Riding The Wave

Everything you always wanted to know
about commodities indexes but were afraid to ask

By Timothy J. Collins

Illustration by Robin Jareaux

There have been a number of articles published recently that highlight the appropriate role of commodities in a balanced portfolio. The main focus of these articles has been that there is indeed a place for commodities, and that investors wishing to diversify have a number of different broad-based commodity indexes to choose from. A comparison of these indexes, highlighting component and sector weights, is then presented.

Figure 1

Broad-Based Commodity Indexes	
Product	**Name**
DJ-AIG	Dow Jones-AIG Commodity Index
GSCI	Goldman Sachs Commodity Index
RICI	Rogers International Commodity Index
RJ-CRB	Reuters/Jefferies CRB Index
SPCI	Standard & Poor's Commodity Index

Although this is a good starting point, it falls short of providing both investors and product developers with the tools required to make intelligent, well-informed decisions regarding these investments. While most articles discuss the various indexes from a component inclusion viewpoint, they do not address the different mechanisms and conventions of each index. In many cases, the highlighted index is not the investable version of a given index. This oversight is of critical importance, as it points toward the question of 'how' to invest in commodities. It is one thing to know that there are diversified commodity indexes. It is another thing entirely to know how to use them effectively when making investment decisions or designing products.

Rising Interest

The current investment environment has been a source of anxiety for many investors. Following a period of sustained growth, profitable trading in equity markets has become more difficult. Generally speaking, financial markets have entered a period of range trading and decreased return profiles. This reduction in marginal returns on traditional investments has forced managers to actively seek out alternative investment strategies. Because this has occurred during a period of base commodity price increases, commodity-based investment products have attracted particular attention. Although crude oil prices have gotten most of the press, many other commodity sectors have posted impressive gains over the past few years.

Beyond their solid recent performance, commodities also exhibit favorable correlation characteristics when included in a well-balanced portfolio. Recent academic work has confirmed the positive effects of a commodity allocation in traditional investment portfolios.

Previously, investors seeking the beneficial effects that commodities could bring to a diversified portfolio were left with few alternatives, other than buying physical gold or purchasing equity shares in natural resource processing and marketing firms as a proxy for a long commodities position (this includes specialty/natural resource mutual funds, which, generally speaking, hold large equity stakes in these firms). Unfortunately, investments such as these rarely provided the full benefit that could be gained by a passive, long position in a diversified basket of real commodity proxies. Although their performance is often related to base commodity prices, natural resource companies come with attendant corporate risks: inefficient management, marketing errors, hedging, overhead, malfeasance, etc. Furthermore, as I'll explain later, the performance of these companies is more closely correlated to the broader equity markets than to the commodities themselves.

For institutional investors, there are other options. Through the use of structured derivative products, they can acquire exposure customized to their needs. Individual investors have had a far more limited field of investment choices. Fortunately, this situation may be about to change. Although diversified commodity indexes have been available for over a decade, few have been available to the average investor. Several new initiatives are beginning to address this shortcoming.

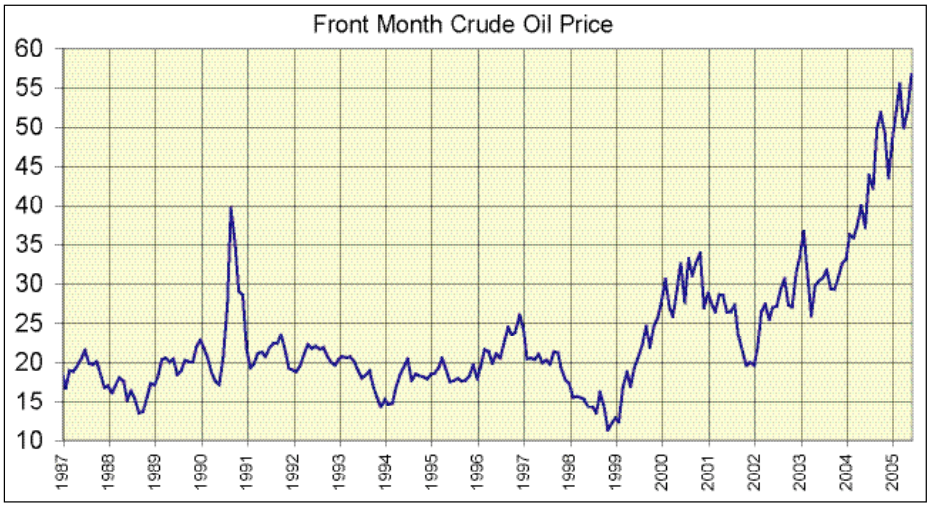
WHY COMMODITIES?

Although the case for commodity investing has been made several times before, it is worth repeating. The argument for the inclusion of a commodity component in a balanced portfolio can be made on two primary foundations. The first is their role as an inflationary hedge. The second relates to the positive aspects that the inclusion of non-correlated assets such as commodities can bring to a traditional portfolio allocation model.

Inflation Protection

Simply stated, commodity prices are driven by global sup-

Figure 2



ply and demand. Commodities are priced at the margin, which is to say that all investors pay the market clearing price. Small changes in demand and supply are reflected immediately in the spot prices, which are disseminated instantly. This information is digested by traders and reflected almost immediately on various public futures exchanges around the world. Thus, investors have access to a wide range of relevant price data.

Global commodity price inflation is a complex topic. Following a period of falling commodity prices, we have witnessed a significant increase in the price levels of a number of important commodity sectors. Demand and supply dynamics have combined with systemic factors to get us where we are today.

Global demand, especially from China (but let's not forget India, Russia and Brazil), has increased. As these economies develop further, their appetite for raw materials is expected to intensify. It is believed that global consumption of commodities will continue to escalate along with this transition.

At the same time, a number of other factors have held supplies in check. Because prices were low during the 1990s, producers were reluctant to commit capital to new production facilities. Producers reacted to low prices by concentrating on the lowest-hanging fruit—the most easily recovered (least expensive) deposits were the only ones that could be justified. One need only look at petroleum production or mining for examples of this. During the past 20 years, there has been virtually no new refining or mining capacity added in the United States.

Once prices rise to a level that supports more complex (and costly) recovery efforts, there is a great amount of difficulty in bringing new supplies to market.

Commodities are also subject to sharp price moves. Systemic shocks, such as a natural disasters or global political turmoil, which disrupt the supply chain of a given commodity, are reflected in price "crashes" to the upside. It takes a considerable amount of time for corrective actions to take effect following a systemic shock. Since there are not any effective methods for increasing supply in the short term, the only thing that can "give" is the price.

Portfolio Diversification

The need for diversification is a basic tenet of modern portfolio theory. By allocating a portion of total portfolio assets into uncorrelated investments, investors can realize an increase in total portfolio return accompanied by a reduction in risk. In its simplest form, diversification takes place within a portfolio of like assets (i.e., a portfolio that holds multiple equity issues rather than a single security). More sophisticated investors also have realized the benefit to be gained by diversification among different asset classes. Historically, this has resulted in an allocation between equities and fixed-income assets.

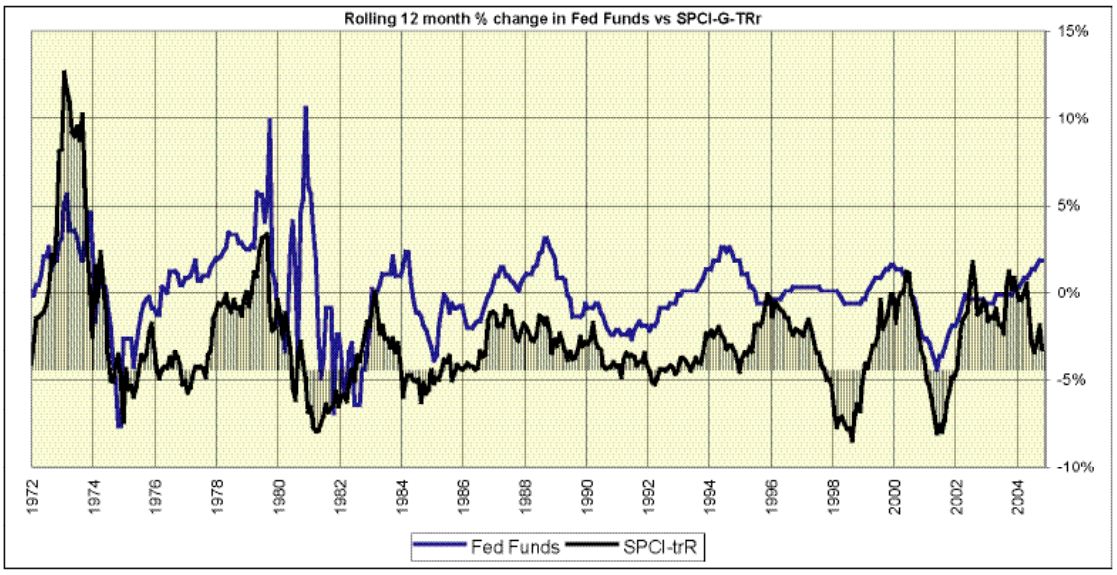
The accompanying table provides data on the correlation of various asset classes. Traditionally, investors have diversified a portfolio by introducing bonds to an equity-based asset basket. The data make clear that commodities should be considered when evaluating asset class allocations, as they have an important role to play alongside their more traditional counterparts. Academic studies have shown that commodities investments can enhance portfolio returns while lowering overall portfolio risk profiles.

Figure 3

Correlation	S&P 500 (TR)	Lehman	SPCI TR	GSCI
S&P 500 (TR)	1.0000	0.2278	0.1404	0.0917
Lehman		1.0000	0.0154	0.0731
SPCI TR			1.0000	0.8500
GSCI				1.0000
R-Squared				
S&P 500 (TR)	100%	5%	2%	1%
Lehman		100%	0%	1%
SPCI TR			100%	72%
GSCI				100

Source: Standard & Poors

Figure 4



Source: RTM Management

To date, commodities have not been fully included in most allocation models. A factor in this under-representation has surely been the relative difficulty of investing in commodities for traditional asset managers. The introduction of diversified commodity indexes and associated investment vehicles should satisfy the need for a well-balanced product that

provides passive long exposure for the asset class.

Analysis of historic data also highlights an important relationship between monetary policy and the price performance of commodities as an asset class. Specifically, during periods of monetary contraction (rising interest rates), returns on commodities have historically outperformed those for fixed income and equities. Given the current interest rate environment, commodity-based investments look like a logical allocation for investment professionals.

The accompanying chart illustrates the historic performance of various asset classes during times of restrictive and expansionary monetary policy.

INDEX BASICS

Having examined the argument for a commodity allocation, let's move on to study what options are out there for commodities investors. There are a number of broad-based commodity indexes currently available, but different rules regarding a host of issues (calculation methodologies, component selection criteria, futures roll periods, etc.) create indexes are significantly diverse. Investors should, at the very least, be aware of these differences before making investment decisions.

When constructing an index, product providers are trying to satisfy two different masters. The first is the desire to compose a basket of components that is "representative" of the market in general. In this case, "representative" has been interpreted differently by the various providers. The second issue is how readily exposure can be gained – the so-called "'investability" of the basket. Investability covers issues such as component liquidity, suitable proxies and other operational concerns. Each of the index providers attempts to draw a balance between these demands. The balance that is struck is the source of many of the differences of the various indexes.

In general, the available indexes draw their constituents from the accompanying list of commodity sectors and components. These component products offer an acceptable balance between demand representation and liquidity. The RICI is the obvious exception, drawing constituents from a larger pool of commodities, albeit at the anticipated cost of liquidity and operational efficiency.

Figure 5

Sector	Components
Energy	Crude Oil, Natural Gas, Heating Oil, Unleaded Gas, etc.
Grain / Agricultural	Soybeans, Wheat, Corn, Oats, etc.
Industrial Metal	Aluminum, Copper, etc.
Livestock	Cattle, Hogs, etc.
Precious Metal	Gold, Silver, etc.
Softs / Fibers	Coffee, Sugar, Cocoa, Cotton, etc.

Arithmetic Vs. Geometric

One of the most prominent differences between the various indexes currently offered is in the calculation methodology. This is the actual formula used to compile the individual component prices and compute an index value.

Figure 6

Index	Methodology[1]
CRB	Geometric
DJ-AIG	Arithmetic
GSCI	Arithmetic
RICI	Arithmetic
SPCI	Geometric

There are some key points to keep in mind when discussing the differences between the geometric and arithmetic index constructs, which can have profound impacts on the actual behavior of the products.

Arithmetic

A three-constituent arithmetic index would be represented by the following formula:

$$\frac{(A^{*}\%\text{WeightA})+(B^{*}\text{WeightB})+(C^{*}\%\text{WeightC})}{3}$$

The main details to keep in mind when discussing arithmetic indexes are the following:

- Constituent dollar weights change as underlying prices move.
- To replicate the index, a portfolio manager must buy and HOLD the basket.
- An arithmetic index will outperform a straight geometric index.

Investors are probably most familiar with arithmetic indexes, as this is the methodology employed by most equity indexes. When a component stock within an arithmetic index appreciates relative to the others, its weight within the index increases. A geometrically calculated index, would keep the representation of this component constant, holding fewer shares at the higher price.

Geometric

A three constituent geometric index is represented by the following equation.

$$\left((A)^{\%\text{Weight}}{}^{*}(B)^{\%\text{Weight}}{}^{*}(C)^{\%\text{Weight}}{}^{*}\right)^{(1/3)}$$

The main points to keep in minds are:

- Each component has a fixed dollar weight in the index. This weight remains constant.
- In order to maintain the constant dollar weight, a portfolio manager must react to changing constituent prices by continually rebalancing the portfolio:
  - BUY commodities when prices fall relative to the basket.
  - SELL commodities when prices rise relative to the basket.

A geometric index which includes the returns from the convexity associated with this methodology often outperforms an arithmetic index in oscillating markets.[2]

In theory, a geometric index rebalances in real time throughout the day, each time a component price changes. In reality, this is not practical for investors. For one thing, futures trade in whole lots—fractional amounts cannot be transacted. Therefore, geometric indexes may establish rules

governing when rebalance trades are initiated and how to reinvest any profits generated by this activity.[3]

Although geometric indexes are not as well known as their arithmetic cousins, there are some notable examples, including the Consumer Price Index, most currency indexes (such as the USDX and those developed by the Federal Reserve Bank) and some equity products (such as the Value Line Composite Index).

Arithmetic Vs. Geometric—An Example

In practice, geometric indexes will always underperform arithmetic indexes—geometrically averaged indexes rise slower and fall faster than arithmetically averaged indexes. An example will help to highlight the differences between arithmetic and geometric averaging methods. Consider an index comprised of only three components - A, B and C- and assume that these components are equally weighted. The base period price for each scenario is assumed to be 100.

Figure 7

			Variable Prices			Arithmetic		Geometric	
		Chg	A	B	C	Index Value	% Change	Index Value	% Change
SCENARIO 1	Base Valuation		100	100	100	100		100	
Period 1	ALL prices increase 10%	10%	110	110	110	110	10%	110	10%
Period 2	ALL prices increase 10%	10%	121	121	121	121	10%	121	10%
SCENARIO 2	Base Valuation		100	100	100	100		100	
Period 1	ALL prices decrease 10%	(10%)	90	90	90	90	(10%)	90	(10%)
Period 2	ALL prices decrease 10%	(10%)	81	81	81	81	(10%)	81	(10%)
SCENARIO 3	Base Valuation		100	100	100	100.0		100.0	
Period 1	ONE prices increases 10%	10%	110	100	100	103.3	3.3%	103.2	3.2%
Period 2	ONE prices increases 10%	10%	121	100	100	107.0	3.6%	106.6	3.2%
Period 3	ONE prices increases 10%	10%	133	100	100	111.0	3.8%	110.0	3.2%
SCENARIO 4	Base Valuation		100	100	100	100.0		100.0	
Period 1	ONE prices decreases 10%	(10%)	90	100	100	96.7	(3.3%)	96.5	(3.5%)
Period 2	ONE prices decreases 10%	(10%)	81	100	100	93.7	(3.1%)	93.2	(3.5%)
Period 3	ONE prices decreases 10%	(10%)	72.9	100	100	91.0	(2.9%)	90.0	(3.5%)

The data make clear several important points:

- Equal price changes in all components will result in equal index changes for both geometrically and arithmetically averaged indexes (scenarios 1 & 2).
- The impact from equal, successive percentage changes in one component are constant for geometric averages. Thus, a 10 percent increase in an individual commodity, all others held constant, will always cause a geometric index to increase by 3.2 percent. Conversely, a 10 percent decrease an individual commodity, all others held constant, will cause the geometric index to decrease by 3.5 percent[4] (scenarios 3 & 4).
- When component prices move independently, geometrically averaged indexes rise slower and fall faster than arithmetically averaged indexes. Scenario 3 shows the geometric index value rising at a constant 3.2 percent while the arithmetic index changes at an accelerating rate (from 3.3 to 3.8 percent). Scenario 4 shows the geometric index value falling by a constant rate (again, 3.2 percent) while the arithmetic index falls at a decelerating rate (from 3.3 to 2.9 percent) (scenarios 3 & 4). This has significant implications for hedgers and others wishing to manage exposure to geometrically indexed products.
- For an arithmetic index, successive constant percentage price changes in one component increase with rising prices and decrease with falling prices (scenarios 3 & 4).

In geometric averaging, changes in an individual component's price do not change the component's relative dollar weight in the index.

In arithmetic averaging, the relative weight of an individual component will change as the component prices move independently of each other. Scenario 3 illustrates that as the price of component A increases at a constant rate of 10 percent each period (all other prices held constant), the index value increases at a rate that accelerates from 3.3 to 3.8 percent (i.e., the component is more heavily weighted). Conversely, as the price of component A declines at a constant rate of 10 percent (scenario 4), the impact on the index price level decreases (from 3.3 percent to 2.9 percent).

This last point highlights a dynamic that has important rami fications for investors and should be discussed in more detail.

- In arithmetic averages, component concentrations within the index are subject to the relative price changes of the components. When the price of a single component rises relative to other index constituents, the weight of that component within the index will also rise. Similarly, when a constituent price falls relative to the others, its weight within the index will decrease. As an example, look at the GSCI for the period from January of this year until the beginning of July. The energy sector represented just

Figure 8

GSCI Components and Dollar Weights (%)			
Sector	1/8/05	7/7/05	Difference
Energy	66.70%	76.79%	+ 10.09%
Agriculture	16.38%	10.73%	- 5.65%
Livestock	7.03%	4.85%	- 2.18%
Industrial Metals	7.54%	5.93%	- 1.61%
Precious Metals	2.35%	1.70%	- 0.65%
Total	100.0%	100.0%	
Source: Goldman Sachs			

under 67 percent of the index valuation at the start of the period. Over the course of the period, this level of exposure increase to almost 77 percent (representing a rise in the sector weight of more than ten percent).

For an investor looking to gain exposure to raw energy products, this was a good position to take. It may not have been as suitable if the aim was to gain broad exposure to a diversified commodity basket.

Futures As Proxy

Most of the published commodity indexes use exchange-traded futures and forward contracts as proxies for the physical commodities. Futures contracts are exchange-traded agreements to deliver a standardized asset (grade, type, location, etc.) at a given price and time in the future. In practice, the vast majority of future positions are used for hedging purposes and are liquidated prior to delivery.

Futures are used by index providers for a number of practical reasons: They are standardized, hedgers have access to the markets and prices are transparent and disseminated instantaneously.

Gaining exposure to commodities without listed futures is more problematic. Physical commodities can be logistical nightmares. High storage costs, slippage and spoilage, geographic constraints and a host of other issues work against involvement by non-professionals. Swaps and commodity-linked notes are an option for institutional investors, but also involve costs that must ultimately be borne by the investors.

While the use of futures is appropriate from a pragmatic standpoint, it is not without drawbacks. Chief among these is that the indexes are limited to commodities for which there are liquid futures contracts. Some important commodities are, as mandated by index rules, omitted. Futures positions also must be rolled from expiring contracts to more deferred ones (see the later section on backwardation/contango).

Indexes

When we speak of commodity indexes, there are actually several different ways to look at the data. For this reason, most index providers compile and report on a series of individual measures for a given index – in effect, creating multiple versions of the same index.

Price Index (aka Spot Index)

The Price Index measures the price movements of the underlying commodity futures spot contracts. It is not a measure of investment performance, and as such, is useful simply as an indication of underlying price trends. Spot indexes cannot be readily compared to their investable counterparts.

Continuous Contract Index (aka Excess Return)

Because the underlying component prices of the indexes are based on futures prices, there is a need to roll positions from the expiring contracts to more deferred ones. The Continuous Contract Index smoothes the price movements associated with these rolls. It is a measure of the dollars/returns associated with the price movement in the index. It does not account for the return associated with margin accounts, and can be viewed as the return on an uncollateralized, or leveraged, commodity investment.

Total Return Index

The Total Return Index takes the underlying futures contract as proxy a step further. When investing in futures contracts, investors are required to post margin in order to establish and maintain positions. The funds posted as margin are invested in government securities and generate a return. All of the Total Return Indexes calculate this portion of return based on current 90-day U.S. Treasury bill rates (90-day T-bills). The return on collateral from the margin account is compounded at a regular interval (which can vary between the indexes).

The Total Return Index represents the performance of the Continuous Contract Index with the inclusion of these collateral returns. Thus, it more closely tracks the investment performance of the collateralized positions.

For a portfolio manager, this collateral return is an extremely important component of the index construction. Generally speaking, the required futures margin, which is usually held as T-bills, is approximately 20 percent of the notional value of the required exposure. The balance of the funds are also calculated to the return of 90-day T-bills, but are available for enhanced strategies.

As an example, consider the manager who has to gain $100 million of commodity index exposure. The actual exposure gained by long positions in the underlying futures would require about $20 million of collateral in a margin account. This position provides the continuous contract portion of the return. The remaining $80 million is calculated as a long T-bill position with the associated returns. In practice, this portion of the portfolio may not be invested in T-bills. By taking alternative positions, an astute portfolio manager may generate returns in excess of the current T-bill rate and generate additional alpha for investors.

Replication Index

Indexes that are calculated geometrically[5] can also provide what is known as a Replication Index. Replication is the return that a passive indexer would earn by replicating the index

Figure 9

Index	Calculated Return Based On…	Note
Price Index	Price change of underlying commodity prices.	Futures prices used as proxy; not investable.
Continuous Contract	Takes futures roll into account when determining returns.	Uncollateralized (leveraged) return.
Total Return	Continuous contract + Collateral Return	Fully collateralized return.
Replication Index	Continuous contract + Collateral Return + Rebalance Return	Not available for arithmetic indexes.

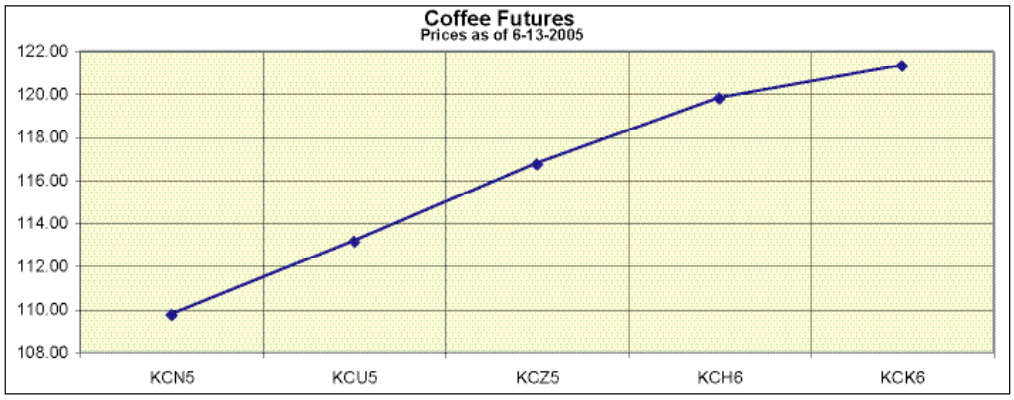
with the underlying components. Geometric indexes maintain equal dollar weightings across the various constituents. Because of this, there is a need to continually rebalance the portfolio. The Replication Index assumes a portfolio is rebalanced at the end of each day to the original dollar weights, and that the resulting rebalance returns are reinvested back into the index.

Index Return

The concept of "return," when discussing commodity indexes, is more nuanced than most investors realize. It is not simply the cumulative change in prices of the component commodities.

As has been discussed, almost all commodity index values are actually based upon the prices of the futures contracts representing the tangible underlying component commodities. This convention ensures that underlying pricing data is widely available. It also enables portfolio managers to hedge the index positions using exchange-traded futures contracts. From a practical standpoint, the use of futures can also increase the complexity of the products. Since the replicated positions are in fact maintained by taking corresponding positions in commodity futures contracts, portfolio managers have to post margin and roll positions. In many cases, replication-hedging models require the manager to hold fractional share amounts, not a possibility with futures. It can also complicate the calculation of index return.

Figure 10



Sources Of Return

The easiest way to view the total return of a commodity index is to look at the sources of that return. Commodity index return can be broken into several distinct components. These components are the underlying price movements, the roll yield and the collateral return. Geometric indexes can also generate additional rebalance returns.

Underlying Cash Price Changes / Spot Yield

It should go without saying that the change in value of the individual components of the basket will influence the overall price of the basket. The factors affecting these prices have been discussed previously. Suffice it to say that the whole is in fact equal to the sum of the parts.

Roll Yield (Backwardation/Contango)

In order to replicate a given index, a portfolio manager will buy futures contracts representing the required exposure in the underlying components. At expiration, a long holder of commodity futures will be assigned delivery of the underlying physical commodity. In order to avoid this and continue to maintain the desired exposure, the position must be 'rolled' to more deferred expiration contracts. Each of the indexes has rules which specify how this roll is to be carried out.

The roll highlights an important dynamic in trading futures – backwardation and contango (also known as carry). These terms are used to describe the shape of the price curve as you move from spot prices to the more deferred expiration contracts. Markets that are in backwardation exhibit spot and near spot prices that are higher than the more deferred contracts. In contango markets, the near contracts are priced at a lower level than the more deferred. As a general rule, a commodity that is not easily stored will trade in backwardation. A commodity that has acute demand/shortage will also trade in backwardation.

Depending upon the price differential between the near and deferred contracts, the roll of futures contracts will result in the new average owned price for a commodity being higher or lower then the average price being replaced.

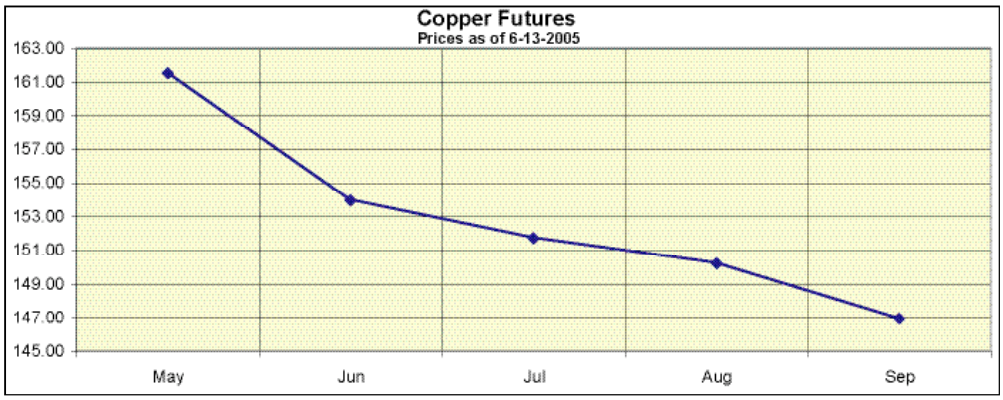
A quick example on the differences in the two market conditions that may exist during a roll period is shown here.

In a contango market, the price of the deferred contract to be rolled into is priced higher than the near-term contract being rolled out of. Assume a portfolio manager is long June Coffee futures contracts at an average price of 110.00. When it comes time to roll the position, the manager would roll the June futures out to the December contract. The December contract is priced at 117.00 and the new average price of Coffee after the roll activity would be 117.00. Obviously there is no inherent profit or loss associated with this activity; in simple terms, a new base price for the Coffee position has been established.

In a backwardated market, the price of the deferred contract to be rolled into is lower than the near term contract being rolled out of. Using High-Grade Copper as an example, suppose a fund owned July Copper futures contracts at an average price of 154.00. When it comes time to roll the position, the fund would roll the July futures position out to the September futures contract. The September contract is priced at 146.00, and the new average price of the Copper contract after the roll activity would be 146.00. Again, there is no inherent profit or loss associated with this activity, simply a new base price.

There has been a great deal of discussion on the actual

Figure 11



benefit of rolling onto backwardated markets and of the implied cost of rolling into contango markets. A casual observer could conclude that an investor is better off getting into a lower price contract than a higher one. But, as stated previously, there is no yield in the roll activity itself. As an example, assume a particular market is backwardated during a roll period. The portfolio manger will be required to roll a specific dollar amount of exposure. The manager will sell fewer contracts at a higher price and replace them with more contracts, albeit at a lower per-contract cost.

Crude in Contango

When discussing the return associated with the roll yield, the energy sector has been the primary focus. Crude and the other energy sector products have contributed the most to this portion of the overall return. There are several reasons for this:

- The energy sector constituents are difficult and/or expensive to store. This effects the shape of the forward price curve.
- Futures contracts on energy components are listed serially – there are 12 expiration contracts every year. Therefore, depending on the index rules, these positions may be rolled with more frequency than other sectors.

This situation, however, may be changing. As the accompanying chart highlights, crude markets, which have historically traded in backwardation, have recently been trading in contango. There is considerable speculation as to why this has occurred. Theories range from the arrival of hedge fund and passive long fund money to the continued lack of refining capacity. Suffice it to say that the game is changing – at least for now. This change may have profound consequences on future performance of the various indexes. Specific differences in the mechanics of the indexes, such as roll frequency and contract selection, will be important factors in what effect that impact may have on future performance.

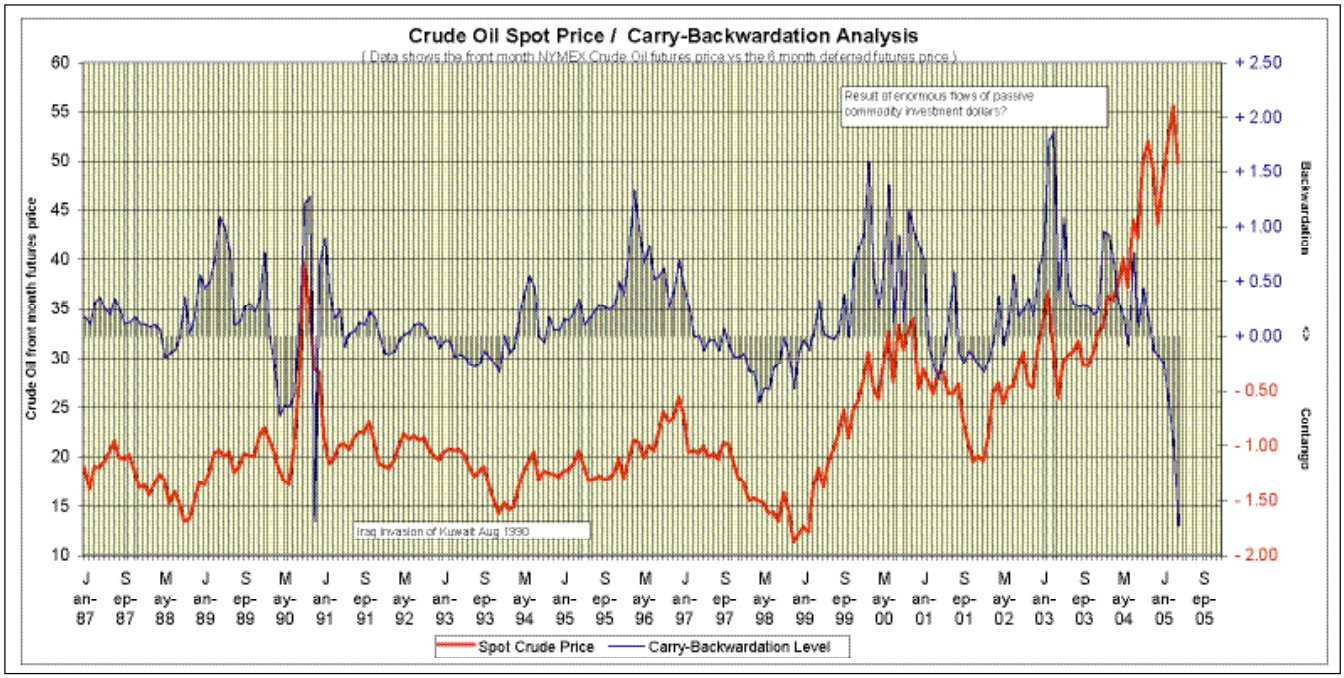
Return On Collateral

To trade futures contracts, investors have to post funds into a margin account. These funds are generally held as short-term securities (90-day T-bills), which will generate a return to the investor. This component of return is only included in the Total Return calculation of the indexes.

Rebalance Returns

In order to maintain constant dollar weights, geometric indexes rebalance periodically. This activity, which is required

Figure 12



by the constant-dollar-weighted structure of the geometric methodology, provides a portfolio manager the opportunity to enhance returns and can be the source of significant additional income.

INDEX ISSUES

When an index is formulated, there are several important matters that providers take into consideration. At the very least, a potential investor should be aware of what some of these issues are and what effect they can potentially have on the performance of the chosen vehicle.

Component Selection

Basket Composition

The most obvious difference between the various indexes is in their composition. When choosing the constituents and their concentrations, index providers take many factors into account. As discussed, most indexes use futures contracts as the basis for index pricing, due to their price transparency and availability for hedging. The drawback is that this limits the index basket to those commodities that have actively traded futures contracts. Currently, there are no liquid contracts coal, steel or chicken futures – among others.

Each of the index providers is attempting to strike a compromise between representability and tradability. At one extreme is the RICI, which has 35 constituents, including azuki beans, wool and rubber. This is good in terms of representing a world basket of consumption goods, but it makes the index more difficult to replicate. Silk and soybean meal each contribute just 0.15 percent to the overall valuation. In fact, the smallest 16 components comprise only 12 percent of the index value. This may be viewed as diversity at the expense of expediency.

Figure 13

Commodity Sector	SPCI	GSCI	DJ/AIG	RICI	CRB
Energy	49.19%	76.79%	36.31%	44.00%	23.53%
Agricultural	36.70%	10.73%	31.17%	28.75%	47.06%
Metals	7.28%	7.63%	24.18%	21.10%	17.65%
Meats	6.81%	4.85%	8.36%	3.00%	11.76%
Other	0.00%	0.00%	0.00%	3.15%	0.00%

This brings us to another concern for index providers—constituent liquidity.

Liquidity of Constituents

The liquidity of the underlying futures contracts should be a concern for investors and product providers. Several of the indexes have rules that limit constituent inclusion based upon liquidity requirements. Minimal liquidity thresholds ensure the ability of market participants to easily (and cheaply) hedge their exposure. It also ensures that market pricing is current and adequately transparent.

The other concern when discussing the liquidity of the underlying constituent futures is the risk of an index representing an extreme percentage of a commodity's open interest. Several of the more marginal commodities held by some of the indexes are thinly traded at best. Low daily volumes and open interest amounts should be viewed with trepidation. The risk is that a high concentration of the open interest will be associated with a particular index, which could create price inaccuracies or operational difficulties related to relative position sizes.

Component Weights

After deciding what commodities to include, the index provider must then decide on what weights each constituent will comprise in the overall index. Once again, the index providers have different approaches.

Keep in mind as well that the price movement of the individual components within a sector will tend to move in unison. For this reason, sector representation should also be evaluated.

Number of Components

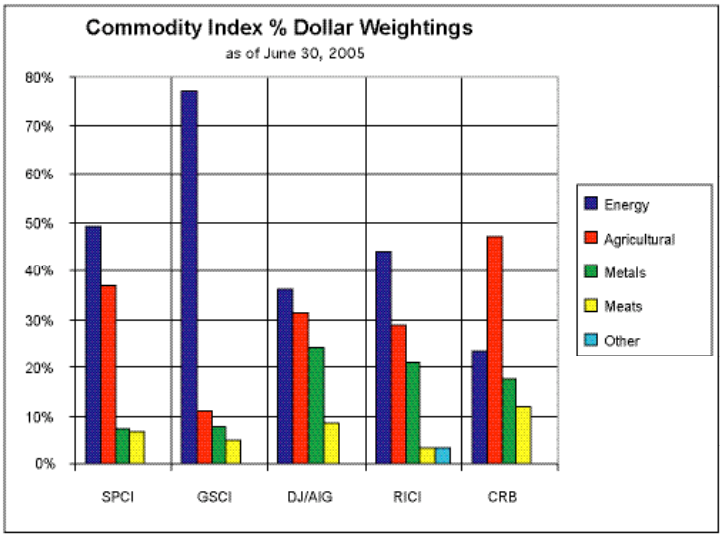
The total number of components is also important. Once again, the balance is between representation and operational efficiency. As the number of components increases, the basket may become more representative of consumption patterns, but the overall complexity and expense of position management activities will increase.

Conversely, too few constituents will not provide the requisite diversification, and will lead to an index that is more akin to a speculative position than a component in a balanced portfolio.

Domestic vs. International Exposure

Several indexes have included non-U.S. listed constituents in their baskets. This can be beneficial, providing investors with a more representative proxy, but it is not without trade-offs. The primary problem is that time zone differences can make the actual management of the portfolio more difficult.

Figure 14



Another concern is currency conversion. Although many non-U.S. listed futures are priced in U.S. dollars, not all are. The inclusion of non-dollar based products introduces the risk of adverse currency fluctuations.

Before including commodities that are not listed in the U.S., index providers should assess the impact that inclusion will have on the management of linked portfolios and associated returns. In many cases, non-U.S. components are highly correlated to their North American counterparts (i.e., Brent Crude traded in London vs. WTI Crude traded in New York). If there is not a suitable difference in the representation that is gained, the inclusion of non-U.S. components may not be warranted. Foreign commodity representation should serve a higher purpose than as a marketing angle.

Other Index Issues

Although variations in index constituents and their weights are the most noticeable differences between indexes, there are other operational issues that deserve mention. Index providers have introduced differences in the way that the various parts of a given index behave. Having decided what to include in an index, providers decide how to gain the desired exposure. While these differences may seem innocuous at first glance, they can be the source of substantial differences in index performance over the longer term.

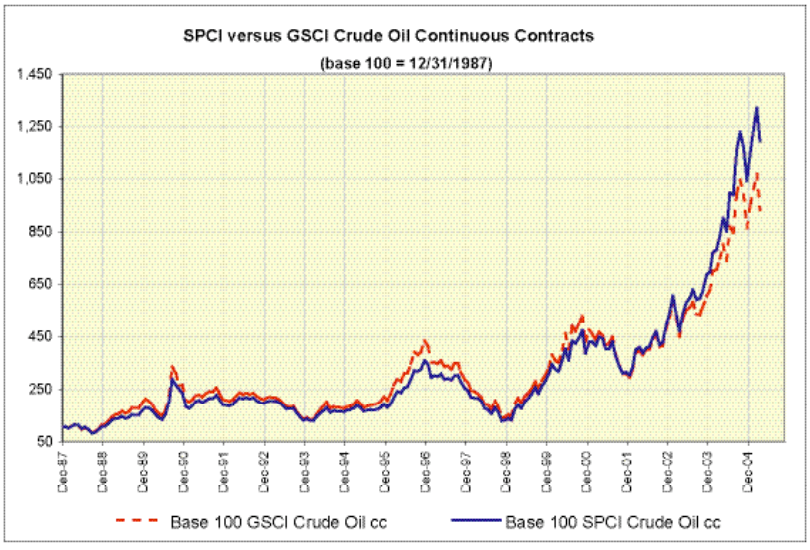
Contract Selection

Contract selection—the choice of which futures expiration contracts to own—has a meaningful influence on the returns of an investment. The accompanying chart shows the performance associated with holding crude oil futures contracts in accordance with the index rules for the SPCI and the GSCI. Over time, the differences can have a significant effect.

Keep in mind that this analysis compares the performance of the contract average prices used for the SPCI and GSCI. It does not take into account the specific index component weights and should not be misinterpreted as such.

Although analysis of this type is out of reach for most investors, they should be aware that issues such as this will influence investment performance. Product developers would have a greater need to perform similar analyses.

Figure 14



Roll Periods

Each index has a stated policy as to how positions are to be rolled into more deferred contracts. The continuous contract must be rolled from the expiring contract into a deferred contract. The choice of which deferred contract to roll into can also have significant implications for investment performance. An analysis of crude data beginning in 1987 reveals the magnitude of these differences.

Figure 15

Roll Contract	Overall Return (%)
2	1,446
3	1,140
4	2,048
5	1,323
6	826
7	1,322
8	1,457
9	1,072
10	877
11	935

Source: RTM Management

The study looked at rolling from the front contract into each of the subsequent deferred contracts and calculated a return series on the continuous contract. The accompanying data table shows a clear advantage to be gained from rolling out of the front month and into the 4th month over this time period.

Double Counting

Some indexes attempt to compensate for downstream uses of one commodity in the production or processing of another. For instance, soybeans are the primary ingredient in both bean oil and bean meal. Therefore, the amount of soybeans may be reduced to account for the inclusion of the other soy-based constituents. This is another reason to be aware of sector weights across the indexes. Please note that in this example, the weight of the grain sector remained constant. In some instances, the double count adjustment can impact sector weights. For example, the SPCI reweighs the amount of corn as a result of its being the main feed component of live cattle, thereby changing the sector weights of grains and livestock.

Rebalance Rules

The timing of the index rebalances can also impact performance. An index may experience a period of rapid price appreciation in a specific sector, but in many cases, the index rebalance period may not occur until after the underlying prices have given back the gains.

Weighting rules

Most of the indexes (RICI is the exception) have an established set of rules regarding when and how the index is rebalanced. These are summarized in the following table.

Figure 16

INDEX HIGHLIGHTS	RJ-CRB	DJ-AIG	GSCI	RICI	SPCI
Inception	1986	1998	1991	1998	2001
Data Series From	1956	1990	1970	1998	1970
Constituents					
Largest Sector	Ags - 47%	Energy - 33% (capped)	Energy - 75%	Energy - 44%	Energy - 49%
Constituents	17	20	25	35	17
Non-US	0	LME (3)	LME (5), IPE (2)	11	0
Notable	Equal Weighted				No gold
Double Count Adjustment	No	No	No	n/a	Yes
Roll Frequency (annual)	6	12	12	12	6
Roll Period (days)	1	5	5	1	3
Methodology					
Arithmetic	Yes	Yes	Yes	Yes	Yes
Geometric	Yes	No	No	No	Yes
Reweighting					
Weighting Based On	Equal Weighted	Production & Liquidity	World Production	Discretionary	Commercial Open Interest
Decided By	n/a	Committee	Committee	Discretionary	Committee
Other					
Exchange Traded Futures	Yes	Yes	Yes	No	No
Exchange	NYBOT	CBOT	CME	n/a	n/a

Alternatives / How To Invest

Having examined the different indexes, we can move on to the meat of the matter: How does an investor gain the desired exposure to commodities? As mentioned previously, larger institutional investors can take positions using index-linked products such as swaps and structured notes. They can also build replication portfolios using individual commodity futures. For smaller investors, however, that is not a realistic option due to the logistical difficulties and scale required to establish and maintain numerous futures positions.

An alternative approach could use index futures, as there are currently futures contracts listed on several of the broad indexes (GSCI, CRB, and DJ-AIG). But again, direct futures trading is impractical for the vast majority of investors. A single contract in GSCI futures has a nominal value of approximately $100,000 and would be rolled 12 times annually. A CRB futures contract has a nominal value of approximately $150,000, is thinly traded and must be rolled six times a year.

Although a single DJ-AIG futures contract has the lowest nominal value, at approximately $54,000, that contract is also thinly traded. This may result in significant slippage, with positions that are difficult to establish, roll over and exit.

Figure 17

Contract	Exch	Price	Multiplier	Contract Value	O/I	OI $ Value	Rolls (Annual)
GSCI	CME	380.00	250	95,000	17,486	1,661,170,000	12
DJ/AIG	CBOT	558.00	100	55,800	489	27,286,200	7
RJ-CRB	NYBOT	300	500	150,000	715	107,250,000	6
DJ/AIG TRAKRS	CME	31.25	1	31	2,284,000	71,375,000	n/a
as of June 30, 2005							

Indirect Investment

Many investors have chosen to take equity or debt positions in firms that specialize in direct commodity production or marketing as a surrogate for real asset exposure. The thinking is that price movements in raw commodity prices will be reflected in the valuation of these firms. The problem with this approach is that it is not supported by the facts.

The following graphics illustrate that commodity-based equity share prices are more highly correlated to equity indexes than to real asset prices. The Select Sector SPDR-Energy (ticker symbol: XLE) is one of several exchange-traded funds (ETFs) which track a basket of stocks from companies in the industries oil, gas, energy equipment and services industries. As such, it is often utilized as a surrogate for energy exposure. As the graph illustrates, the basket of energy industry stocks that make up the XLE is closely correlated to the S&P 500 stock index. It is not, however, a good indicator of energy futures returns.

The second graph highlights XLE's low correlation to crude oil prices. Obviously, an investor using the XLE as a surrogate for energy exposure would be advised to look elsewhere.

The primary reason for the high correlation to equities is that, in many instances, these commodity industry companies hedge their commodity exposure to better weather fluctuations in raw commodity prices. Simply put, these firms are in the moving business, not the storage business. They run exploration and development operations, not commodity price speculation firms. To the extent possible, they will do what can be done to lessen the influence of raw commodity prices on their bottom lines, as a fiduciary responsibility to the firm's shareholders.

Index Benchmarked and "Real Asset" Funds

There are currently a number of commodity index

Figure 18

Figure 19

benchmarked products offered to the retail market. Although the aim of most of these products is seductively beneficial, investors should be forewarned that the actual execution of the strategy has been an expensive proposition. In almost all cases, the investor is presented with the desired broad benchmark performance. In exchange for this performance, all that the investor has to do is pay very high fees that may have a materially adverse impact on that performance.

Real asset or specialty natural resource mutual funds present another option for smaller investors. Far too often, however, there are serious drawbacks to the current offerings.

Most real asset funds have notoriously high costs. A sample of these funds reveals that many have load fees of more than 500 basis points and annual expenses of more than 125 basis points. These cost structures are far too high and present an enormous drag on portfolio performance.

The RICI is currently offered as the benchmark for a fund with a minimum initial investment of $10,000. In the first year of participation, an investor could pay well over 750 basis points in various fees and expenses. This is not an unusually high threshold for these funds and that is the problem. The index would have to appreciate by over ten percent for the investor to net the same return as an investment in relatively low-risk T-bill.[6]

What's worse, oftentimes the holdings are not commodities or their direct derivatives;the funds are frequently loaded with equity shares of natural resource firms. As previously discussed, this is the wrong exposure. These issues conspire to make benchmarking to an index a problematic endeavor.

- The mutual fund structure itself has been the subject of recent criticism. The mechanics of the product have some undesirable features. Transparency is lacking - holdings are generally revealed, on a delayed basis, only twice a year.
- Buy and sell orders are transacted at the daily closing net asset value of the fund. There is no real-time pricing or trade execution mechanism.
- There are no facilities for stock type orders, such as short sales, limit orders or margin trades.

Exchange-Traded Funds (ETFs)

An area of particular interest has been the use of ETFs to gain commodity exposure. An ETF is an investment vehicle used by both institutional and retail investors that seeks to match the performance of an index or other benchmark. Unlike mutual funds, ETFs are priced throughout the day, can be traded like stocks and offer better transparency to investors. Operating expenses are generally lower for an ETF than a mutual fund that tracks the same index. This is because the ETF does not provide the same level of services to investors (service call centers, periodic statements, check writing facilities, etc.). Investors pay commissions when buying or selling the funds.

At the end of 2004, State Street launched the first U.S.-traded ETF based on commodity prices: The Gold Bullion Securities ETF (GLD), which attempts to mirror the price of gold, has been well received, with average volume approaching two million shares a day. The product has an annual expense ratio of 40 basis points. Barclays Global Investors followed up with another gold ETF (IAU) soon after. The positive reception of these products shows the appetite of investors for direct commodity exposure.

More recently, an ETF that tracks the GSCI was listed in Europe (Deutsche Börse and SWX Swiss Exchange). This is the first ETF offering that is based upon a commodity index. The product charges a 45 basis point annual management fee. As with all ETFs, which trade like stocks, investors can use conventional stock trading techniques to enter into positions.

Figure 20

Real Asset Funds—Expense Structure Examples			
Fund	**Expense Ratio (%)**	**Front Load (%)**	**Deferred Load (%)**
PIMCO Commodity Real Ret Strat A	1.24	5.50	0.0
PIMCO Commodity Real Ret Strat B	1.99	0.00	5.00
PIMCO Commodity Real Ret Strat C	1.99	0.00	1.00
Oppenheimer Real Asset A	1.40	5.75	0.00
Oppenheimer Real Asset B	2.31	0.00	5.00
Oppenheimer Real Asset C	2.24	0.00	1.00
Merrill Lynch Natural Resources A	1.25	5.25	0.00
Merrill Lynch Natural Resources B	2.02	0.00	4.00
Merrill Lynch Natural Resources C	2.02	0.00	1.00
Ivy Global Natural Resources A	1.65	5.75	0.00
Ivy Global Natural Resources B	2.42	0.00	5.00
Ivy Global Natural Resources C	2.38	0.00	1.00
Source: Morningstar.com			

These features make this an attractive product.

But there's a catch. Because this product has not received SEC approval, it is not available to U.S. investors. The product sponsors have expressed their desire to list in the U.S. The approval process is a long one, however, often taking several years – especially for a product such as this one, with its multi-faceted characteristics (a commodity product, in a fund structure, that trades like an equity).

What Now?

Having come this far, the reader could conclude that there are not a lot of good alternatives currently available to most investors. Unfortunately, there is little to contradict this statement. This should be a seen as a wake up call to both investors and product providers. Investors should realize that the current offerings are lacking. In many cases, a good idea badly implemented is worse than doing nothing at all. High fees, portfolio holdings that don't advance the concept of broad-based commodity indexation, improper benchmarking, and the use of inappropriate surrogates all tend to negate the positive reasons for investing in commodities in the first place.

Ideally, product providers would strive to address the issues identified in this article and provide products which strive to address the following points:

1. Perhaps the single most significant change that product providers could make is to reduce the fee and expense structure of the various commingled fund structures. Early in a new product life cycle, higher fees can be expected. As the products become more prevalent, however, expenses should decrease. Although commodity-linked assets under management have grown tremendously over the past few years, there has been almost no significant reduction in expenses charged to the investor.

2. All returns should be benchmarked to an index that is transparent, rules-based and widely disseminated. This means that the composition of a model portfolio is readily known, that individual constituent prices are widely available, and that the price change of the index can be broken out and attributed to the various components. Product providers should track the investment performance on an individual component and/or sector level, and should make this information available to investors in a timely manner. Index specifics, such as composition, rebalancing timing and calculation methodology, should be prominently identified.

3. As has been discussed, some index methodologies allow for significant portions of the invested funds to be available for enhanced strategies. In many cases, portfolios that are nominally benchmarked to a broad commodity index contain other high yield assets, such as junk bonds. If this is done, it should be noted and explained in detail. Ideally, the commodity return portion of the portfolio would be benchmarked to the commodity index and reported alongside the performance of these other investments, which should also be benchmarked (perhaps versus 90-day T-bills). In this way, investors could make informed decisions regarding the management of the commodity portfolio versus that of the non-margined allocation.

4. Investors should know if their investment is backed by actual commodity proxies, and represents an ownership interest in this underlying basket of products. Holding transparency and adherence to published index rules and conventions should ensure that investors actually get the exposure that they think they are getting when they first invest.

5. Benchmark transparency should be such that market professionals are able to calculate index prices independently throughout the day and maintain replication positions. An open-ended structure would allow these market participants to enter the market and would provide an arbitrage mechanism, which would lead to more accurate pricing and increased liquidity.

6. Finally, investors should be able to trade shares in the products intraday, like stocks. Initial investment thresholds

should be low enough to allow all investors to include these products in their strategic investment planning.

These suggestions represent the product model that providers should be attempting to attain. Investors should not expect to see all of these features in a single product, nor should they expect them to appear all at once. In some cases, they could not all be included in the same product. Rather, innovative product providers will address these issues piecemeal and provide products that will gradually move us toward the goals set forth herein. For instance, regulatory issues cannot be pushed forward any faster than they take to move through the system. Exchange-traded products are subject to this approval process, and cannot be offered until they are approved. The timing, therefore, is largely out of the hands of the product providers once the application process has begun.

In the short-term, however, there is no good reason why co-mingled funds with direct commodity exposure and low fees have not been introduced. The time is right for those who choose to lead by innovation. The market has shown incredible growth in spite of the current product offerings - not because of them. Imagine what could happen with a well-designed product that addressed these issues.

Footnotes

1. Both the SPCI and the CRB recently began publishing index values using arithmetic averaging methodologies. These indexes are listed and reported alongside the existing geometric products.
2. This could occur only when the results from the rebalance trading activity are included in the performance measurement. It is limited to Total Return Indexes and does not occur when looking at Price Index or Continuous Contract performance.
3. The SPCI-Replication Index is the only index currently employing this feature.
4. The index will likely have futures contracts for several different expiration dates for each of the component commodities. The impact on an individual commodity average from a 10 percent increase or decrease on an individual month will vary according to the level of that month relative to other months in the average of that commodity.
5. Currently, there are two commodity indexes that are calculated geometrically, the SPCI and the CRB. The SPCI is the only index that currently publishes a Replication Index data series.
6. For the quarter ending March 2005, the T-Bill rate was approximately 2.60 percent.