GUIDE TO THE BACHE COMMODITY INDEX [SM]

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1. Introduction

1.1 Overview of the Bache Commodity Index (BCI^{SM})

The Bache Commodity Index^{SM}(BCI^{SM}) is currently comprised of 19 Commodities that are traded on seven major futures Exchanges located in the United States and the United Kingdom.

The primary objective of the BCI^{SM} is to provide broad-based exposure to global Commodity markets. There are additional objectives of the BCI^{SM} methodology. The first of these is to provide broad, long-term diversified exposure to individual Commodities within each major Commodity sector consistent with their overall importance to that sector as well as their market liquidity. The second objective is to ensure that the BCI^{SM} does not become dominated by a single Commodity sector or by several Commodities within a Commodity sector. This is accomplished by employing upper and lower bounds on the market and Commodity weights, and by a frequent rebalancing of the BCI^{SM} weights. The third objective is to moderate the volatility inherent in the major Commodity market sectors. This is accomplished by considering the optimized weights derived from the risk-return profiles of mean-variance efficient portfolios that can be created with the three major Commodity sectors.

Additional risk reduction factors considered in the BCI^{SM} methodology include systematically reducing near-term exposure to Commodity markets that are experiencing price declines, and reducing the pricing impact that BCI^{SM} -linked investment products will have on the underlying Commodity markets. This is accomplished through a precise roll methodology. Lastly, given the dynamic nature of Commodity markets, overall construction of the BCI^{SM} is monitored by an Advisory Committee. The Committee reviews the BCI^{SM} methodology on an ongoing basis and may recommend changes in BCI^{SM} components as well as its methodology.

For 2009, exposure to the three major Commodity sectors (energy, metals, and agriculture) is as follows:

Bache Commodity Index^{SM} Components: March 2009	
Major Commodity Sectors	Weight (%)
Energy	50.0
Metals	20.0
Agriculture	30.0
Total	100.0

The allocations to individual Commodities within each major Commodity sector are as follows:

Bache Commodity Index[SM] Components: March 2009				
Commodity Market	Exchange	Sector	Sub-Sector	Allocation (%)
Crude Oil WTI	NYMEX	Energy	Petroleum	20.0
Natural Gas	NYMEX	Energy	Natural Gas	10.0
Heating Oil	NYMEX	Energy	Petro Product	2.5
Gas Oil	ICE	Energy	Petro Product	10.0
RBOB Gasoline	NYMEX	Energy	Petro Product	2.5
Crude Oil Brent	ICE	Energy	Petroleum	5.0
Copper	LME	Metals	Industrial	5.0
Aluminum	LME	Metals	Industrial	2.5
Gold	COMEX	Metals	Precious	7.5
Silver	COMEX	Metals	Precious	2.5
Nickel	LME	Metals	Industrial	2.5
Corn	CBT	Agriculture	Grains	7.5
Soybeans	CBT	Agriculture	Grains	5.0
Wheat	CBT	Agriculture	Grains	5.0
Live Cattle	CME	Agriculture	Livestock	2.5
Lean Hogs	CME	Agriculture	Livestock	2.5
Coffee	ICE US	Agriculture	Soft	2.5
Cotton	ICE US	Agriculture	Soft	2.5
Sugar	ICE US	Agriculture	Soft	2.5
Total				100.0

Allocations to Commodity sectors may change. However, sector allocations will remain within a pre-specified range. These ranges are determined every five years and will remain fixed for five years barring major structural changes in Commodity markets. Section 2 discusses the factors that are taken into account in determining the allocation range. The following sector allocation boundaries are effective from January 2006 to December 2010.

Minimum and Maximum Sector Weights: January 2006 to December 2010		
Sector	Minimum Allocation (%)	Maximum Allocation (%)
Energy	40.0	65.0
Metals	15.0	45.0
Agriculture	15.0	45.0

1.2 The Advisory Committee

PFDS Holdings has established an Advisory Committee to assist it in connection with the operations of the BCI[SM]. The Advisory Committee meets on an annual basis and at other times at the request of PFDS. The principal purpose of the Advisory Committee is to advise PFDS with respect to, among other things, the calculation of the BCI[SM], and the effectiveness of the BCI[SM] as a representative basket of commodity future contracts and the need for changes in the composition or methodology of the BCI[SM]. The Advisory Committee acts solely in an advisory and consultative capacity; all decisions with respect to the composition, calculation and operation of the BCI[SM] are made by PFDS.

The Advisory Committee meets on a regular basis during each calendar year. Prior to the meeting PFDS outlines the commodities and contracts to be included in the BCI[SM] in accordance with the selection criteria set below. The proposed composition of the BCI[SM] is then circulated to the Advisory Committee members in advance of the meeting and is presented and discussed at the meeting. The Advisory Committee is also consulted on any other significant matters with respect to the calculation or operation of the BCI[SM] and may, if necessary or practicable, meet at other times during the year as issues arise that warrant Advisory Committee consideration.

1.3 Definitions

Actual Allocation: The number of Futures Contracts in a given market that are actually held by an investor utilizing the Transactions Minimizing Strategy.

Advisory Committee: An established group of individuals who meet to advise on the set of Commodities and the set of allocations to those Commodities that comprise the BCI[SM]. These allocation decisions are based on pre-determined criteria and guidelines. The Advisory Committee is comprised of seasoned global markets executives and leading academics selected by senior management of PFDS Holdings.

BCI[SM]: Bache Commodity Index[SM]. It is comprised of the Bache Single Commodity Indices[SM]. BCI[SM] may also be used as an acronym for the Bache Commodity Index[SM].

BSCI[SM]: Bache Single Commodity Index[SM].

Business Day: a day, on which commercial banks settle payments and are open for general business, including dealings in foreign exchange and foreign currency deposits.

Commodity: In respect of a Transaction, the Commodity specified in the relevant Commodity Reference Price.

Commodity Business Day: A day in which a Transaction for which the Commodity Reference Price is announced or published by an Exchange, a day that is (or, but for the occurrence of a Market Disruption Event, would have been) a day on which that Exchange is open for trading during its regular trading session, notwithstanding any such Exchange closing prior to scheduled closing time.

Commodity Reference Price: A price announced or published by an Exchange.

Daily Roll: The portion of the BCI^{SM} that is sold each day as it approaches expiration, with an accompanying purchase of new Futures Contracts for delivery further in the future.

Daily Roll Quantity: The inverse of the number of Business Days between expirations. If this quantity is rolled each trading day, then the entire position will be rolled in equal installments by the Last Roll Date. For example, if there are 62 Business Days Between Expirations for a given copper Futures Contract, then if 1/62 (1.613%) of the position is rolled each trading day the position will be fully rolled on the Last Roll Date for the nearby copper contract.

Days Between Expirations: The number of trading weekdays between the Last Roll Date of the prior Nearby Contract (the contract that has most recently passed its last roll date) and the last roll date of the current Nearby Contract.

Essentially Similar Commodities: Commodities that demonstrate comparable traits in trading behavior and expected return. Essentially Similar Commodity pairs include gold/platinum and soybeans/soybean meal.

Exchange: The Exchange or principal trading market specified in the relevant confirmation or Commodity Reference Price.

Futures Contract: In respect of a Commodity Reference Price, the contract for future delivery of a contract size in respect of the relevant delivery date relating to the Commodity referred to in that Commodity Reference Price.

Index Value: The value of the BCI^{SM}, which is the sum of the number of BSCI Units held in each market multiplied by the BSCI values.

Index Holiday: If all the U.S. products in the BCI^{SM} do not settle (the exchange is not producing a settlement price) then the day is declared an Index Holiday. On an Index Holiday we do not publish BCI^{SM} value and do not trade any products in the BCI^{SM}. Current index holidays include: New Years Day, Martin Luther King Day, President's Day, Good Friday, Memorial Day, July 4th, Labor Day, Thanksgiving and Christmas.

Indication Value: The value of the BCI^{SM} if one or more of the Futures Contracts represented in the index did not trade due to market closure or could not be transacted due to trading limits at the close of trading.

Last Roll Date: The last date that an investor will hold a position in the Nearby Contract. After this date any position in the Nearby Contract must be either rolled or closed out. This value is determined by the PFDS Holdings and will generally be set in a manner that ensures adequate liquidity remaining in the Nearby Contract so that positions can be easily liquidated.

Market Disruption Event: An event that would give rise to an alternative basis for determining the relevant price in respect of a specified Commodity Reference Price or the termination of the Transaction were the event to occur or exist on a day that is a pricing date for that Transaction.

Maximum Nearby Allocation: The largest position that can be held in the Nearby Contract. This quantity cannot be more than 100% of the total allocation, and must be zero after the Last Roll Date for the Nearby Contract.

Maximum Roll Quantity: The largest percentage of a Futures Contract that will be rolled on a given day.

Minimum Allocation: For a new Commodity, Minimum Allocation is 2.5% of the Index Value.

Nearby Contract: A Futures Contract that is close to its expiration date. In a Rollover strategy, the Nearby Contract is the position that must be closed out.

Nextout Contract: A Futures Contract with an expiration date further in the future than the Nearby Contract. In a Rollover strategy, the Nextout Contract is the one that will be used to initiate a new position.

Official Index Value: The value of the BCI^{SM} if there was an official closing price for all Commodity Futures Contracts represented in the index for that day, and if none of the Commodity Futures Contracts represented in the BCI^{SM} were subject to trading limits at the close of trading.

Rollover: A Futures Contract calls for delivery of a Commodity at a particular time in the future. An investor in Futures Contracts does not generally take delivery of the Commodity, but rather sells the Futures Contract as it approaches expiration and buys a new Futures Contract for delivery further in the future. This Transaction is called a Rollover or sometimes simply a roll. An investor can roll an entire futures position or roll a portion of an open position.

Rollover Strategy: A method that describes how a particular portfolio of Futures Contracts will be rolled.

Target Allocation: The Target Allocation is the number of Futures Contracts in a given market that some futures trading strategy indicates should be held.

Transaction: Any Transaction that is a Commodity swap Transaction, Commodity basis swap Transaction, Commodity cap Transaction, Commodity floor Transaction, Commodity collar Transaction, Commodity option Transaction, Commodity index Transaction, Commodity forward Transaction, or Commodity spot Transaction.

Unit: Each unit of the BSCI^{SM}.

Value Weight: The percentage of each BSCI^{SM} allocated to the Nearby and Nextout Contracts, and to cash.

2. Index Structure and Selection Criteria

2.1 Initial Eligibility Criteria

PFDS Holdings will consider for inclusion Commodity markets that satisfy the following initial selection criteria:

Physical Commodities. Financial markets (e.g., interest rate, currency, and equity) will not be considered. Financially settled derivatives that are based on physical Commodities will be considered for inclusion in the BCI^{SM}.

Active Derivative Markets. Commodities included in the BCI^{SM} must have actively traded futures or other derivative contracts listed on an approved exchange. All exposure to Commodity markets must take place through derivative contracts.

Representative. Allocations to global Commodity sectors and to Commodities within those sectors will take into account their importance to the global economy, which will include their size based on production.

Liquidity. Derivative markets on approved Commodities must have sufficient liquidity across multiple delivery months to support a significant investment without resulting in undue market impact. Consider liquidity measures such as open interest when determining allocations across and within Commodity sectors.

2.2 Guidelines for Selection

PFDS Holdings will consider all Commodity markets that satisfy the initial criteria. The decision to add or remove a Commodity in the BCI^{SM} will be based on the following guidelines:

Minimum Size. The Minimum Allocation to a new Commodity is 2.5% of BCI^{SM} market value. If the Advisory Committee determines that the Commodity does not add sufficient value to the BCI^{SM} to support the Minimum Allocation, the Commodity will not be included in the BCI^{SM}.

Essentially Similar Commodities. Commodities that are essentially similar to Commodities that are already included in the BCI^{SM} may be excluded. Essentially Similar Commodity pairs such as gold/platinum and soybeans/soybean meal will only be included in the BCI^{SM} if there is sufficient liquidity to support both Commodities and there is sufficient diversification benefit from doing so.

Diversification. PFDS will base all final decisions regarding inclusion of a Commodity market on the primary objective of the BCI[SM], which is to provide broad-based exposure to Commodity markets. PFDS will consider the risk impact of Commodity investment allocation and will emphasize Commodity markets and sectors that have been determined to provide risk reduction benefits for portfolios that include multiple asset classes.

PFDS has determined the following minimum and maximum Commodity weights:

Across Commodity Sectors. Currently, Commodity sectors are defined as energy, metals, and agriculture. The minimum allowable allocation to energy is 40% and to metals and agriculture is 15%. The maximum allowable allocation to energy is 65% and to metals and agriculture is 45%

Within Commodity Sectors. The BCI[SM] will contain a minimum of 5% of exposure to each of the following Commodity sub-sectors: petroleum-crude, petroleum-products, natural gas, industrial metals, precious metals, grains, livestock, and softs and a minimum of 2.5% in any one commodity.

Additional Characteristics. Consider the additional roles of Commodity investment through the BCI[SM] such as a potential hedge against inflation, low correlation to traditional assets and will emphasize Commodities that have been determined to provide these benefits.

Sector Allocations: March- 2009			
Sector	Allocation (%)	Minimum* (%)	Maximum* (%)
Energy	55.0	40.0	65.0
Metals	17.5	15.0	45.0
Agriculture	27.5	15.0	45.0

Sub Sector Allocations: March 2009			
Petroleum-Crude	25	5.0	60.0
Petroleum-Products	17.5	5.0	60.0
Natural Gas	12.5	5.0	60.0
Industrial Metals	12.5	5.0	40.0
Precious Metals	5.0	5.0	40.0
Grains	15.0	5.0	35.0
Livestock	7.5	5.0	35.0
Softs	5.0	5.0	35.0

* Based on 2006 Diversification Criteria

Candidate Markets Not Included in 2009				
Commodity Market	Exchange	Sector	Sub-Sector	Reason(s)*
Platinum	COMEX	Metals	Precious	1,2
Zinc	LME	Metals	Industrial	1,2
Lead	LME	Metals	Industrial	1,2
Tin	LME	Metals	Industrial	2
Cocoa	ICE US	Agriculture	Softs	2,3
Orange Juice	ICE US	Agriculture	Softs	2,3
Feeder Cattle	CME	Agriculture	Livestock	1
Soybean Meal	CBT	Agriculture	Grains	1
Soybean Oil	CBT	Agriculture	Grains	1

1. Essentially similar to other market(s) already included in the Index
2. Liquidity not sufficient to support the Minimum Allocation
3. Sector/Sub-Sector constraint limited inclusion of additional Commodities

2.3 Choice of Exchanges for Commodities

PFDS will determine the appropriate Exchange(s) for a given Commodity. Considerations will include the liquidity and transparency provided by the Exchange, availability of over-the-counter derivatives such as swap contracts priced using the Exchange, and the availability of accurate pricing during New York trading hours.

2.4 Announcements

Decisions regarding BCI^{SM} composition may generally be announced 30 to 60 days prior to the date that the BCI^{SM} changes are to be incorporated into published values, except that PFDS Holdings may make immediate changes in the event of a significant change in the trading environment for a particular Commodity.

2.5 Dates

The BCI^{SM} is published on Reuters every Business Day except for Index Holidays. BCI^{SM} values will generally be available between the hours of 8:00 pm and 10:00 pm, New York Time.

2.6 Official BCI^{SM} Values and Indication Values

A BCI^{SM} value will be considered an Official Index Value if there was an official closing price for all Commodity Futures Contracts represented in the BCI^{SM} for that day, and if

none of the Commodity Futures Contracts represented in the BCI^{SM} were subject to trading limits at the close of trading.

A BCI^{SM} value will be considered an Indication Value if one or more of the Futures Contracts represented in the BCI^{SM} did not trade due to market closure or could not be transacted due to trading limits at the close of trading. Examples of events that would result in Indication Values include: Holidays declared by Exchanges that are not Index Holidays, market closures resulting from unexpected emergencies, and trading limits that are in effect at the normally scheduled closing time for the market. Examples of events that would not result in Indication Values include: temporary or emergency market closures that are resolved before the regularly scheduled close of trading, temporary imposition of price limits that are removed prior to the close of trading, and market closures that are different from the usual closing time but are sanctioned by the Exchange and are announced at least one day prior to the event.

2.7 Roll Schedule for BCI^{SM} Futures Markets

Roll Schedule for Bache Commodity Index^{SM} Components.

Roll Date: 4th Day of:		Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy												
Crude Oil WTI Nymex	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
Crude Oil Brent ICE	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
Natural Gas Nymex	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
Heating Oil Nymex	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
Gas Oil ICE	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
RBOB Gas Nymex	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
Metals												
Copper LME		Mar		May		Jul		Sep			Dec	
Aluminum LME		Mar		May		Jul		Sep			Dec	
Nickel LME		Mar		May		Jul		Sep			Dec	
Silver		Mar		May		Jul		Sep			Dec	
Gold Comex	Feb		Apr		Jun		Aug		Oct		Dec	
Agriculture												
Corn CBT		Mar		May		Jul		Sep			Dec	
Soybeans CBT		Mar		May		Jul		Sep		Nov		Jan
Wheat CBT		Mar		May		Jul		Sep			Dec	
Live Cattle CME	Feb		Apr		Jun		Aug		Oct		Dec	
Lean Hogs CME	Feb		Apr		Jun		Aug		Oct		Dec	
Coffee ICE US		Mar		May		Jul		Sep			Dec	
Cotton ICE US		Mar		May		Jul			Oct		Dec	
Sugar ICE US		Mar		May		Jul			Oct		Dec	

Notes:

Roll schedule applies to composite indexes, sector indexes, and single-commodity indexes

Date is Last Roll Date for Contract nearest to expiration

For example, January 5th is the last roll date for the February WTI Crude Oil Contract

3. Calculation of the BCI[SM] and Related Indices

The BCI[SM] is currently comprised of 19 Bache Single Commodity Indices[SM] (BSCI[SM]). The BCI[SM] value is the sum of the number of BSCI[SM] Units held in each market multiplied by the BSCI[SM] values.

$$BCI = \sum_{i=1}^{19} u_i BSCI_i \tag{3.1}$$

Each BSCI[SM] is assigned a value percentage in the BCI[SM]. The percentages for 2009 are as follows:

Bache Single Commodity Index[SM]	Commodity Market	Exchange	Percent of Composite Index	
BSCI_CL	Crude Oil WTI	NYMEX	20.0	
BSCI_CO	Crude Oil Brent	ICE Futures Europe	5.0	
BSCI_NG	Natural Gas	NYMEX	10.0	
BSCI_HO	Heating Oil	NYMEX	2.5	
BSCI_QS	Gas Oil	ICE Futures Europe	10.0	
BSCI_XB	RBOB Gas	NYMEX	2.5	
BSCI_HG	Copper	LME	5.0	
BSCI_LA	Aluminum	LME	2.5	
BSCI_LX	Nickel	LME	2.5	
BSCI_GC	Gold	COMEX	7.5	
BSCI_SI	Silver	COMEX	2.5	
BSCI_C	Corn	CBT	7.5	
BSCI_S	Soybeans	CBT	5.0	
BSCI_W	Wheat	CBT	5.0	
BSCI_LC	Live Cattle	CME	2.5	
BSCI_LH	Lean Hogs	CME	2.5	
BSCI_KC	Coffee	ICE Futures U.S.	2.5	
BSCI_SB	Sugar	ICE Futures U.S.	2.5	
BSCI_CT	Cotton	ICE Futures U.S.	2.5	

3.1 Computing the Number of BSCI^{SM} Units

To maintain the appropriate weight for each Commodity, the BCI^{SM} is rebalanced each day to have the predetermined Commodity weights. Rebalancing generally involves increasing the allocation to the BSCI^{SM} units that declined in value by more than the BCI^{SM}, and decreasing the units of the BSCI^{SM} units that increased in value by more than the BCI^{SM}. In this way, the percentage of BCI^{SM} value represented by each BSCI^{SM} will always be equal to the pre-specified Commodity weights.

Changes in the number of BSCI^{SM} Units in the BCI^{SM} are made at the end of the next Business Day. If one or more Exchanges are closed on a particular day, then no changes in those BSCI^{SM} Units will be incorporated into the BCI^{SM}, and net changes will be implemented on the next Commodity Business Day. The equation for calculating the number of Units for each BSCI^{SM} is as follows:

$$u_i = \frac{(BCI)(w_i)}{BSCI_i} \tag{3.2}$$

Definitions:

Composite:	BCI^{SM} value
$BSCI_i$:	Bache Single Commodity Index^{SM}
w_i :	Target percentage for the BSCI^{SM} in the composite BCI^{SM}
u_i :	Number of Units of the BSCI^{SM} to be included in the composite BCI^{SM} on the following Index Day.

The BCI^{SM} will be rebalanced on Business Days. This includes all Commodities traded on both U.S. and non-U.S. Exchanges. In the calculations of the BCI^{SM}, Index Holidays will be counted as Commodity Business Days, but any trading will take place the first Business Day following the Index Holiday. The Transactions that would have occurred on the U.S. Federal Bank Holiday, plus the following day's Transactions (or, the net changes), will both occur on the first Business Day following the U.S. Federal Holiday.

3.2.1 Computing the BSCI^{SM} Values

A BSCI^{SM} is calculated for each Commodity market in the BCI^{SM}. BSCI^{SM} values are calculated every weekday except for Index Holidays. Index values will generally be available between the hours of 8:00 pm and 10:00 pm, New York Time.

Each BSCI^{SM} value is derived from the following prices:

The Nearby Futures Contract for the BSCI Market. The Nearby Contract is the active Futures Contract with the closest maturity date, subject to the restriction that Futures Contracts may not be held past the fifth calendar date of the month prior to delivery. The list of active Futures Contracts is determined by PFDS Holdings.

The Nextout Futures Contract. This is the active Futures Contract that matures just after the Nearby Contract. If the next out Futures Contract for that Commodity has insufficient liquidity (e.g., very limited open interest), the next liquid deferred Futures Contract will be used in the calculation of the BSCI^{SM} for that Commodity.

Cash Allocation. Each BSCI^{SM} employs a dynamic asset allocation methodology, and is not always fully invested in Futures Contracts. The allocation to cash is incorporated into the BCI^{SM} value and the BCI^{SM} return calculations.

The following table shows a hypothetical BSCI^{SM} calculation for the NYMEX WTI Crude Oil futures market (BSCI_CL). In this example, BSCI_CL was based on 0.00035271 contracts for delivery in October 2006, 0.00071763 contracts for delivery in November 2006, and 44.53 index points held in cash. Based on the settlement prices of 73.65 dollars/barrel for the Nearby Contract and 74.12 dollars/barrel for the Nextout Contract, the BSCI value was 123.70. In this example, the Value Weights for the Nearby Contract, the Nextout Contract, and cash are 21%, 43%, and 36%, respectively.

EXAMPLE: Single Commodity Index for WTI Crude Oil						
	Futures Expiration Month	**Market Price**	**Contract Value**	**Number Contracts in BSCI_CL**	**Index Points**	**Value Weight (%)**
CL_NEARBY	Oct-06	73.65	73,650	0.00035271	25.98	21.0%
CL_NEXTOUT	Nov-06	74.12	74,120	0.00071763	53.19	43.0%
CASH		1.00	1.00	44.53	44.53	36.0%
BSCI_CL					123.70	100.0%

The number of Futures Contracts in the BSCI^{SM} is determined by the actual percentage. This quantity is further separated into the percentage held in the Nearby Contract and the percentage in the Nextout Contract. These quantities are determined using a separate algorithm designed to minimize the total turnover in the BSCI^{SM}. After executing this algorithm, the following index weights are known:

$$\begin{aligned} w_{N_t} &: \text{The BSCI weight in the nearby contract} \\ w_{N_t} &: \text{The BSCI weight in the nextout contract} \\ w_{C_t} &= 1 - w_{N_t} - w_{X_t} : \text{The BSCI weight in cash} \end{aligned} \qquad (3.3)$$

These weights are then converted into the number of Futures Contracts to be held in the BSCI^{SM} by incorporating the market value of the Nearby and Nextout Contracts. Definitions:

$BSCI_t$: The current index value

q_N : The number of futures contract in the nearby contract

q_X : The number of futures contract in the nextout contract

C_t : The number of dollars in cash

v_N : The market value of one nearby futures contract

v_x : The market value of one nextout futures contract

Then the quantity of Futures Contracts and cash in the BSCI^{SM} that will be used to calculate the BSCI^{SM} on the next BCI^{SM} date are:

$$\begin{aligned} q_{\mathbf{N}} &= \frac{BSCI_t \cdot w_N}{v_{N_t}} \\ q_X &= \frac{BSCI_t \cdot w_X}{v_{X_t}} \\ C_t &= BSCI_t \cdot w_{C_t} \end{aligned} \tag{3.5}$$

So that on date t+1, the new BSCI^{SM} value will be:

$$BSCI_{t+1} = p_{N,t+1} q_{N,t} + p_{X,t+1} q_{X,t} + C_t \tag{3.6}$$

The return on cash held in the BCI^{SM}, referred to as "Treasury Bill Return", or TBR, will be equal to:

$$TBR_t = \left[\frac{1}{1 - TBAR_{t-1} x 91/360} \right]^{1/91} - 1 \tag{3.7}$$

Where "TBAR" equals the daily 3-Month Treasury Bill Rate.

3.2.2 Computing London Metal Exchange (LME) Contract Values

At present, the London Metals Exchange (LME) metals markets are the only *forward* markets included in the BCI^{SM}. The rest are *futures* markets.

The main difference between forward and futures markets is related to settlement procedures. Futures contracts are settled each day, while forward markets are settled only once, on the expiration date of the contract. For the BCI^{SM}, this influences the timing of cash flows. If the BCI^{SM} holds a position in NYMEX Crude Oil futures, the cash flows associated with that position are realized in full each trading day. However, if the BCI^{SM} holds a position in LME Copper for delivery in four months, then the cash flows (gains/losses) associated with that trade will not be realized until the expiration date in four months time. In order to place a fair and accurate value on the BCI^{SM}, we will apply a discount rate to profits or losses from unexpired forward contracts. In this way, the published BCI^{SM} index values will accurately reflect the liquidation value of all the positions in the BCI^{SM}.

The 3-Month Treasury Bill yield was selected as the discount rate for the LME cash flows. The following equation will be used, where *T-bill Yield* is the daily yield on 3-Month T-bills, and *Days to expiration* is the number of days until expiration of the LME contract.

$$\text{Discount Return}_t = \frac{\text{Return}_t}{\left(1 + \text{Tbill Yield}_{t-1}\right)^{\text{Days to Expiration}}}$$

Making this change to LME positions implicitly reduces BCI^{SM} exposure to these markets. For example, if interest rates were at 5% and a weighted average maturity in LME markets of about three months, this change would reduce the LME contribution to BCI^{SM} risk and return by about 1.25%.

In order to maintain our target exposure, the size of LME positions will be increased by about 1.25% (assuming 5% rates). The larger position sizes will result in slightly larger profits and losses. Then, after applying the discount rate, the LME exposure and profit/loss will be the same as before. The equation below shows the new weights for LME contracts.

$$w_{\text{increase}_t} = w_t\left(1 + \text{TBill Yield}_{t-1}\right)^{\text{Days to Expiration}}$$

3.3 The Trading Rule and the Target Allocation

The index utilizes a momentum-based trading rule to determine the Target Allocation to a given Commodity. To minimize turnover and trading costs, there is a maximum daily position change in each Commodity, so that the Actual Allocation to a given Commodity

may be higher or lower than the Target Allocation if the Target Allocation changes by more than this daily maximum turnover. This section describes the method of determining the Target Allocation. Section 3.3.5 describes the method of determining the Actual Allocation and the position changes each trading day.

The Target Allocation is based on the momentum-based trading rule described in Spurgin (1999)[1]. Three signals are evaluated for each Commodity; a short-term signal, a medium-term signal, and a long-term signal. Each signal can be positive or negative. Based on these signals, the Target Allocation takes on one of four possible values: 40%, 60%, 80%, or 100% of the maximum allocation. Thus the position in each Commodity will never be more than 100% or less than 40%. For example, corn is given a 5% maximum allocation, so the Target Allocation for corn as a percentage of the total value of the index can be 2%, 3%, 4%, or 5%.

3.3.1 Description of the Trading Rule

The Target Allocations in the BCI^{SM} are based on a lookback strategy. An *x*-day lookback strategy gives a positive signal if the futures price index on date *t* is higher than it was on date *t-x*. Otherwise the strategy gives a negative signal. The strategy is called a lookback model because it looks back *x* days but ignores changes in the Commodity price that occurred after date *t-x*. The lookback rule was found to provide a higher correlation with Commodity trading advisors than other common rules such as a moving average (Spurgin, 1999).
The number of days used to compute the lookback indicators in the BCI^{SM} are 15 days for the short-term, 27 days for the medium-term, and 55 days for the long-term momentum strategy.

3.3.2 Computing the Futures Price Index

The futures price index must be computed before the lookback signals can be evaluated. Note that this futures price index is used only to evaluate trading signals and generate the Target Allocation. The futures price index is not actually traded in the index. The futures price index is based on a full long position in the underlying Commodity Futures Contract and uses a slightly different Rollover Strategy than the traded portion of the BCI^{SM}.

The futures price index for each Commodity is a weighted average of the return of the position in both the Nearby and Nextout Contracts. The BCI^{SM} uses a continuous roll strategy: It holds positions in the two nearest active Futures Contracts, and each day sells some of the front contract and rolls the position into the Nextout Contract. The roll

[1] Trading rule has been previously published in "A Benchmark for Commodity Trading Advisor Performance," (R. Spurgin, The Journal of Alternative Investments, Fall 1999) and is adapted for use in this index.

strategy incorporated in the futures price index is linear – if there are 90 weekdays between the Last Roll Dates[2] of the Nearby and Nextout Contract, then 1/90 of the position will be rolled each weekday. This strategy is employed in order to provide the smoothest possible return series from which to generate a trend-following system.

Let p_t be the proportion of the investment held in the Nearby Contract on date t

$$p_t = \frac{\#\ \text{weekdays until last roll date of nearby contract}}{\#\ \text{weekdays between last roll dates of prior expiration and nearby expiration}} \tag{3.8}$$

The proportion held in the Nextout Contract is 1-p_t. At the end of each day (p_{t-1} - p_t) is rolled from the Nearby Contract to the Nextout Contract. The daily return is the percentage gain or loss based on the prior day's total investment:

$$r_t = \frac{totalPL_t}{s_{t-1}} \tag{3.9}$$

The futures price index is computed from these daily returns:

$$FPI_t = FPI_{t-1}(1 + r_t) \tag{3.10}$$

3.3.3 Computing the Trading Rule

The lookback trading rule for a given number of weekdays L_x will take on a positive value if the total return is positive between date t-x and date t:

$$L_x = \begin{cases} 1 \text{ if } FPI_t > FPI_{t-x} \\ 0 \text{ if } FPI_t \le FPI_{t-x} \end{cases} \tag{3.11}$$

The BCI^{SM} evaluates three lookback signals to determine the Target Allocation: L_{15}, L_{27}, and L_{55}. The minimum Target Allocation is 40% long, and this is increased by 20% for each positive signal:

$$TA_t = 0.4 + 0.2 \cdot (L_{15} + L_{27} + L_{55}) \tag{3.12}$$

Changes in the BCI^{SM} lookback trading rule are implemented with a one-day lag, in order to insure that there is no ambiguity.

[2] The Last Roll Date is the last date a futures contract can be held before it must be rolled to the next contract. The Last Roll Date in the index varies from market to market, but is generally in the month prior to the delivery month.

3.3.4 The Target Allocation

If a Commodity Futures Contract has a zero long-run rate of return, then the average target allocation will be 70%, as each signal will have a 50% chance of being positive on any given day. Given the positive long-run rate of return observed in Commodity futures markets as a result of inflation and positive roll returns due to backwardation, it is likely that the long-run probability of a positive signal will be higher than 50%, and the average Target Allocation above 70%.

Number of Positive Signals	Target Allocation as % of Maximum Allocation
Zero (all negative)	40% of maximum
One (two negative)	60% of maximum
Two (one negative)	80% of maximum
Three (zero negative)	100% of maximum

3.3.5 The Actual Allocation

The Actual Allocation is percentage of assets invested in Futures Contracts. The remaining assets are assumed to be invested in cash. The Actual Allocation can differ from the Target Allocation (Section 3.3.3, above) because changes to the Actual Allocation are smoothed in order to reduce turnover and transactions costs. The methodology for determining the Actual Allocation is given in Section 3.4.

3.4 The Transaction Minimizing Strategy

The Transaction Minimizing Strategy (TMS) incorporates many of the features of the daily Rollover Strategy described above, but with modifications to allow for dynamic asset allocation based on the trading rule, while still minimizing Transaction costs. The daily Rollover Strategy involves selling a small portion of the position in the Nearby Contract each day and buying a similar quantity of the deferred contract. However, if the intent is to reduce the overall exposure to the Futures Contract, this can be accomplished by selling a small portion of the Nearby Contract as planned, but not buying the deferred contract. The result is a lower overall allocation. Similarly, increasing the allocation can be accomplished by slightly increasing the position in the deferred contract but not selling the front contract. Thus, within certain boundaries, active asset allocation can be accomplished without increasing the transaction costs.

3.4.1 The TMS Methodology

The TMS fixes the Maximum Roll Quantity (MRQ) in a given market equal to the Daily Roll Quantity (DRQ):

$$MRQ = DRQ = \frac{1}{\text{days between expiration s}} \tag{3.13}$$

This differs from other published futures strategies. Other published strategies roll 100% of their positions on a particular date or in a particular week. Because the Daily Roll Quantity in the BCI^{SM} does not exceed 5% for any of the Futures Contracts currently traded on major Exchanges, the Maximum Roll Quantity of an investor using the TMS will not exceed 5% in any market and will often be much less. An additional benefit of this method is a reduction in market impact from Rollovers. If a strategy calls for rolling 100% of a position on a particular day, this may have an impact on a market with relatively low liquidity. By limiting the turnover in any Futures Contract, the effect of low liquidity will be considerably lessened.

The Maximum Nearby Allocation (MNA) is set equal to the product of the Daily Roll Quantity and the number of days until the Last Roll Date (LRD). This ensures that the entire position can be rolled on or before the roll date without ever exceeding the Daily Roll Quantity on a given date:

$$MNA = DRQ \cdot LRD \tag{3.14}$$

In a given market, there are four possible outcomes each trading day:

1. The Target Allocation exceeds the Actual Allocation by an amount that is at least as large as the Daily Roll Quantity. **Action:** Make no change in nearby position. Purchase quantity equal to Daily Roll Quantity in the Nextout Contract. If, after this trade has been executed, the nearby allocation exceeds the Maximum Nearby Allocation, then the amount by which the nearby exceeds the maximum is rolled in the usual way (sell the Nearby Contract, buy the Nextout Contract). **Result:** Actual Allocation increases but is still below the Target Allocation.

2. The Target Allocation exceeds the Actual Allocation by an amount that is less than the Daily Roll Quantity or is equal to the Actual Allocation. **Action:** Make no change in nearby position. Purchase quantity equal to the difference between the Target and the Actual Allocations in the Nextout Contract. If, after this trade has been executed, the nearby allocation exceeds the Maximum Nearby Allocation, then the amount by which the nearby exceeds the maximum is rolled. **Result:** Actual Allocation increases and is equal to the Target Allocation.

3. The Target Allocation is less than the Actual Allocation by an amount that is less than the Daily Roll Quantity. **Action:** Make no change in nextout position. Sell a quantity equal to the difference between the Target and the Actual Allocations in the Nearby Contract. If, after this trade has been executed, the nearby allocation exceeds the Maximum Nearby Allocation, then the amount by which the nearby exceeds the maximum is rolled. **Result:** Actual Allocation decreases and is equal to the Target Allocation.

4. The Target Allocation is below the Actual Allocation by an amount that is at least as large as the Daily Roll Quantity. **Action:** Make no change in nextout position. Sell a quantity equal to Daily Roll Quantity in the Nextout Contract. **Result:** Actual Allocation decreases but is still above the Target Allocation.

If ΔNB is defined as the change in the position of the Nearby Contract and ΔNX is the change in the Nextout Contract, with TA as the Target Allocation and AA as the Actual Allocation, then:

$$\begin{array}{lccc} \text{Case 1:} & TA_t - AA_t \geq DRQ & \Delta NB = 0 & \Delta NX = DRQ \\ \text{Case 2:} & DRQ > TA_t - AA_t \geq 0 & \Delta NB = 0 & \Delta NX = TA_t - AA_t \\ \text{Case 3:} & 0 > TA_t - AA_t > -DRQ & \Delta NB = -(TA_t - AA_t) & \Delta NX = 0 \\ \text{Case 4:} & -DRQ \geq TA_t - AA_t & \Delta NB = -DRQ & \Delta NX = 0 \end{array} \tag{3.15}$$

And, if after this Transaction, the nearby allocation is greater than the Maximum Nearby Allocation ($NB>MNA$) then an additional Transaction is needed to bring the nearby allocation to the Maximum Nearby Allocation:

$$\begin{aligned} \Delta NX &= -(NB - MNA) \\ \Delta NX &= NB - MNA \end{aligned} \tag{3.16}$$

These actions summarize the TMS system. By following these rules, the total turnover cannot be larger than a system that employs a different Rollover Strategy and will in almost every instance be lower. The turnover cannot be higher than simply rolling a long position because:

With the TMS, one almost never buys the Nearby Contract. Once a Futures Contract becomes the Nearby Contract, the position may be reduced each day or left unchanged but will almost never be increased. With the TMS, one almost never sells the deferred contract. Once a Futures Contract becomes the deferred contract, the position may be increased each day or left unchanged but will not be reduced. There are a few circumstances when these rules do not hold.