with a model for underweighting or overweighting contracts intra-month based on various asset allocation models (e.g., momentum).

⁷ FYI: Correlation statistics are not very indicative of the relationship between two indices, since the calculation is very sensitive to extreme values.

Exhibit 26: S&P GSCI Roll Return (1991-2008)



RESEARCH IN COMMODITIES

A great deal of recent research on commodity investment revolves around diversification benefits and sources of returns of commodity investments, as well as the structure of futures markets. A number of commonly accepted facts regarding commodity investment can be found in Gorton and Rouwenhorst [2005], which attempts to address what the authors see as a fundamental shortcoming of the previous commodities literature. Their concern is that most commodities research has been done using short time series on a limited number of commodities. They construct an equal weighted index from 1959 to 2005 of all commodity futures that existed in 2005. However, it must be noted that there have been fundamental changes in commodities in the last 50 years. Energy contracts were not traded prior to the 1970s, which was when heat and propane contracts were introduced. Crude and gasoline were not introduced until the 1980s. This is significant, because these contracts command a strong presence in the current commodities landscape, with their risk and return characteristics being quite different from those of many other commodities. There has also been an important shift in recent years in the use of commodities for food products, such as corn and sugar, to energy products. In addition, a number of agricultural commodities which had strong consistent seasonal patterns in the past exhibit much less seasonality due to more diverse growing regions around the world.

Gorton and Rouwenhorst [2005] find that *spot* commodity prices did not keep pace with inflation from 1959 to 2004. However, fully collateralized commodities provided very similar returns and volatilities to those of stocks, while both stocks and collateralized commodities outperformed bonds over the 45 year period. The average historical risk premium of commodity futures was very similar to that of stocks at 5% per annum, which is about twice that of bonds. Furthermore, commodities have positive skewness while stocks have negative skewness. They also find that commodity futures returns are negatively correlated with stocks and bonds and positively correlated with inflation (stocks and bonds are negatively correlated with inflation). In addition, this negative correlation persists in periods of large downward equity movements. Their research showed that futures contracts based on an individual commodity provide important information about that commodity's risk premium.

Gorton and Rouwenhorst [2005] examine the use of equities of commodity producing companies to access commodity returns. Basing their analysis on SIC codes, they looked at 17 different commodities and found that the firms' stocks were more highly correlated with the stock market than with the corresponding commodity. In addition, the equity commodity index underperformed the futures commodity index. Unfortunately, they did not break out firms that hedge from those who do not. Greer [2007] also suggests that equity investment in commodity producers is not an efficient method for accessing commodity returns due to the limitations of commodity exposure created by the hedging activities of firms, but provides no evidence to support his assertion.

Buyuksahin, Haigh and Robe [2007] address concerns the rapid growth in commodity investment may have changed the correlations with equity markets. They use dynamic correlation and recursive co-integration techniques and find that the relationship between commodity (GSCI) and equity (S&P500) indices has not changed significantly from 1992 to 2007. In addition, they find that there is no increase in co-movement during periods of extreme movements. In fact, Chong and Miffre [2006] consider the period from 1979 to 2004 and find that the correlations actually fell over time as well as during periods of above average market volatility. Jin and Jorion [2006] look at the 10-K filings of 119 oil and gas producers and came to the conclusion that hedging does not affect firm values as measured by their Tobin's Q. Chung [2004] shows that hedging for gold mining firms reduces their risk and improves the accuracy of analysts' earnings forecasts. Guay, Haushalter and Minton [2003] find that analysts have difficulty assessing firms' risks associated with interest rate, exchange rate, and commodity price exposures, suggesting that hedging can improve earnings forecast accuracy.

Erb and Harvey [2006] suggest that it is inappropriate to naively extrapolate the past performance of commodities into the future. Therefore, they suggest that one should first understand the factors that drive returns and then extrapolate those relationships into the future. They also address concerns of the appropriateness of equally-weighted portfolios and commodity indices to assess the performance of the asset class. It was suggested that commodity portfolios can generate "equity-like" returns by focusing on commodity futures that tend to exhibit positive roll return or spot return. However, they believe that there is little reason to expect that the positive return term structure patterns should persist. Similarly, while momentum strategies can generate significant positive returns, their persistence is questionable.

Schneeweis, Spurgin and Kazemi [2008] review the literature on momentum, with a focus on commodities markets. They discuss many of the characteristics that differentiate commodities from other asset classes, such as storage issues and hedging demand. Research suggests that it is these characteristics that drive the returns to momentum strategies. In addition, research indicates that momentum exposure can provide a portfolio with return enhancement as well as diversification benefits.

CONCLUSIONS

In recent years, investible commodity indices and commodity linked assets have increased the number of available commodity-based products. This paper provides both theoretical and empirical analysis for the inclusion of commodities in investors' portfolios. Results show that direct commodity investment can provide significant portfolio diversification benefits to traditional stock and bond portfolios, as well as to mixed traditional (stocks and bonds) and alternative (private equity, real estate, hedge funds and CTAs) portfolios. Furthermore, it shows that direct commodity investment provides simple inflation hedging and a commodity exposure beyond that achievable from commodity-based stock investment.

Appendix

APPENDIX I: PERFORMANCE OF COMMODITY COMPOSITE AND SECTOR INDICES (1991-2008)

The performance statistics for the BCI, GSCI and DJ-UBS commodity index and commodity sector indices for the period of 1991-2008 are given. The performance statistics for the composite indices constructed for the general commodity sectors as well as their component sub-indices are reported. As noted below, of the various indices used in creating the composite index, the BCI index generally had the lowest volatility due primarily to its ability to rebalance intra-month to various contracts as well as to cash and the S&P-GSCI the highest volatility primarily due to its overweight in energy.

Sector Performances and Correlations 1991-2008	Annualized Return	Standard Deviation	Information Ratio	Maximum Drawdown	Correlation with		
					S&P 500	BarCap Bond Aggregate	SP GSCI Sector Index
Commodity Index: Composite	6.1%	15.7%	0.39	-48.81%	0.14	0.03	0.98
BCI Total Return	10.3%	12.8%	0.80	-31.45%	0.09	0.01	0.94
Dow Jones-UBS Commodity Total Return Index	4.9%	14.5%	0.34	-49.42%	0.19	0.05	0.90
SP GSCI Total Return Index	2.8%	21.0%	0.13	-62.16%	0.12	0.03	1.00
Commodity Index: Agriculture	1.7%	14.1%	0.12	-48.49%	0.20	0.05	0.98
BCI Total Agri Return	5.2%	9.7%	0.54	-27.16%	0.15	-0.01	0.86
Dow Jones-UBS Total Agriculture Return Sub-Index	0.8%	16.8%	0.05	-53.15%	0.21	0.05	0.95
SP GSCI Total Agriculture Return Index	-1.1%	17.1%	-0.06	-63.87%	0.20	0.07	1.00
Commodity Index: Energy	7.6%	28.1%	0.27	-59.70%	0.05	0.03	0.99
BCI Total Energy Return	13.1%	23.0%	0.57	-39.92%	0.02	0.02	0.95
Dow Jones-UBS Total Energy Return Sub-Index	5.8%	31.2%	0.19	-69.39%	0.06	0.04	0.97
SP GSCI Total Energy Commodity Return Index	3.3%	31.3%	0.11	-68.79%	0.07	0.03	1.00
Commodity Index: Industrial Metals	5.8%	18.6%	0.31	-51.62%	0.29	-0.11	0.98
BCI Total Industrial Metals Return	10.8%	18.1%	0.59	-33.49%	0.24	-0.10	0.85
Dow Jones-UBS Total Ind. Metals Return Sub-Index	3.8%	20.1%	0.19	-60.03%	0.31	-0.10	0.99
SP GSCI Total Ind. Metal Commodity Return Index	2.6%	19.3%	0.14	-59.61%	0.29	-0.12	1.00
Commodity Index: Precious Metals	4.9%	14.1%	0.35	-30.58%	-0.01	0.12	0.99
BCI Total Precious Metals Return	3.8%	11.4%	0.33	-27.15%	-0.04	0.14	0.95
Dow Jones-UBS Total Precious Metal Return Sub-Index	5.2%	16.3%	0.32	-34.37%	0.02	0.10	0.98
SP GSCI Total Precious Metal Commodity Return Index	5.4%	15.1%	0.36	-30.30%	-0.01	0.12	1.00
Commodity Index: Livestock	1.4%	12.6%	0.11	-35.56%	0.06	0.02	0.99
BCI Total Livestock Return	6.1%	9.8%	0.62	-24.59%	0.04	-0.01	0.93
Dow Jones-UBS Total Livestock Return Sub-Index	-1.1%	14.4%	-0.08	-49.14%	0.06	0.04	0.99
SP GSCI Total Livestock Commodity Return Index	-0.9%	14.1%	-0.06	-43.76%	0.06	0.01	1.00
Commodity Index: Grains	1.1%	18.2%	0.06	-54.96%	0.17	0.09	0.99
BCI Total Grains Return	4.8%	14.1%	0.34	-35.58%	0.11	0.06	0.94
Dow Jones-UBS Total Grains Return Sub-Index	0.1%	20.6%	0.00	-56.05%	0.20	0.09	0.95
SP GSCI Total Grains Return Index	-1.8%	20.8%	-0.09	-73.71%	0.18	0.09	1.00

APPENDIX II: PERFORMANCE: 2001-2008

Since 2001, a number of new regulatory (growth of home mortgages), economic (post-2001 technology bubble), market structure (e.g., credit spreads) and technological developments have occurred, such that the recent return and risk relationships may not reflect that of the longer period of 1991-2008. The following exhibit shows the risk and return performance of the CCI commodity index, traditional U.S. equity and bond indices, the CASAM/CISDM Equally Weighted Hedge Fund and CTA indices and real estate and private equity indices for the period 2001-2008. Portfolio combinations which include traditional assets, other alternative investments (such as hedge funds and CTAs) and commodities for the most recent eight year period 2001-2008 are also reviewed. Over the period of analysis, the CCI reported higher annualized return as well as a higher volatility than the S&P 500. Compared to the returns of the Barclays Capital Bond Aggregate Index, the CCI reported lower rates of return albeit with higher volatility. Compared to the returns of the CASAM/CISDM EW Hedge Fund and CTA indices, the CCI reported lower returns with higher risk. Lastly, the CCI reported higher returns and lower risk than private equity and lower returns with lower risk than real estate.

Index Performance 2001-2008

Stock, Bond and Commodity Performance	S&P 500	Barclays Capital Bond Aggregate		Composite Commodity Index
Annualized Total Return	-2.89%	5.74%		3.97%
Annualized Standard Deviation	15.05%	3.99%		18.87%
Information Ratio	-0.19	1.44		0.21
Maximum Drawdown	-40.68%	-3.83%		-48.81%
Correlation with Commodities	0.21	-1.01		1.00
Alternative Asset Performance	Hedge Funds	CTA	Real Estate	Private Equity
Annualized Total Return	5.58%	9.17%	6.41%	-3.67%
Annualized Standard Deviation	6.62%	8.75%	20.95%	26.43%
Information Ratio	0.84	1.05	0.31	-0.14
Maximum Drawdown	-21.12%	-8.75%	-58.79%	-70.33%
Correlation with Commodities	0.49	0.27	0.17	0.30

In brief, the weak correlations between the CCI and hedge funds, CTAs, real estate, private equity and traditional asset classes again suggest that, over the most recent eight year period, additional diversification benefits can exist from adding commodities to an already diversified portfolio. As shown in the following, when adding commodities to a traditional stock/bond portfolio, Portfolio B has a higher return and lower risk (standard deviation) than pure stock and bond portfolios. The same pattern is seen when commodities are added to a stock/bond/hedge funds/CTA/private equity/real estate portfolio (Portfolio D).

As seen, the information ratios for portfolios which include at least a 10% investment in commodities are found to dominate those that invest solely in stocks and bonds: Portfolio A (0.22) versus Portfolio B (0.28). Information ratios for portfolios which include at least a 10% investment in commodities (e.g. Portfolio D) are found to dominate those that invest solely in stock/bond/CTA/hedge funds/real estate/private equity (Portfolio C).

Portfolio Performance 2001-2008

Portfolios	A	B	C	D
Annualized Returns	1.68%	2.07%	2.62%	2.91%
Standard Deviation	7.51%	7.39%	8.19%	8.09%
Information Ratio	0.22	0.28	0.32	0.36
Maximum Drawdown	-20.98%	-21.19%	-24.84%	-24.69%
Correlation with CCI	0.21		0.27	
Portfolio A	Equal Weights S&P 500 and Barclays Capital Bond Aggregate			
Portfolio B	90% Portfolio A and 10% Commodities			
Portfolio C	75% Portfolio A and 25% HF/CTA/Private Equity/Real Estate			
Portfolio D	90% Portfolio C and 10% Commodities			

APPENDIX III: COMMODITY COMPOSITE AND SECTOR INDICES

Different individual commodity indices are available on the market and can be categorized into five sectors (agriculture, industrial and precious metals, energy and livestock) and various market segments within these sectors. The three composite indices we look at in this paper, DJ-UBS, S&P-GSCI and BCI differ in the amount of individual commodity indices they include, as well in their composition nature. For example, the DJ-UBS is constructed from 19 different individual indices whereas the S&P-GSCI is composed of 24. The number of indices within the five sectors also varies from one composite index to another, while most of them heavily rely on agriculture indices. In the following, an overview of the most common composite indices and their components is provided:

	S&P-GSCI	DJ-UBS	BCI	RICI	MLCX	DBLCI
Type	Quantity-based	Quantity-based	Value-based	Quantity-based	Quantity-based	Value-based
Components Selected By	Liquidity measures	Liquidity measures	Liquidity measures	Significance in worldwide consumption	Liquidity measures and value of global production	Liquidity measures
Weights Determined By	World production weighted over previous five years	Liquidity and production measures	Liquidity of the commodity	Contract liquidity and worldwide consumption pattern	Importance of commodity in the global economy; emphasis on downstream commodities	Determined by the index committee
Number of Components	24	19	19	36	19	6
Agriculture	8	7	6	18	8	2
Industrial Metals	5	4	3	7	4	1
Energy	6	4	6	6	4	2
Livestock	3	2	2	2	1	0
Precious Metals	2	2	2	3	2	1
Launch Date	Nov-1991	Jul-1998	Jan-2007	Jul-1998	Jun-2006	Feb-2003
Roll Period	5th to 9th	4th to 8th	Continuous roll	Over a three-day period from the day prior to the last business day of the month to the first business day of the following month	1st to 15th from next contract to second next contract	2nd to 6th. Rolls every month for the energy. Rolls once a year for the other commodities.
Reweighting *	Annual	Annual	Annual	Annual	Annual	Annual
Average Maturity	Less than two months	Same maturity as S&P - GSCI for agriculture, but longer average maturity for energy and metals as it holds every alternative month.	Around 3 weeks more than average maturity of SPGSCI contracts.	Same as the average maturity of the S&P-GSCI prior to the roll period for contracts that are common to both RICI and SPGSCI except industrial metals. Average maturity of industrial metals is three months.	About a month longer than DJAIG and six weeks longer than SPGSCI.	The longest of any of conventional commodity indices. Considerable variation in maturity during the year. It is shortest in the fall, just before the annual rolls, and longest in winter just after the rolls.
Energy Allocation	Target allocation 74.59% for 2009	Capped at 33%	Maximum allocation is set at 50%	Target allocation is 44% for 2009	Can have maximum value of 60%	Target is 55% energy
Liquidity	Highly liquid	Slightly less liquid than SPGSCI due to alternating energy contracts.	Highly liquid	Most of the commodities are in the most liquid part of the curve. But some commodities in the index are illiquid with very low open interest.	Slightly less liquid than SPGSCI due to alternating energy	Only moderate liquidity due to long maturity of grain contracts.
Outperformance	During rising energy prices and when markets in backwardation.	Will outperform when the price of agriculture and metals rise more compared to energy prices. When agriculture and metals are more in backwardation than energy.	When markets are in contango, it will beat most of the traditional indices. It will have a smaller drawdown compared to any other indices in declining markets. Also will perform better in strong trending markets.	Will outperform when the agriculture sector performs better than the energy and metals sectors. Will outperform when natural gas declines.	Will do better when markets are in contango.	Low diversification means that DBLCI could perform very well if its subset of commodities does well. Also a contango player, as it holds long maturities and rolls ahead of S&P - GSCI/DJAIG.

**APPENDIX IV: OVERVIEW OF MAJOR INDIVIDUAL
COMMODITY MARKET SEGMENT INDICES**

In the following, an overview of major indices for different commodity market segments is given for the period of January 2007 to May 2009. One should note that S&P GSCI and DJ-UBS indices exhibit similar numbers in terms of returns, standard deviation and information ratios, whereas BCI and DCI BNP indices show a somewhat different performance in various commodities. This may be due to the differing roll process (BCI) or investment process (DCI). Investors who are interested in commodity investment products should carefully consider available products for each commodity market.

Indices Performance: Jan 2007-May 2009	Annualized Return	Annualized Stdev.	Information Ratio	Maximum Drawdown	Correlation with		
					S&P 500	BarCap Bond Aggregate	SP GSCI Market Segment Index
SP GSCI Total Aluminum Return Index	-28.0%	25.6%	-1.09	-60.10%	0.30	0.05	1.00
BCI Total Aluminum Return	-13.5%	15.5%	-0.87	-36.19%	0.14	0.05	0.93
DCI BNP Paribas Enhanced Aluminum	-21.5%	24.6%	-0.87	-57.29%	0.31	0.01	0.99
Dow Jones - UBS Total Aluminum Return Index	-27.8%	25.5%	-1.09	-60.04%	0.30	0.05	1.00
SP GSCI Total Brent Return Index	-8.2%	42.1%	-0.19	-72.72%	0.54	0.02	1.00
BCI Total Brent Crude Return	14.4%	28.3%	0.51	-44.95%	0.44	-0.02	0.96
DCI BNP Paribas Enhanced Brent Crude	1.3%	36.2%	0.04	-64.99%	0.56	0.09	0.98
SP GSCI Total Copper Return Index	-7.3%	40.4%	-0.18	-63.90%	0.45	0.13	1.00
BCI Total Copper Return	12.0%	25.5%	0.47	-34.50%	0.45	0.12	0.95
DCI BNP Paribas Enhanced Copper	-7.0%	39.1%	-0.18	-63.79%	0.45	0.15	1.00
Dow Jones - UBS Total Copper Return Index	-9.5%	40.4%	-0.24	-63.64%	0.47	0.17	0.99
SP GSCI Total Corn Return Index	-8.2%	36.5%	-0.22	-56.13%	0.35	0.35	1.00
BCI Total Corn Return	3.1%	27.0%	0.12	-38.66%	0.16	0.29	0.96
DCI BNP Paribas Enhanced Corn	1.5%	32.3%	0.05	-51.63%	0.36	0.34	0.99
Dow Jones - UBS Total Corn Return Index	-8.2%	36.5%	-0.22	-56.13%	0.35	0.35	1.00
SP GSCI Total Cotton Return Index	-16.0%	33.0%	-0.48	-58.01%	0.45	0.31	1.00
BCI Total Cotton Return	-6.2%	22.0%	-0.28	-39.05%	0.39	0.18	0.94
DCI BNP Paribas Enhanced Cotton	-11.6%	29.9%	-0.39	-53.95%	0.52	0.23	0.97
Dow Jones - UBS Total Cotton Return Index	-16.0%	33.0%	-0.48	-58.01%	0.45	0.31	1.00
SP GSCI Total Crude Return Index	-16.3%	46.4%	-0.35	-77.98%	0.53	0.01	1.00
BCI Total WTI Crude Return	14.1%	29.9%	0.47	-43.86%	0.39	-0.02	0.94
DCI BNP Paribas Enhanced Crude Oil	-0.6%	38.4%	-0.01	-66.22%	0.57	0.10	0.95
Dow Jones - UBS Total Crude Return Index	-15.0%	44.7%	-0.34	-75.95%	0.52	0.02	1.00
SP GSCI Total Gas Oil Return Index	-2.3%	41.4%	-0.06	-71.66%	0.52	-0.06	1.00
BCI Total Gas Oil Return	18.5%	25.6%	0.72	-42.87%	0.46	-0.08	0.95
DCI BNP Paribas Enhanced Gas Oil	-1.8%	40.1%	-0.04	-70.12%	0.53	-0.04	1.00
SP GSCI Total Heating Oil Return Index	-3.0%	39.3%	-0.08	-69.80%	0.53	-0.06	1.00
BCI Total Heating Oil Return	14.8%	24.8%	0.60	-42.03%	0.45	-0.08	0.95
DCI BNP Paribas Enhanced Heating Oil	-2.4%	38.0%	-0.06	-68.62%	0.53	-0.03	0.99
Dow Jones - UBS Total Heating Oil Return Index	-5.5%	39.3%	-0.14	-70.88%	0.53	-0.05	1.00
SP GSCI Total Live Cattle Return Index	-15.2%	12.8%	-1.18	-37.85%	0.32	-0.01	1.00
BCI Total Live Cattle Return	-5.2%	8.1%	-0.64	-19.24%	0.15	0.02	0.92
Dow Jones - UBS Total Live Cattle Return Index	-15.2%	12.8%	-1.18	-37.82%	0.32	-0.01	1.00
SP GSCI Total Gold Return Index	17.9%	23.1%	0.78	-27.07%	0.05	0.50	1.00
BCI Total Gold Return	12.8%	16.8%	0.77	-22.36%	0.04	0.47	0.97
Dow Jones - UBS Total Gold Return Index	17.9%	23.1%	0.78	-27.07%	0.05	0.50	1.00

Indices Performance: Jan 2007-May 2009	Annualized Return	Annualized Stdev.	Information Ratio	Maximum Drawdown	Correlation with		
					S&P 500	BarCap Bond Aggregate	SP GSCI Market Segment Index
SP GSCI Total Nickel Return Index	-28.1%	46.4%	-0.61	-79.69%	0.53	0.37	1.00
DCI BNP Paribas Enhanced Nickel	-26.8%	46.0%	-0.58	-78.76%	0.54	0.37	1.00
Dow Jones - UBS Total Nickel Return Index	-28.2%	46.2%	-0.61	-79.59%	0.53	0.36	1.00
SP GSCI Total Lean Hog Return Index	-31.4%	26.6%	-1.18	-63.99%	0.11	0.14	1.00
BCI Total Lean Hog Crude Return	-18.3%	12.7%	-1.44	-41.02%	0.05	0.14	0.96
Dow Jones - UBS Total Lean Hog Return Index	-31.4%	26.6%	-1.18	-63.91%	0.10	0.14	1.00
SP GSCI Total Soybean Return Index	19.5%	36.0%	0.54	-45.75%	0.42	0.28	1.00
BCI Total Soybean Return	22.1%	29.1%	0.76	-34.64%	0.28	0.18	0.96
DCI BNP Paribas Enhanced Soybean	20.3%	36.4%	0.56	-48.85%	0.42	0.27	0.98
Dow Jones - UBS Total Soybean Return Index	19.5%	36.0%	0.54	-45.75%	0.42	0.28	1.00
SP GSCI Total Silver Return Index	6.8%	37.2%	0.18	-51.64%	0.13	0.32	1.00
BCI Total Silver Return	7.3%	28.4%	0.26	-40.46%	0.02	0.24	0.98
DCI BNP Paribas Enhanced Silver	-1.0%	38.0%	-0.03	-52.01%	0.12	0.34	0.96
Dow Jones - UBS Total Silver Return Index	6.8%	37.2%	0.18	-51.64%	0.13	0.32	1.00
SP GSCI Total Natural Gas Return Index	-37.4%	44.0%	-0.85	-79.17%	0.16	-0.05	1.00
BCI Total Natural Gas Return	-18.4%	28.1%	-0.66	-55.34%	0.06	-0.09	0.94
SP GSCI Total Gasoline Return Index	1.0%	46.4%	0.02	-69.99%	0.51	-0.05	1.00
BCI Total Gasoline Return	19.0%	29.9%	0.64	-40.88%	0.51	-0.03	0.95
DCI BNP Paribas Enhanced Gasoline	-2.0%	41.8%	-0.05	-67.74%	0.58	0.05	0.97
Dow Jones-UBS Total Unleaded Gas Return Index	-3.6%	45.7%	-0.08	-70.89%	0.51	-0.05	1.00
SP GSCI Total Soybean Oil Return Index	6.2%	37.7%	0.17	-57.56%	0.43	0.28	1.00
Dow Jones - UBS Total Soybean Oil Index	6.0%	37.7%	0.16	-57.61%	0.43	0.28	1.00
SP GSCI Total Sugar Return Index	-4.9%	32.1%	-0.15	-38.81%	-0.12	0.11	1.00
BCI Total Sugar Return	2.2%	23.0%	0.09	-30.45%	-0.08	0.12	0.95
DCI BNP Paribas Enhanced Sugar	6.7%	25.2%	0.26	-22.33%	-0.02	0.20	0.90
Dow Jones - UBS Total Sugar Return Index	-4.9%	32.1%	-0.15	-38.81%	-0.12	0.11	1.00
SP GSCI Total Wheat Return Index	-1.0%	39.6%	-0.02	-57.22%	0.32	0.45	1.00
BCI Total Wheat Return	9.7%	29.4%	0.33	-39.24%	0.26	0.34	0.95
DCI BNP Paribas Enhanced Wheat	13.5%	33.3%	0.41	-50.05%	0.33	0.50	0.94
Dow Jones - UBS Total Wheat Return Index	-1.0%	39.6%	-0.02	-57.22%	0.32	0.45	1.00
SP GSCI Total Zinc Return Index	-34.2%	36.5%	-0.94	-73.87%	0.44	0.49	1.00
BCI Total Zinc Return	-18.6%	23.2%	-0.80	-53.97%	0.44	0.41	0.96
DCI BNP Paribas Enhanced Zinc	-32.2%	36.0%	-0.89	-72.06%	0.44	0.49	1.00
Dow Jones - UBS Total Zinc Return Index	-34.1%	36.2%	-0.94	-73.72%	0.44	0.49	1.00
SP GSCI Total Cocoa Return Index	17.4%	37.8%	0.46	-35.54%	0.21	0.41	1.00
Dow Jones - UBS Total Cocoa Return Index	17.5%	37.8%	0.46	-35.54%	0.21	0.41	1.00
SP GSCI Total Coffee Return Index	-6.2%	31.3%	-0.20	-40.07%	0.21	0.14	1.00
BCI Total Coffee Return	-5.0%	24.3%	-0.21	-33.12%	0.13	0.13	0.97
DCI BNP Paribas Enhanced Coffee	-4.1%	28.0%	-0.15	-36.68%	0.21	0.11	1.00
Dow Jones - UBS Total Coffee Return Index	-6.2%	31.3%	-0.20	-40.06%	0.21	0.14	1.00

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100 University Drive
Amherst, Massachusetts 01002
TEL: 413-548-7950
FAX: 413-549-0327
EMAIL: info@ingarm.org
WEB: www.ingarm.org