

# **S&P Commodity Trends Indicator** *Methodology*

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# 1. Introduction

## 1.1 Index Objective

The objective of the indicator is to measure the price movement and premium expansion of certain highly liquid futures and to serve as an investment tool. Limiting the volatility of the indicator was a guide in the determination of the methodology. The methodology is implemented in a rules-based, systematic manner. The indicator is not intended to be representative of or serve as a benchmark for a particular futures market or group of markets.

Through a licensing agreement with Alpha Financial Technologies, LLC (AFT)<sup>1</sup>, S&P Dow Jones Indices<sup>2</sup> now offers the S&P Commodity Trends Indicator.

The indicator<sup>2</sup> follows a quantitative methodology to track prices of a diversified portfolio of 16 traditional, physical commodity futures contracts. The contracts (also called components) are grouped into 6 sectors and each sector is represented on either a “long” or “short” basis, depending on recent price trends of that sector. With the ability to go either long or short, the S&P Commodity Trends Indicator is designed to capture the economic benefit derived from both rising and declining trends within a cross-section of traditional, physical commodities markets.

## 1.2 Description of the S&P Commodity Trends Indicator

The key characteristics of the S&P Commodity Trends Indicator include:

- 16 traditional, physical commodity components (futures contracts), grouped into 6 sectors
- Long or short positions are determined by comparing the current sector price to a moving exponential average (i.e., most recent price weighted most heavily, etc.)
- Sectors are rebalanced monthly; components are rebalanced annually
- Performance has a positive correlation to its own standard deviation (i.e., performance tends to increase/decrease with increased/decreased volatility)
- Exposure offers potential to mitigate the negative effect of commodity price cyclicality

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<sup>1</sup> A limited liability company founded by Victor Sperandio, with headquarters in Dallas, TX. Victor Sperandio is recognized as offering futures market trading expertise as a commodity trading advisor and has for some time implemented a number of successful strategies that are designed to profit from futures price trends. The S&P Commodity Trends Indicator is an evolution of these strategies in that it constitutes the intellectual property of AFT, but is constructed, calculated, and maintained by S&P Dow Jones Indices with participation from AFT.

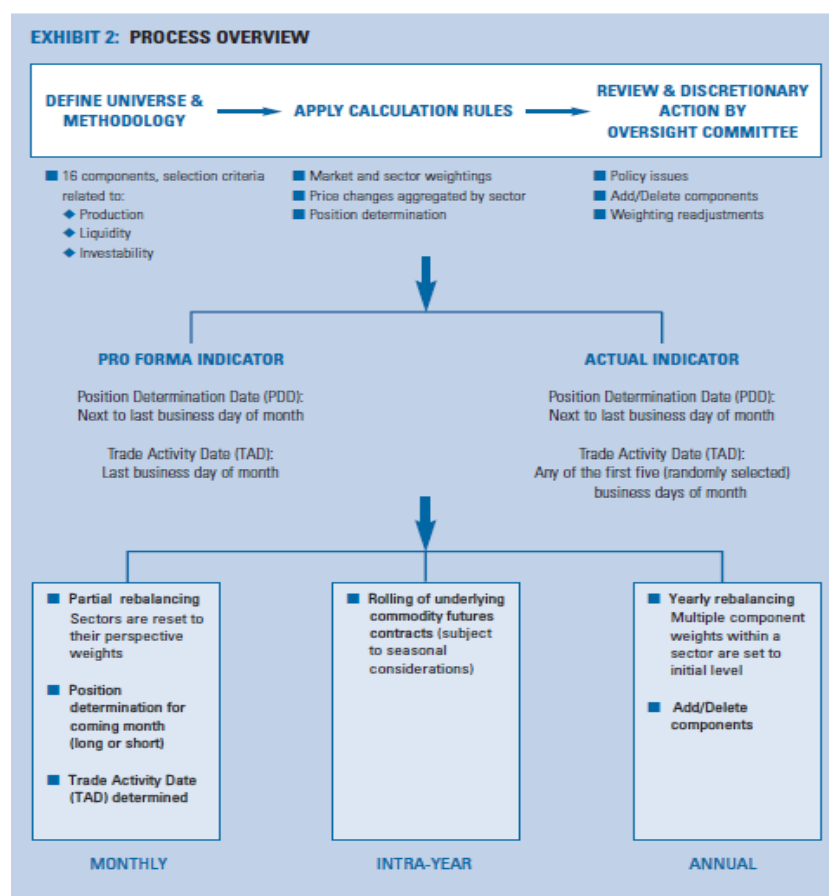
<sup>2</sup> An indicator is a rules-based model or strategy using judgment in its construction to target particular risk/return characteristics of an asset class or segment of a market. It does not intend to passively represent a market as a benchmark index, but instead passively reflects a specific characteristic of that market.

Exhibit 1 illustrates the sector weightings of the indicator, including a reference to the component weights. Note that in some cases there is only one component. See Appendix A for details of the component contracts.

**EXHIBIT 1: S&P COMMODITY TRENDS INDICATOR WEIGHTING SCHEME**

MARKET	MARKET WEIGHT	SECTOR	SECTOR WEIGHT	COMPONENT	COMPONENT WEIGHT
Commodities	100.00%	Energy	37.50%	Heating Oil	6.00%
				Light Crude	17.00%
				Natural Gas	8.50%
				RBOB Gasoline	6.00%
		Industrial Metals	10.00%	Copper	10.00%
				Precious Metals	10.50%
		Livestock	10.00%	Silver	3.50%
				Lean Hogs	4.00%
		Grains	23.00%	Live Cattle	6.00%
				Corn	8.00%
				Soybeans	10.00%
				Wheat	5.00%
		Softs	9.00%	Cocoa	2.00%
				Coffee	3.00%
				Cotton	2.00%
				Sugar	2.00%

Exhibit 2 offers an overview of the construction and maintenance process of the S&P Commodity Trends Indicator and serves as an introduction to the description following.



**Supporting Documents**

This methodology is meant to be read in conjunction with supporting documents providing greater detail with respect to the policies, procedures and calculations described herein. References throughout the methodology direct the reader to the relevant supporting document for further information on a specific topic. The list of the main supplemental documents for this methodology and the hyperlinks to those documents is as follows:

<b>Supporting Document</b>	<b>URL</b>
S&P Dow Jones Indices' Commodities Indices Policies & Practices Methodology	<a href="#">Commodities Indices Policies &amp; Practices</a>
S&P Dow Jones Indices' Index Mathematics Methodology	<a href="#">Index Mathematics Methodology</a>

This methodology was created by S&P Dow Jones Indices to achieve the aforementioned objective of measuring the underlying interest of each index governed by this methodology document. Any changes to or deviations from this methodology are made in the sole judgment and discretion of S&P Dow Jones Indices so that the index continues to achieve its objective.

## 2. Methodology and Maintenance

The methodology of the S&P Commodity Trends Indicator is designed with a focus on capturing both up and down price trends, yet moderating volatility. Components of the indicator are chosen based on fundamental characteristics and liquidity (necessary for an investable model), as opposed to a means for achieving performance per se.

### 2.1 Selection Criteria

Of the factors considered in determining the S&P Commodity Trends Indicator components and weights, liquidity—the volume and notional size of futures contracts traded—is one of the most important. Liquidity is an indication both of the significance of a particular market and the ability to trade with minimal market impact. All the components of the indicator are consistently in the lists of top traditional, physical commodity contracts traded in the U.S.

Investability is another important consideration. Other liquid contracts may exist, but exceptionally large contract values would make the cost to replicate the indicator very inefficient. Contracts are limited to those traded on U.S. exchanges to minimize any impact from major differences in trading hours, avoid currency exchange calculations, and allow for similar closing times and holiday schedules.

#### 2.1.1 Initial Weightings

For commodities, production is an indication of the significance of a given component to the world economy and of such component's significance within the futures markets themselves. Since there is often no single recognized source for a commodity's production figures, estimates are used in selecting and making allocations<sup>3</sup>.

### 2.2 Rebalancing

#### 2.2.1 Monthly Rebalancing for Sector Weights

Sectors are rebalanced monthly to their fixed weights. The rebalance date is the second to the last business day of the month with an effective date randomly selected from any of the first five business days of the next month. Rebalancing monthly helps to keep volatility low since otherwise an extended move in one group or sector would overweight the S&P Commodity Trends Indicator and potentially lead to significantly higher volatility of the indicator. An exception to this (described more fully below) is when the Energy sector has a neutral position.

#### 2.2.2 Variability of Component Weights

While sectors are always rebalanced monthly back to their fixed weights, the component weightings are allowed to vary. A hypothetical example is described below and shown in Exhibit 5:

In the Livestock sector, for the two months ending February 2000, the cumulative year-to-date return is 5.26% for the Lean Hogs component and -0.68% for the Live Cattle component. To determine the weight of each component within the Livestock sector for March 2000, we multiply one plus the component's year-to-date return by its initial weight and divide by one plus the sector's year-to-date return.

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<sup>3</sup> In the case of the Natural Gas component included in the Energy sector, North American rather than world production has been used as the relevant factor due to constraints linked to transporting natural gas internationally.

Thus, the weight for Lean Hogs in March is:  
 $(1 + 5.26\%) * 2.00\% / (1 + 1.70\%) = 2.07\%$

For Live Cattle, the March weight is:  
 $(1 - 0.68\%) * 3.00\% / (1 + 1.70\%) = 2.93\%$

The two components weights sum to 5.00%, which is the target Livestock sector weight.

**EXHIBIT 5: EXAMPLE OF MULTIPLE COMPONENT WEIGHT CHANGES IN A SECTOR**

	LEAN HOGS COMPONENT			LIVE CATTLE COMPONENT			LIVESTOCK SECTOR		
INITIAL WEIGHT			2.00%			3.00%			5.00%
	MONTHLY RETURN	YTD RETURN	MONTHLY WEIGHT	MONTHLY RETURN	YTD RETURN	MONTHLY WEIGHT	MONTHLY RETURN	YTD RETURN	MONTHLY WEIGHT
Jan-00	6.04%	6.04%	2.00%	0.29%	0.29%	3.00%	2.59%	2.59%	5.00%
Feb-00	-0.74%	5.26%	2.07%	-0.97%	-0.68%	2.93%	-0.87%	1.70%	5.00%
Mar-00	10.27%	16.07%	2.19%	0.07%	-0.61%	2.81%	4.29%	6.06%	5.00%

**2.2.3 Annual Rebalancing for Component Weights**

At the end of each year, each of the 16 components is rebalanced. It is expected that the component weights will not vary significantly from those shown in Exhibit 1. Although production figures change over time, in a relative sense as it affects component weights, that change is small.

Rebalancing components only annually allows a degree of microeconomic influence among the correlated sector components so that market actions can determine which components are relatively more important.

**2.3 Position Determination**

The rule for the indicator regarding long or short positions can be summarized as follows:

- Long positions are tracked when a component’s current price input is equal to or greater than an exponential average of the past seven price inputs;
- Short positions are tracked when a component’s current price input is less than an exponential average of the past seven price inputs;
- Track a flat (zero weight) position for the Energy sector when a short position is indicated; in this case, the 37.50% weight for Energy is distributed proportionately to the other 5 sectors.

Position is determined on the second to the last business day of the month (defined as the position determination date or PDD) when the monthly percentage change of a sector’s price is compared to past monthly price changes exponentially weighted to give greatest weight to the most recent return and least weight to the return seven months prior. See Appendix B for details regarding the exponential average. The weighted sum of the percentage changes of all the sector prices equals the daily movement of the indicator.

After the market closes on the trade activity date (TAD), active S&P CTI contracts are replaced either because (a) a new long / short signal has been generated for a particular sector or component; or (b) to roll into a further dated contract as required by the roll schedule (see exhibit 6), or both. Therefore, new contracts become active as of the day following the TAD. The TAD is when the contracts are executed and can be any of the first five business days of the next month. The TAD is randomly selected. S&P acknowledges that limit closes which occur on the TAD in active S&P CTI contracts can restrict, and in some cases eliminate, the liquidity required for perfect replication of the S&P CTI.

### 2.3.1 Price Input

The price input for a particular contract is based on the cumulative percentage price change. For example, assume the July Coffee contract goes from 100 to 102 in April and from 102 to 104 in May. At the end of May/beginning of June, the S&P Commodity Trends Indicator represents a selling of the July Coffee contract and a buying of the September Coffee contract which is trading at 110 and which then experiences a decline to 106 by month end. The price input for this hypothetical Coffee contract would be as follows:

#### EXHIBIT 4: EXAMPLE OF PRICE INPUT CALCULATION

MONTH	PRICE % CHANGE	CALCULATION OF PRICE INPUT	PRICE INPUT
April	$2.00\% = (102/100)-1$		2.00%
May	$1.96\% = (104/102)-1$	$((1+2.00\%)*(1+1.96\%))-1$	4.00%
June	$-3.64\% = (106/110)-1$	$((1+2.00%)*(1+1.96%)*(1-3.64\%))-1$	0.21%

### 2.3.2 Sectors versus Components

For those sectors with only one component such as Industrial Metals, the price input calculations to determine position are at the component level. For the Energy, Precious Metals, Livestock, and Grains sectors, the price inputs from the respective underlying components are aggregated to determine position for that sector as a whole. In this case, aggregating the components reduces minor and unnecessary minor fluctuations, i.e., whipsaws. An exception exists in the calculation of the Softs sector. Here, since there is no fundamental tie between each of its components (Coffee, Cocoa, Cotton, and Sugar), the position of each is determined separately. For example, Coffee could be long while Sugar is short.

### 2.3.3 Energy's Short Exemption – Risk of Ruin

Energy, due to the significant level of its continuous consumption, limited reserves, and oil cartel controls is subject to rapid price increases in the event of perceived or actual shortages<sup>4</sup>. Although a problem of this magnitude has not occurred historically, consider if the S&P Commodity Trends Indicator were capable of shorting the Energy sector and a catastrophe occurred (such as significant damage to the Saudi oil fields) which caused Light Crude prices to surge dramatically from its current level up 100% to 300%, if the Energy Sector were short its 37.5% allocation the S&P Commodity Trends Indicator would lose over 25% in value on the Light Crude position alone. Because no other sector is subject to the same continuous demand with supply and concentration risk, the Energy sector is never positioned short in the S&P Commodity Trends Indicator methodology.

<sup>4</sup> A "limit" is a contract's maximum price advance or decline from the previous day's settlement price permitted in one trading session, as determined by the relevant exchange.



Exhibit 5 shows how the 37.50% weight of the Energy sector would be allocated to the other sectors if it were not positioned long.

**EXHIBIT 5: S&P COMMODITY TRENDS INDICATOR WEIGHTING SCHEME WITHOUT ENERGY**

MARKET	MARKET WEIGHT	SECTOR	SECTOR WEIGHT	COMPONENT	COMPONENT WEIGHT
Commodities	100.00%	Energy	0.00%	Heating Oil	0.00%
				Light Crude	0.00%
				Natural Gas	0.00%
				Unleaded Gasoline	0.00%
		Industrial Metals	16.00%	Copper	16.00%
				Precious Metals	16.80%
		Livestock	16.00%	Gold	11.20%
				Silver	5.60%
				Lean Hogs	6.40%
		Grains	36.80%	Live Cattle	9.60%
				Corn	12.80%
		Softs	14.40%	Soybeans	16.00%
				Wheat	8.00%
				Cocoa	3.20%
				Coffee	4.80%
				Cotton	3.20%
				Sugar	3.20%

## 2.4 Contract Maintenance

The S&P Commodity Trends Indicator is an indicator of futures contract price trends, and futures contracts have limited durations. Consequently, in order for the indicator to be calculated on an ongoing basis, it must change (or roll) from tracking contracts that are approaching expiration to tracking new contracts. Currently, each contract has three to four roll periods each year and its own “roll pattern” based on historical liquidity. In rolling the indicator futures contracts from an expiring contract to the next contract, contracts are rolled over from the current contract to the next contract beginning with the TAD for the month that is two months before the current contract matures.

See Exhibit 6 for a schedule of the active contracts used for price inputs of the indicator.

**EXHIBIT 6: SCHEDULE OF CONTRACTS**

CONTRACT NAME	ACTIVE CONTRACT FOR:											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Heating Oil	H	M	M	M	U	U	U	Z	Z	Z	H	H
Crude Oil (Light)	H	M	M	M	U	U	U	Z	Z	Z	H	H
Natural Gas	H	M	M	M	U	U	U	Z	Z	Z	H	H
RBOB Gasoline	H	M	M	M	U	U	U	Z	Z	Z	H	H
Copper	H	N	N	N	N	U	U	Z	Z	Z	H	H
Gold	M	M	M	M	V	V	V	V	Z	Z	G	G
Silver	H	N	N	N	N	U	U	Z	Z	Z	H	H
Lean Hogs	M	M	M	M	Q	Q	Z	Z	Z	Z	G	G
Live Cattle	M	M	M	M	Q	Q	Z	Z	Z	Z	G	G
Corn	H	N	N	N	N	U	U	Z	Z	Z	H	H
Soybeans	H	N	N	N	N	X	X	X	X	H	H	H
Wheat	H	N	N	N	N	U	U	Z	Z	Z	H	H
Cocoa	H	N	N	N	N	U	U	Z	Z	Z	H	H
Coffee	H	N	N	N	N	U	U	Z	Z	Z	H	H
Cotton	H	N	N	N	N	Z	Z	Z	Z	Z	H	H
Sugar	H	K	K	N	N	V	V	V	H	H	H	H

LETTER	CONTRACT EXPIRATION
F	JAN
G	FEB
H	MAR
J	APR
K	MAY
M	JUN
N	JUL
Q	AUG
U	SEP
V	OCT
X	NOV
Z	DEC

The risk of aberrational liquidity or pricing around the maturity date of a commodity futures contract is greater than in the case of other futures contracts because (among other factors) a number of market participants take delivery of the underlying commodities. Spot markets in commodities occasionally have delivery problems, related to, for example, weather conditions disrupting transportation of cattle to a delivery point. Such a delay could cause the spot market to skyrocket, while later-dated futures contracts are little changed. The indicator avoids delivery issues by owning contracts that are outside of nearby delivery.

### 3. S&P Commodities Index Committee

S&P Dow Jones Indices' Commodities Index Committee oversees the daily management and operations of the indices, and is responsible for all analytical methods and calculation of the indices. The Committee is comprised of full-time professional members of S&P Dow Jones Indices' staff. The Committee meets regularly. At each meeting, the Committee reviews any issues that may affect index constituents, statistics comparing the composition of the indices to the market, commodities that are being considered as candidates for addition to an index, and any significant market events. In addition, the Index Committee may revise the methodology covering rules for selecting commodities, or other matters.

S&P Dow Jones Indices considers information about changes to its indices and related matters to be potentially market moving and material. Therefore, all Index Committee discussions are confidential.

S&P Dow Jones Indices' Index Committees reserve the right to make exceptions when applying the methodology if the need arises. In any scenario where the treatment differs from the general rules stated in this document or supplemental documents, clients will receive sufficient notice, whenever possible.

In addition to the daily governance of indices and maintenance of index methodologies, at least once within any 12-month period, the Index Committee reviews the methodology to ensure the indices continue to achieve the stated objectives, and that the data and methodology remain effective. In certain instances, S&P Dow Jones Indices may publish a consultation inviting comments from external parties.

*For information on:*

- *Quality Assurance*
- *Internal Reviews of Methodology*
- *Calculations and Pricing Disruptions*
- *Expert Judgment*
- *Data Hierarchy*
- *Unexpected Exchange Closures*
- *Error Corrections*

*Please refer to S&P Dow Jones Indices' Commodities Indices Policies & Practices document.*

## 4. S&P Commodity Trends Indicator Return

There are two kinds of returns for a futures-based index or indicator. The first is a simple combination of the weighted price percentage changes on a daily basis: this will be referred to as the S&P Commodity Trends Indicator Price Return (PR). The second return stream represents a simple, but realistic rate of return for an actual implementation of the indicator. Since futures contracts are bought on margin rather than with an actual cash investment, it is useful to have a return that uses a fully-collateralized margin account consisting of 90-day U.S. Treasury bills. This collateralized return will be known as the S&P Commodity Trends Indicator Total Return (TR). Compounding of the interest on the U.S. Treasury bill is on a quarterly basis.

### 4.1 Pro Forma S&P Commodity Trends Indicator Performance Analysis

For purposes of analysis, AFT constructed a pro forma version of the S&P Commodity Trends Indicator from January 1985 through December 2003. This methodology differs only slightly from the current methodology of the S&P Commodity Trends Indicator:

<u>S&amp;P Commodity Trends Indicator</u>	<u>S&amp;P Commodity Trends Pro Forma Indicator</u>
❖ Includes November Soybean contract	Includes September Soybean contract
❖ Includes December Cotton contract	Includes October Cotton contract
❖ TAD any of first five business days	TAD always last business day
❖ Quarterly compounding of T-bill interest for total return	Monthly compounding of T-bill interest for total return

Furthermore, minor changes were made to the component composition to accommodate market changes, specifically before May 1991 Natural Gas was not included as a component.

The pro forma S&P Commodity Trends Indicator Price Return stream is based on data that were (for the period January 1, 1985 through May 31, 2001) attested to by a big four accounting firm that was engaged for a fee. Beginning with January 1, 2004, the methodology of the S&P Commodity Trends Indicator was switched to the current methodology (the “live” series).

All references to the performance of the S&P Commodity Trends Indicator in this section refer to this pro forma version and the live series history.

Past performance of the pro forma indicator is based on back tested results that do not represent the results of concurrent calculation but are achieved instead through retroactive application of a methodology that was developed with the benefit of hindsight. The performance data disclosed in this document does not take into account taxes, brokerage commissions, advisory fees, or other fees, which would reduce the returns if they had been taken into account. Past performance is not necessarily indicative of future results and investing based on the S&P Commodity Trends Indicator may result in losses.

## Appendix A: Component Futures Contracts

The following are the futures contracts, exchanges, ticker symbols and date that the various markets currently included in the S&P Commodity Trends Indicator became available for use in indicator simulations. The “Start Month” column indicates the first month for which the returns of the market in question can reasonably be included in the indicator simulations. Typically a contract would not be eligible for inclusion until approximately one year after the contract first begins to trade. The delay is due, in part, to the need for the contract to have established sufficient liquidity.

FUTURES CONTRACT	EXCHANGE	SYMBOL	INCLUSION
Wheat	CBOT	W	January 1985
Cotton	NYCE	CT	January 1985
Corn	CBOT	C	January 1985
Copper	COMEX	HG	January 1985
Soybeans	CBOT	S	January 1985
Cocoa	CSCE	CC	January 1985
Sugar	CSCE	SB	January 1985
Silver	COMEX	SI	January 1985
Live Cattle	CME	LC	January 1985
Lean Hogs	CME	LH	January 1985
Coffee	CSCE	KC	January 1985
Gold	COMEX	GC	January 1985
Heating Oil	NYMEX	HO	January 1985
Light Crude Oil	NYMEX	CL	January 1985
Unleaded Gasoline (replaced in October 2006 by RBOB)	NYMEX	HU	January 1986
Natural Gas	NYMEX	NG	May 1991
RBOB Gasoline (replaces Unleaded)	NYMEX	RB	October 2006

CBOT:	Chicago Board of Trade
CME:	Chicago Mercantile Exchange
COMEX:	The COMEX Division of the New York Mercantile Exchange
CSCE:	Coffee, Sugar and Cocoa Division of the New York Board of Trade
NYCE:	Cotton Exchange Division of the New York Board of Trade
NYMEX:	The NYMEX Division of the New York Mercantile Exchange

## Appendix B: Exponential Average Multiplier Schedule

To create an exponential average for comparison, price inputs (percentage change from current and previous six PDDs) are weighted using a multiplier per the schedule below which is based on 1.60, 1.61, 1.62, etc.

NUMBER OF MONTHS	MULTIPLIER	WEIGHT
7	1	2.32%
6	1.6	3.71%
5	2.56	5.94%
4	4.096	9.51%
3	6.5536	15.22%
2	10.48576	24.34%
1	16.777216	38.95%
Sum	43.072576	100.00%

The weight given to the price seven months prior is 2.32% ( $1/43.072576$ ), and so on. Therefore, 78.5% of the indicator's moving average is weighted to the price movements of the last three months. This makes current price movements more important than those of the past, which is logical.

## Appendix D: S&P Commodity Trends Indicator Calculation Algorithm

The daily values of the S&P Commodity Trends Indicator (SPCTI) are:

$$SPCTI_t = \left( \frac{1 + WCh_t}{1 + WCh_{t-1}} \right) * SPCTI_{t-1}$$

where

t = time period, where t = 0,1,2... and t = 0 is the initial time period;

WCh<sub>t</sub> = weighted year-to-date percentage change up to date t for SPCTI;

WCh<sub>t-1</sub> = weighted year-to-date percentage change up to date t-1 for SPCTI.

Let i indicate the sector i in SPCTI.

$$WCh_t = \frac{\left( \sum_{i=1}^{14} DWPS_{it} \right)}{DCA_t}$$

where

DWPS<sub>it</sub> = daily weighted percentage change of sector i at period t;

DCA<sub>t</sub> = daily change adjustment at time t:

If Energy sector is flat:

$$DCA_t = 1 - \text{weight of energy sector}$$

Otherwise:

$$DCA_t = 1.$$

For sectors that only have one component:

$$DWPS_{it} = SC_{it} * SW_i * AC_{Pt}$$

where

SC<sub>it</sub> = cumulative change of sector i on a roll-to-date basis;

SW<sub>i</sub> = weight of sector i (initial weights) ;

AC<sub>Pt</sub> = the active contract position of sector i where it takes on values 1 (long), 0 (flat for energy only), and -1 (short).

For sectors that have more than one component:

$$DWPS_{it} = SC_{it} * SW_i * AC_{Pt}$$

where

$$SC_{it} = \frac{1 + SWC_{it}}{1 + SWC_{i,rolldate}} - 1$$

$SWC_{it}$  = the sum of weighted percentage changes of components in the sector:

$$SWC_{it} = \frac{\sum_{c=1}^C w_c * ACCP_{ct}}{SW_{i,where,c \in i}}$$

where

$w_c$  = Component (i.e. contract) weight;

$SW_i$  = Weight of sector i (initial weights);

$ACCP_{ct}$  = Active component (contract) cumulative percentage change  
(on a year-to-date basis);

$ACCP_{ct} = ((1 + ACCP_{ct} - 1) * (1 + ACDPC_{ct})) - 1$ ;

$ACDPC_{ct}$  = Active component contract daily percentage change;

$SWC_{i,rolldate}$  = Value of  $SWC_i$  at the last roll date = "Y" before t.

The value from t+1 through the next roll date remains constant.

**TABLE 1: HYPOTHETICAL ROLL DATE CALCULATION**

SECTOR I				
DATE	ROLDDATE	SWC	SWC(ROLDDATE)	SC
t-1		-3.79%	-0.69%	-3.11%
t	Y	-2.39%	-0.69%	-1.71%
t+1		-2.93%	-2.39%	-0.55%
t+2		-3.30%	-2.39%	-0.93%
t+3		-4.03%	-2.39%	-1.68%
t+4		-3.88%	-2.39%	-1.52%

We can see from Table 1 that  $SC_i$  depends on the roll date. The roll date at t = "Y" so  $SWC_{i,rolldate}$  on date t+1 takes on value of  $SWC_i$  on t and carry forward until the next roll date = "Y".  $SC_i$  on t+3 =  $(1 - 0.0403) / (1 - 0.0239) - 1 = -1.68\%$ .

Daily values of the Standard & Poor's Diversified Trends Indicator Total Return (SPDTI\_TR) are:

$$SPCTI\_TR = \left[ \frac{SPCTI_t - SPCTI_0}{SPCTI_0} + \sum_{t=1}^t SPCTI\_TR\_DI_t \right] * SPCTI_0 + SPCTI_0$$

where  $SPCTI\_TR\_DI_t$  is the SPCTI total return daily interest rate, which is equal to (daily three-month U.S. Treasury bill rate at t = 0 divided by 360)\*(date t – date t-1). Note that because there can be holidays or weekends, (date t – date t-1) does not necessarily equal to 1. For example, the SPCTI\_TR daily



interest rate jumps from 0.003% (1/3/2003) to 0.01% (1/6/2003) because three days have elapsed; on 1/6/2003, SPCTI\_TR daily interest rate = 0.01% = (1.215%/360)\*3.

*Active Contract Position for Sector i:*

For each of the 6 sectors, the monthly percentage change is calculated using the closing price on the second to the last business of each month, identified as the position determination date (PDD). Let  $t$  denote the time period by month associated with the PDD. The active contract position of sector  $i$  at  $t+1$  is:

$$\begin{aligned} ACP_{i,t+1} &= 1 && \text{If the Cumulative Monthly Sector Percentage Return up to } \tau \geq \text{Exponential} \\ &&& \text{Moving Average of the Cumulative Monthly Sector Percentage Return up to } \tau; \\ &= -1 && \text{Otherwise;} \\ &= 0 && \text{If Energy.} \end{aligned}$$

The Exponential Moving Average of the Cumulative Monthly Sector Percentage Return up to  $\tau$  ( $CMSR_{\tau}$ ) is:

$$\frac{CMSR_{\tau-6} + 1.6CMSR_{\tau-5} + 1.6^2 CMSR_{\tau-4} + 1.6^3 CMSR_{\tau-3} + 1.6^4 CMSR_{\tau-2} + 1.6^5 CMSR_{\tau-1} + 1.6^6 CMSR_{\tau}}{43.07258}$$

where

$$\sum_{i=0}^6 1.6^i = 43.07258 \quad \text{and}$$

$$CMSR_{\tau} = [(1 + CMSR_{\tau-1})^{\tau} (1 + \text{Monthly Sector Returns at } \tau) - 1].$$

The S&P Commodity Trends Indicator Price and Total Returns are calculated in both USD and Euro denominated currencies. The FX conversion is done selling the asset at each month end, converting the proceeds into EUR at spot and then reconverting the proceeds back into USD and investing for another month.

In addition to the S&P CTI Price Return and S&P CTI Total Return, S&P Dow Jones Indices calculates and disseminates the S&P Commodity Trends Indicator Tracker Series in both USD and EUR. This indicator series is meant to be representative of an investment that replicates the returns of the S&P CTI returns and that assumes a 0.95% annually in total fees. Like the other S&P CTI series, the S&P Commodity Trends Indicator Tracker Series is calculated on a daily basis.

BLOOMBERG SYMBOLS	
NAME	TICKERS
S&P CTI Price Return USD	SPTICDP
S&P CTI Total Return USD	SPTICDT
S&P CTI Price Return Tracker Series USD	SPTICDPN
S&P CTI Total Return Tracker Series USD	SPTICDTN
S&P CTI Price Return EUR	SPTICEP
S&P CTI Total Return EUR	SPTICET
S&P CTI Price Return Tracker Series EUR	SPTICEPN
S&P CTI Total Return Tracker Series EUR	SPTICETN

## Appendix E: S&P Diversified Trend Indicator: Commodities and Financials

The S&P Diversified Trends Indicator (S&P DTI) is an investable long/short strategy that can benefit from trends (in either direction) in the global futures markets. It consists of 24 futures contracts, with a 50% weighting in financial futures (e.g., interest rates and currencies) and 50% weighting in commodities futures (softs, energy, metals, etc.). S&P Dow Jones Indices also offers financials-only and commodities-only subsets of the S&P DTI, providing a flexible way to tailor exposure to these respective asset classes.

Sophisticated investors have long recognized the value of diversification, an objective that is increasingly achieved by adding non-traditional asset classes to a portfolio. To that aim, some investors have looked to physical commodity and financial futures investing, but this requires a great deal of skill and often entails substantial risk. With the S&P DTI and its financials-only and commodities-only subsets, investors have several flexible ways to diversify a traditional portfolio with a strategy that can benefit from both long and short positions.

Prices of financial and commodity futures contracts as well as their underlying components tend to be cyclical in nature. Each of the 14 sectors in the composite S&P DTI (with the exception of the Energy sector) gets positioned each month either long or short based on its price behavior relative to its moving average. This long/short design provides the opportunity for the S&P DTI to capture profits in both up and down markets. The S&P DTI and the two sub-indicators are rebalanced monthly by sector, and the specific futures contracts for each component are determined annually.

The S&P Diversified Trends Indicator Price Return and Total Return series can be found under Bloomberg symbols SPDTP <index> and SPDTT <index>, respectively.

# S&P Dow Jones Indices' Contact Information

## Client Services

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