S&P Dow Jones Indices

A Division of S&P Global

S&P Dynamic Futures Index
Methodology

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Introduction

Overview

The S&P Dynamic Futures Index (S&P DFI) follows a quantitative methodology to track the prices of a diversified portfolio of 24 commodity and financial futures contracts. The contracts (also called components) are represented individually on either a “long” or “short” basis, depending on market momentum. With the ability to go long or short individual components, the S&P DFI is designed to capture the economic benefit over long time periods, derived from both rising and declining trends within a cross-section of futures markets. The Index is also designed with tradable securities, which are readily accessible to market participants.

The primary objective of the strategy is to measure component trends based on price movements of certain highly liquid futures. Limiting volatility is also a guiding principle of the methodology, which is implemented in a rules-based, systematic manner. The strategy is not intended to be representative of a particular futures market or group of markets. The S&P DFI is calculated and maintained by S&P Dow Jones Indices.

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.

Highlights[1]

The key characteristics of the S&P DFI include:

- The S&P DFI is comprised of 24 components (futures contracts), grouped into 14 sectors: eight financial and six commodity sectors, which are equally divided by weight between financial and commodities. The financials includes eight global financial futures contracts. The commodities includes 16 traditional, physical commodity components (futures contracts), grouped into six sectors
- Long or short positions are determined by measuring the current component price relative to an exponential moving average.
- To maintain a balanced weighting across different commodity sectors, the weighting scheme of the S&P GSCI Light Energy Index is applied at the beginning of each year.
- To maintain appropriate weighting across different financial contracts, each country’s current year IMF estimates for nominal Gross Domestic Product (GDP) is used to derive contract weights at the beginning of each year.
- Component weights are reset monthly to the target weights, which are defined annually.
- Positions are rolled from the 1st thru the 5th business days of the month.

For more information on the S&P GSCI Light Energy Index, please refer to the S&P GSCI Index Methodology.

[1] Prior to the July 2012 rebalancing, positions were determined on a sector level, (as described above), with each sector having its own position signal (long, short, neutral for Energy sector only) as opposed to the current individual component level (long or short only).

The S&P DFI Methodology

On any given day, the composition of the S&P DFI and its value, as determined and published by S&P Dow Jones Indices, are dispositive. This document describes the methodology used by S&P Dow Jones Indices in determining such composition and calculating such value. Neither this S&P DFI Methodology nor any set of procedures, however, are capable of anticipating all possible circumstances and events that may occur with respect to the S&P DFI and the methodology for its composition, weighting and calculation. Accordingly, a number of subjective judgments are made in connection with the operation of the S&P DFI that cannot be adequately reflected in this document. All questions of interpretation with respect to the application of the provisions of this methodology, including any determinations that need to be made in the event of a market emergency or other extraordinary circumstances, are resolved by S&P Dow Jones Indices.

S&P Dow Jones Indices is committed to maintaining the S&P DFI as an index comprised of liquid, tradable securities that serves as a principal benchmark for commodity investing. We also recognize that the detailed rules-based approach contained in the methodology may not, at all times, reflect the underlying liquidity and condition of a specific market, particularly in periods of extraordinary market volatility or rapid technological change. Therefore, S&P Dow Jones Indices may determine that a given Contract that satisfies the eligibility criteria set forth in this methodology should, nevertheless, be excluded from the S&P DFI if inclusion of such Contract is inconsistent with or would undermine the purposes of the S&P DFI as a benchmark for commodity market performance, with tradable components, or if inclusion of such Contract in the S&P DFI would otherwise not be in the best interests of market participants.

Further, modifications to the methodology used to calculate the S&P DFI may be necessary from time to time. S&P Dow Jones Indices reserves the right to make such changes or refinements to the methodology set forth in this document, as it believes necessary in order to preserve and enhance the utility of the S&P DFI as a benchmark for commodity market performance and the tradability of the S&P DFI components. S&P Dow Jones Indices also reserves the right to take any action with respect to the S&P DFI, as it deems necessary or appropriate, in order to address market emergencies or other extraordinary market events or conditions. Wherever practicable, any such changes or actions will be publicly announced prior to their effective date.

This methodology uses various terms and definitions similar to the S&P GSCI Index Methodology. Where not specifically noted otherwise in this document, the rules of the S&P GSCI Methodology will prevail. Where the terms in this document are also defined in the S&P GSCI Methodology, the definitions in this document prevails.

Index Family

S&P Dow Jones Indices also calculates two sub-indices representing components of the S&P DFI. These are the S&P DFI Commodity (reflecting the physical commodity futures components of the S&P DFI) and the S&P DFI Financial (reflecting the financial futures components of the S&P DFI) Indices. Excess and Total Return sub-indices are calculated and published for each of these two market sectors.

Index Constituents and Weightings

Overview of the Index Constituent Determination Process

Each year, the Contracts included in the S&P DFI must satisfy several eligibility criteria. First, S&P Dow Jones Indices identifies those contracts that meet the general criteria for eligibility. Second, the Contract liquidity requirements are applied. At that point, the list of Designated Contracts for the relevant S&P GSCI Year is complete and the process moves to the determination of the constituents weights; all discussed below.

General Eligibility Requirements

In determining the Contracts to be included in the S&P DFI for a given year, S&P Dow Jones Indices first identifies the Contracts that satisfy the general eligibility criteria set forth below. These criteria are intended only to identify Contracts with characteristics that will facilitate the calculation of the S&P DFI and are consistent with the general purpose of the S&P DFI as an index with tradable components. This process generally produces a substantial list of Contracts eligible for inclusion in the S&P DFI; the list is narrowed through the application of the more specific criteria described below.

Physical Commodities Futures and Financial Futures. To be eligible for inclusion in the S&P DFI, a Contract must be a physical commodity or a financial instrument, and may not be on a short term interest rate (STIR) or an equity index. The Contracts need not require physical delivery by their terms in order for a commodity to be considered a physical commodity.

The S&P DFI is intended, in part, to measure the performance of specific physical commodities and financial markets, and to correlate with general price movements in the world economy. The limitation to Contracts on physicals and specific financials, and the exclusion of Contracts on interest rate and equity indices, serves to limit the eligible universe to those Contracts on commodities that are the subject of production or distribution processes in the world economy, and that have a direct effect on price levels and inflation.

Certain Contract Characteristics. In order for a Contract to be eligible for inclusion in the S&P DFI, the following criteria must be satisfied: (i) the Contract must have a specified expiration or term, or provide in some other manner for delivery or settlement at a specified time, or within a specified time period in the future; (ii) the Contract must, at any given point in time, be available for trading at least five months prior to its expiration or such other date or time period specified for delivery or settlement; and (iii) the Trading Facility on which the Contract is traded must allow market participants to execute spread transactions, through a single order entry, between the pairs of Contract Expirations included in the S&P DFI that, at any given point in time, will be involved in the rolls to be effected in the next three Roll Periods.

The requirements set forth in this section reflect the fact that some of the products, from time to time, traded on or through Trading Facilities, in particular certain electronic platforms, may not display traditional characteristics of a futures contract, such as particular contract months. While it is not necessary for a Contract Expiration to be expressed as a calendar month, the S&P DFI and its underlying methodology are premised upon the existence of specified dates or time periods for delivery or settlement. It is assumed that Contracts traded on contract markets, exempt electronic trading facilities, derivatives transaction execution facilities, exempt boards of trade and foreign boards of trade (as such terms are defined in the U.S. Commodity Exchange Act and the rules and regulations promulgated there under) will generally satisfy the above requirements, unless S&P Dow Jones Indices determines that any such Contract does not satisfy the foregoing criteria. The requirement that the Contract be available for trading at least five months prior to its expiration is designed to ensure that a genuine trading market in the Contract exists prior to the time established for delivery or settlement, when trading conditions can be affected by the impending expiration of the Contract. The final requirement in this Section, regarding execution of spread transactions, is designed to allow market participants to effect the rolling of contracts included in the S&P DFI more efficiently.

Denomination and Geographical Requirements. To be eligible for inclusion in the S&P DFI, a Contract must be denominated in U.S. dollars and traded on or through a Trading Facility that has its principal place of business or operations in a country that is a member of the Organization for Economic Cooperation and Development (OECD) during the relevant Annual Calculation Period or Interim Calculation Period. The first requirement facilitates the calculation and consistency of the S&P DFI, since numerous currency conversions and other adjustments would need to be made in order to accommodate contracts denominated in other currencies. The latter assures that the S&P DFI will be limited to those commodities for which there are Trading Facilities in industrialized countries.

Availability of Daily Contract Reference Prices. For a Contract to be eligible for inclusion in the S&P DFI, Daily Contract Reference Prices generally must have been available on a continuous basis for at least two years prior to the proposed date of inclusion. In appropriate circumstances, S&P Dow Jones Indices may determine that a shorter time period is sufficient or that historical Daily Contract Reference Prices for a given Contract may be derived from Daily Contract Reference Prices of a similar or related Contract.

At and after the time a particular Contract is included in the S&P DFI, the Daily Contract Reference Price for such Contract must be published between 10:00 AM and 4:00 PM, Eastern Time, on each Contract Business Day by the Trading Facility on or through which it is traded. The price must generally be available to all members of, or participants in, such Facility (and S&P Dow Jones Indices) on the same Contract Business Day, from the Trading Facility or through a recognized third-party data vendor. Such publication must include, at all times, Daily Contract Reference Prices for at least one Contract Expiration that is five months or more from the date the determination is made, as well as for all Contract Expirations during such five-month period.

The requirement that a Contract have a continuous price history of at least two years is intended to ensure the reliability and availability of the prices necessary to enable S&P Dow Jones Indices to calculate the S&P DFI. In addition, in order to calculate the S&P DFI on an ongoing basis, S&P Dow Jones Indices must be able to obtain Daily Contract Reference Prices for certain Contract Expirations with respect to each Designated Contract prior to the S&P DFI Settlement Time on each Contract Business Day. This requirement is intended to assure that the value of the S&P DFI can be reliably calculated on the basis of prices that are both announced and, in general, readily available to the members of, or participants in, the relevant Trading Facility (and S&P Dow Jones Indices).

Availability of Volume Data. For a Contract to be eligible for inclusion in the S&P DFI, volume data with respect to such Contract must be available from sources satisfying the criteria specified under *Sources of Information* below, for at least the four years immediately preceding the date on which the determination is made.

Other Requirements with respect to the Trading Facility. The Trading Facility on or through which a Contract is traded must: (i) make price quotations generally available to its members or participants (and to S&P Dow Jones Indices) in a manner and with a frequency that is sufficient to provide reasonably reliable indications of the level of the relevant market at any given point in time; (ii) make reliable trading volume information available to S&P Dow Jones Indices with at least the frequency required by S&P Dow Jones Indices to make the monthly determinations described under *Sources of Information* below; (iii) accept bids and offers from multiple participants or price providers (i.e., it must not be a single-dealer platform); and (iv) be accessible to a sufficiently broad range of participants. Such access may be provided either (a) by the Trading Facility making clearing services reasonably available, thereby eliminating counterparty credit considerations, or (b) by a network of brokers or dealers who are willing to intermediate transactions with third parties, thereby enabling such third parties to enter into transactions based on prices posted on such Facility.

These requirements are intended to establish certain minimum standards for Trading Facilities. If trading in certain commodities is shifted to electronic platforms that are largely unregulated, or subject to different levels or types of regulation than traditional exchanges, these standards serve to ensure that the S&P DFI includes only Contracts for which sufficient and reliable data and, in particular, price data developed in a competitive process are available. It is assumed that contract markets and foreign boards of trade (as such terms are defined in the U.S. Commodity Exchange Act and the rules and regulations promulgated there under) will generally satisfy the above requirements, unless S&P Dow Jones Indices determines otherwise.

Contract Trading Hour Requirements. S&P Dow Jones Indices may exclude a Contract from the S&P DFI that otherwise satisfies the criteria and conditions for inclusion if, in its reasonable judgment, such Contract's Overall Trading Window is insufficient to support the tradability of the S&P DFI taken as a whole.

This requirement is intended to support and enhance the tradability of the components of S&P DFI, by ensuring that all Designated Contracts are available for trading during at least a minimum period of time.

Liquidity Requirement

The S&P DFI is limited to those Contracts that are actively traded in order to assure that the prices generated by the markets for such Contracts represent reliable, competitive prices. Liquidity is an indication both of the significance of a particular market and the ability to trade with minimal market impact. The Contracts that satisfy the general eligibility requirements set forth in *General Eligibility Requirements* above must, therefore, also satisfy the liquidity requirements described below before being included in the S&P DFI.

The total reported volume (long and short) in the previous four years is used to determine the liquidity of the futures contracts. If futures with similar underlying characteristics are traded on multiple exchanges, only the most liquid one is selected. If two contracts are closely related, only the most liquid one is selected.

Eight financial futures are selected based on the total reported volume in the previous four years. The most liquid bond futures and the most liquid note futures are selected. The six most liquid currency futures, excluding emerging market currencies, are selected. All equity index futures are excluded.

No more than 16 commodity futures are selected out of the 20 most liquid contracts. Of these, however, no more than three grains and four softs commodity futures are chosen.

Weighting Scheme

For commodities, production is an indication of the significance of a given component in 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 sometime used in selecting and making allocations.

The S&P GSCI Light Energy Index is comprised of the same Designed Contracts as the S&P GSCI, but the Contract Production Weights (CPW) of all Designed Contracts in the energy sector are one-fourth (1/4) their size in the S&P GSCI. There are some component differences between the S&P GSCI Light Energy Index and S&P DFI. The table below summarizes the differences as of January 29th 2016.

To derive the weighting scheme for the S&P DFI on the last business day of January of each year, we start with the weights of the components of the S&P GSCI Light Energy Index, and then reallocate the relative weights among the components by 1) removing the weights of components not in existence in the S&P DFI, such as Feeder Cattle, Aluminum High Grade, Lead, Nickel, and Zinc, and 2) picking the most liquid components in the S&P GSCI Light Energy Index, such as Chicago Wheat instead of Kansas City Wheat, WTI Crude Oil instead of Brent Crude Oil, and Unleaded Gasoline instead of Gasoil, where more than one futures contracts track the same component.

Chart 1 – S&P DFI Commodities Initial Weightings 2017 (as of January 31st , 2017)

S&P GSCI Light Energy Components	Weight	S&P DFI Components	Weights related to S&P GSCI Light Energy	Weights related to S&P DFI
Chicago Wheat	5.55%	Chicago Wheat	5.55%	7.40%
Kansas City Wheat	1.60%			
Corn	8.48%	Corn	8.48%	11.31%
Soybeans	6.43%	Soybeans	6.43%	8.57%
Coffee "C"	1.90%	Coffee	1.90%	2.53%
Sugar #11	4.91%	Sugar	4.91%	6.55%
Cocoa	0.63%	Cocoa	0.63%	0.85%
Cotton #2	2.87%	Cotton	2.87%	3.83%
Lean Hogs	4.17%	Lean Hogs	4.17%	5.56%
Live Cattle	7.29%	Live Cattle	7.29%	9.72%
Feeder Cattle	1.85%			
Heating Oil	1.95%	Heating Oil	1.95%	2.60%
Gas Oil	2.40%			
Unleaded Gasoline	2.06%	Unleaded Gasoline	2.06%	2.74%
WTI Crude Oil	11.23%	WTI Crude Oil	11.23%	14.98%
Brent Crude Oil	8.12%			
Natural Gas	1.71%	Natural Gas	1.71%	2.28%
Aluminum High Grade	5.95%			
Copper - Grade A	7.93%	Copper	7.93%	10.58%
Lead	1.58%			
Nickel	1.11%			
Zinc	2.42%			
Gold	6.93%	Gold	6.93%	9.25%
Silver	0.93%	Silver	0.93%	1.24%
Total	100.00%	Total	74.97%	100.00%

Gross domestic product (GDP) is an indication of a country's economic significance and is used in selecting and making allocations to currency financials in the S&P DFI. The annual GDP data, reported in U.S. dollars, is obtained from the World Economic Outlook (WEO) database of the International Monetary Fund (IMF). The current year IMF estimates for nominal GDP is used to determine the weight for the financial (currency) future components. The data from the IMF are updated twice a year in April and September. The GDP number released in the September report of previous year is used for determining the weights of the currency futures for the current year.

Chart 2 – 2017 Estimated Nominal Gross Domestic Product

RELATED SECTOR WEIGHT	REGION	GDP (USD Billion)
40.61%	United States	19,377.20
35.56%	European Monetary Union	16,970.02
10.70%	Japan	5,106.26
5.47%	United Kingdom	2,609.91
3.41%	Canada	1,627.30
2.82%	Australia	1,343.61
1.43%	Switzerland	684.39

Nominal GDP estimates from the International Financial Statistics of the IMF

The markets in the Index are divided equally between tangible commodities and financials (excluding equities and short term interest rates) in order to decrease correlation among the components. This is done to produce a smooth, less volatile return.

Chart 3 – S&P DFI Weighting Scheme Example 2017

Market	Market Weights	Sector	Sector Weight	Component	Component Weight
Commodities	50.00%	Energy	11.30%	WTI Crude Oil	7.49%
				Heating Oil	1.30%
				RBOB Unleaded Gas	1.37%
				Natural Gas	1.14%
		Industrial Metals	5.29%	Copper	5.29%
		Precious Metals	5.24%	Gold	4.62%
				Silver	0.62%
		Livestock	7.64%	Lean Hogs	2.78%
				Live Cattle	4.86%
		Grains	13.64%	Corn	5.66%
				Soybeans	4.29%
				Wheat	3.70%
		Softs	6.88%	Coffee	1.27%
				Cocoa	0.42%
				Sugar	3.28%
				Cotton	1.91%
Financials	50.00%	Australian Dollar	1.41%	Australian Dollar	1.41%
		British Pound	2.73%	British Pound	2.73%
		Canadian Dollar	1.71%	Canadian Dollar	1.71%
		Euro	17.78%	Euro	17.78%
		Japanese Yen	5.35%	Japanese Yen	5.35%
		Swiss Franc	0.72%	Swiss Franc	0.72%
		U.S. Treasury Notes	10.15%	U.S. Treasury Notes	10.15%
		U.S. Treasury Bonds	10.15%	U.S. Treasury Bonds	10.15%

Rebalancing

Monthly Rebalancing for Component Weights. Components are rebalanced to their fixed weights at the beginning of each month. The rebalancing reference date is the second to last S&P DFI business day of the month and implemented over a five-day period from the first (1^{st}) through the fifth (5^{th}) S&P DFI business days of the month.

Monthly rebalancing helps to keep volatility low. An extended component trend could overweight the S&P DFI and potentially lead to significantly higher volatility of the strategy. Because the components are rebalanced, the aggregate markets are reset to equal weighting each month (50% each commodities and financials).

Annual Rebalancing for Component Weights. At the end of each year, each of the commodity components is rebalanced to the weightings derived from the S&P GSCI Light Energy Index, and the financial components are rebalanced to reflect the previous year's relevant nominal GDP figures. The component weights vary over time, as production and GDP figures change. Rebalancing the components annually, to reflect the changes in the S&P GSCI Light Energy Index weighting and relevant GDP figures, allows the strategy to better reflect the underlying economic developments and different stages of the market cycle

Sources of Information

The following are the sources of the information used to determine the eligibility of Contracts for inclusion in the S&P DFI pursuant to the requirements set forth in *General Eligibility Requirements* above. If any of the sources identified below is unavailable, with respect to the determination of the S&P DFI for a particular S&P DFI Year, S&P Dow Jones Indices will identify appropriate alternative sources and the composition of the S&P DFI for such year will be based on such alternative sources. In addition, if S&P Dow Jones Indices believes that one or more of the sources identified below contains a manifest error, it may use an alternative source to obtain the necessary information. Any such alternative sources used by S&P Dow Jones Indices will be publicly disclosed at the time that the composition of the S&P DFI for the next S&P DFI Year is announced.

General Eligibility Requirements. The identification of those commodities that satisfy the general eligibility requirements set forth in *General Eligibility Requirements* above is based on (1) the FIA (Futures Industry Association) Reports that are published at the time of the relevant Annual Calculation Period or Interim Calculation Period, and (2) the most recent version of the *Futures and Options Fact Book*, published by the Futures Industry Institute. The determination as to whether a particular Trading Facility has its principal place of business or operations in an OECD country is based on the most recent data published by the OECD.

Contract Volume and Liquidity Requirements. In order to determine whether a particular Contract satisfies the volume and liquidity requirements described above, S&P Dow Jones Indices may use any available sources that it believes to be reasonably reliable including, but not limited to, data contained in the FIA Reports. In the event of manifest error, S&P Dow Jones Indices may supplement, and make corrections to, any such data.

Index Construction

Overview of the Index Construction

The S&P DFI is designed to capture both upward and downward price trends while moderating overall volatility. Components of the strategy are chosen based on fundamental characteristics and the liquidity needed for an investable model.

Position Determination.

The rule for the index regarding long or short positions is summarized as follows:

- **Long positions** are tracked when a component's current price input is greater than or equal to the exponential average of the past seven price inputs;

- **Short positions** are tracked when a component's current price input is less than the exponential average of the past seven price inputs.

The position is determined on the second to last S&P DFI business day of the month (defined as the position determination date, or PDD) when the monthly percentage change of a component'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 the *Appendix* for details regarding the exponential average. The weighted sum of the percentage changes of all the component prices equals the daily movement of the index.

The trade activity period (TAP) is the five S&P DFI business day period when the positions are executed from the first (1^{st}) thru the fifth (5^{th}) S&P DFI business days of the month.

The roll rules and procedures followed are those as specified in the *S&P GSCI Methodology*, sections VI.2 (b), VI.2 (c) and VI.2 (d).

Sectors versus Components

Effective as of the July 2012 rebalancing, all S&P DFI component positions are determined at the component level. For information on the methodology used prior to the July 2012 rebalancing, please contact S&P Dow Jones Indices' client support group.

No Short Exemptions

Prior to the July 2012 rebalancing, energy positions were restricted from short positions. Beginning with the July 2012 rebalancing, all S&P DFI component positions are determined independently and there is no short exemption for any components.

Index Maintenance

The S&P DFI is a strategy index designed to capture futures contract price trends, but futures contracts have limited durations. Consequently, for the index to be calculated through time 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. The following rules are observed in rolling the strategy futures contracts from an existing contract to the next contract:

- The non-currency component contracts are rolled from the current contract to the next contract beginning with the trade activity period (TAP) for the month that is two months before the current contract matures.

- The currency contracts are rolled from the current contract to the next maturing futures contract four times per year as of the first TAP for the month prior to the contract's final maturity month.

Chart 4 - Active contract schedule used for price inputs of the index

CONTRACT NAME	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
Unleaded Gas	H	M	M	M	U	U	U	Z	Z	Z	H	H
Copper	H	K	K	N	N	U	U	Z	Z	Z	H	H
Gold	J	J	M	M	Q	Q	Z	Z	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
Australian Dollar	H	H	M	M	M	U	U	U	Z	Z	Z	H
British Pound	H	H	M	M	M	U	U	U	Z	Z	Z	H
Canadian Dollar	H	H	M	M	M	U	U	U	Z	Z	Z	H
Euro	H	H	M	M	M	U	U	U	Z	Z	Z	H
Japanese Yen	H	H	M	M	M	U	U	U	Z	Z	Z	H
Swiss Franc	H	H	M	M	M	U	U	U	Z	Z	Z	H
U.S. Treasury Bond	H	M	M	M	U	U	U	Z	Z	Z	H	H
U.S. Treasury Note	H	M	M	M	U	U	U	Z	Z	Z	H	H

Chart 5 – Month Letter Codes

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 cash-settled 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 latter-dated futures contracts are little changed. The strategy avoids delivery issues by owning contracts that are outside of nearby delivery.

Chart 6 – Commodities, Contract Codes, and Exchanges.

Reuters Code	Bloomberg Code	Currency & Commodities Contracts	Exchange
AD	AD	Australian Dollar	Chicago Mercantile Exchange
BP	BP	British Pound	Chicago Mercantile Exchange
C	C	Corn	Chicago Board Of Trade
CC	CC	Cocoa	Intercontinental Exchange - US
CD	CD	Canadian Dollar	Chicago Mercantile Exchange
CL	CL	WTI Crude Oil	NYMEX
CT	CT	Cotton #2	Intercontinental Exchange - US
GC	GC	Gold	NYMEX
HG	HG	Copper	NYMEX
HO	HO	Heating Oil	NYMEX
JY	JY	Japanese Yen	Chicago Mercantile Exchange
KC	KC	Coffee 'C'	Intercontinental Exchange - US
LC	LC	Live Cattle	Chicago Mercantile Exchange
LH	LH	Lean Hogs	Chicago Mercantile Exchange
NG	NG	Natural Gas	NYMEX
RB	XB	RBOB Gasoline	NYMEX
S	S	Soybeans	Chicago Board Of Trade
SB	SB	Sugar #11	Intercontinental Exchange - US
SF	SF	Swiss Franc	Chicago Mercantile Exchange
SI	SI	Silver	NYMEX
TY	TY	US 10 Year Bond	Chicago Board Of Trade
URO	EU	Euro	Chicago Mercantile Exchange
US	US	US Long Bond	Chicago Board Of Trade
W	W	Chicago Wheat	Chicago Board Of Trade

Index Calculation

Daily Calculation

Spot Calculation. On a given business day, *d*, the spot price (*SPOT)* of the index containing *i* number of Components/Commodities (*c*) is calculated as follows:

$$\boxed{SPOT_d = \frac{\left(\sum_{c=1}^{i} TDW1 + SC1\right)}{NC_{old}} + \frac{(\sum_{c=1}^{i} TDW2 + SC2)}{NC_{new}}}$$

where

$\sum_{c=i}^{i} TDW1$ = The sum of the Total Dollar Weight (*TDW*) of each Component's (*c's*) Current Contract.

$\sum_{c=i}^{i} TDW2$ = The sum of the *TDW* of each Component (*c's)* next Contract

SC1 = The Short Component effective during the last month, expressed in the same terms as Contract Production Weights, (*CPWs*).

SC2 = The Short Component effective in the current month, expressed in the same terms as *CPWs*.

NC_{old} = Normalizing Constant effective during the last month

NC_{new} = Normalizing Constant effective during this month

The Short Component *(SC)* is allocated to the amount of weight remaining in the Index after the weights of each component has been defined based on the long and short positions and their respective percentage weights. Adding the weight of the Short Component to the sum of the weights of the Components will make the weights in the Index sum to 100%.

The Short Component is calculated as follows:

$$SC = \left(1 - \sum ComponentWeights\right) * 1000$$

Total Dollar Weight Calculation. On any day, *d*, the Total Dollar Weight (TDW) for Commodity *c* is the product of its Contract Production Weight, Contract Roll Weight and Daily Contract Price for the current and next contracts, respectively.

$$\boxed{TDWc_d = CPWc_d * CRWc_d * DCRPc_d}$$

where:

$TDWc_d$ = Total Dollar Weight for Commodity *c* on day *d*.

$CPWc_d$ = Contract Production Weight for Commodity *c* set on the first business day of the month.

$CRWc_d$ = Contract Roll Weights for Commodity *c* on day *d*

$DCRPc_d$ = Daily Contract Price for Commodity *c* on day *d*

Contract Production Weights. Are determined on the last business day of the month. The CPW value is calculated as follows:

$$CPW = \frac{ComponentWeight}{DCRP_d * 1000}$$

Contract Roll Weights Logic. On a given non-roll day, *CRW1* = 1 and *CRW2* = 0

During the Roll Period the CRW value is computed as follows:

For the S&P DFI the number of roll days is five (5).

$$CRW = \boxed{\frac{100\%}{number\ of\ roll\ days}} = 20\%$$

Since the number of roll days is five, 20% of its component will roll in and roll out daily, keeping the aggregate Component weight's 100%.

Days	CRW1	CRW2
1	0.8	0.2
2	0.6	0.4
3	0.4	0.6
4	0.2	0.8
5	0	1

The S&P DFI holds the roll for two (2) days after its completion, so the *CRW1* value during the roll hold days will be 0 and the *CRW2* value will
be 1.

Normalizing Constant

$$NC_{new} = NC_{old} * \frac{\sum\left(CPW_{new} * DCRP1_d + CPW_{new} * DCRP2_d\right) + SC1}{\sum\left(CPW_{old} * DCRP1_d + CPW_{old} * DCRP2_d\right) + SC2}$$

where

CPW_{new}	=	This month's Contract Production Weight
CPW_{old}	=	Last month's Contract Production Weight
SC1	=	The Short Component effective during the last month
SC2	=	The Short Component effective in the current month
$DCRP1_d$	=	Current contract price on day *d*
$DCRP2_d$	=	Next contract price on day *d*
NC_{old}	=	Normalizing Constant effective as of the last month

Excess Return Calculation. On any Business Day, the S&P DFI Excess Return (ER) index level is equal to the product of the S&P DFI ER index level on the immediately preceding S&P DFI Business Day multiplied by one plus the Contract Daily Return as of that day. The Index is calculated to a seven (7) digit precision.

$$ER_d = ER_{d-1} * \left[1 + CDR_d\right]$$

where

ERd	=	Excess Return Value for Business Day *d*.
ERd-1	=	Excess Return Value as of the immediate preceding Business Day.
CDRd	=	Contract Daily Return of the Index.

Contract Daily Return Calculation. The Contract Daily Return (*CDR*) on any Business Day, *d*, is equal to the ratio obtained by dividing the Total Dollar Weight Obtained by the Total Dollar Weight Invested on the immediately preceding Business Day, minus one.

$$CDR_d = \frac{TDWO_d}{TDWI_d} - 1$$

where

$TDWO_d$ = The Total Dollar Weight Obtained for Business Day *d*.

$TDWI_d$ = The Total Dollar Weight Invested as of the immediate preceding Business Day.

Total Dollar Weight Obtained. On any given day, *d*, the Total Dollar Weight Obtained (*TDWO*) is the amount obtained from an investment on the immediately preceding day. The TDWO for a given day is calculated using the *Component Weights* and *Contract Roll Weights* in effect on the immediately preceding day *d-1* and the Daily Contract Reference Prices used to calculate the S&P DFI Index on day *d*.

$$TDWO_d = \frac{NC_{new}}{NC_{old}} * \left[\left(\sum_{c=1}^{i}\left(CPWnew_d * CRW1_{d-1} * DCRP1_d\right) + SC1 * CRW1_{d-1}\right) + \left(\sum_{c=1}^{i}\left(CPWnew_d * CRW2_{d-1} * DCRP2_d\right) + SC2 * CRW2_{d-1}\right)\right]$$

where

$CPWnew_d$	=	Contract Production Weight of the Component on day *d*
$CRW1_{d-1}$	=	The roll-out percentage of the Contract Roll Weight on day *d-1*
$CRW2_{d-1}$	=	The roll-in percentage of the Contract Roll Weight on day *d-1*
$DCRP1_d$	=	Current contract price on day *d*
$DCRP2_d$	=	Next contract price on day *d*
$SC1$	=	Short Component effective last month
$SC2$	=	Short Component effective in the current month.
NC_{old}	=	Normalizing Constant effective as of the last month
NC_{new}	=	Normalizing Constant effective during this month

Total Dollar Weight Invested. On any given day, *d*, the Total Dollar Weight Invested (*TDWI*) is equal to the Total Dollar Weight of the immediate preceding business day *d-1* and can be calculated as follows:

$$TDWI_d = \frac{NC_{new}}{NC_{old}} * \left[\left(\sum_{c=1}^{i}\left(CPWnew_d * CRW1_{d-1} * DCRP1_{d-1}\right) + SC1 * CRW1_{d-1}\right) + \left(\sum_{c=1}^{i}\left(CPWnew_d * CRW2_{d-1} * DCRP2_{d-1}\right) + SC2 * CRW2_{d-1}\right)\right]$$

where

$CPWnew_d$	=	Contract Production Weight of the Component on day *d*
$CRW1_{d-1}$	=	The roll-out percentage of the Contract Roll Weight on day *d-1*
$CRW2_{d-1}$	=	The roll-in percentage of the Contract Roll Weight on day *d-1*
$DCRP1_d$	=	Current contract price on day *d-1*
$DCRP2_d$	=	Next contract price on day *d-1*
$SC1$	=	Short Component effective last month
$SC2$	=	Short Component effective in the current month.
NC_{old}	=	Normalizing Constant effective as of the last month
NC_{new}	=	Normalizing Constant effective during this month

Total Return Calculation. On any given calendar day, d, the Treasury Bill Return (*TBR*) is equal to an amount determined in accordance with the following formula:

$$TBR_d = \left[\frac{1}{1 - \frac{91}{360} * TBAR_{d-1}} \right]^{1/91} - 1$$

where:

$TBAR_{d-1}$ = The 3 month T-Bill Rate available on the immediately preceding Business Day, *d-1.*

On any Business Day, the value of the S&P DFI Total Return (TR) Index is equal to the product of (i) the value of the S&P DFI TR on the immediately preceding Business Day, (ii) one plus the sum of the Contract Daily Return and the Treasury Bill Return on the day on which the calculation is made, and (iii) one plus the Treasury Bill Return for each non S&P DFI Business Day since the immediately preceding S&P DFI Business Day. The result of the foregoing calculation is, then, rounded to seven (7) digits of precision. The calculation of the S&P DFI TR for any Business Day, *d,* is obtained by rounding the expression below to seven digits of precision.

$$SPDTITR_d = SPDTITR_{d-1} * (1 + CDR_d + TBR_d) * (1 + TBR_d)^{days}$$

where:

$SPDTSITR_{d-1}$ = The previous day's S&P DFI TR Index value
CDR_d = The Contract Daily Return on day *d*.
TBR_d = Treasury Bill Return on day *d*.
Days = Number of non-business bays since the last immediate preceding Business Day.

Glossary

Term	Description
CDR	Contract Daily Return
CPW	Contract Production Weight
CRW	Contract Roll Weight
DCRP	Daily Contract Reference Price
Active Contract	A liquid, actively traded Contract with respect to a Designated Contract, as defined or identified by the relevant Trading Facility or, if no such definition or identification is provided by the Trading Facility, as defined by standard custom and practice in the industry.
Contract Expiration	A date or term specified by the Trading Facility on or through which a Contract is traded as the date or term on, during or after which such Contract will expire, or delivery or settlement will occur. The contract expiration may, but is not required to, be a particular contract month.
NC	Normalizing Constant
Roll Period.	With respect to any Designated Contract, the period of five Business Days beginning on the 1^{st} Business Day of each calendar month and ending on the 5^{th} Business Day of such month.
ER Index	Excess Return Index, which is the accretion of the Contract Daily Return indexed to a normalized value
Spot Index	The index that reflects the price levels of the Designated Contracts and the CPW of each such Contract.
TR Index	The Total Return Index incorporates the returns of the ER Index and the Treasury Bill Return.
TDW	Total Dollar Weight
TDWO	Total Dollar Weight Obtained
TDWI	Total Dollar Weight Invested
TBR	Treasury Bill Rate

Index Data

In order to reflect the performance of a total return investment in commodities, three separate but related indices have been developed based on the S&P DFI.

1. The S&P DFI Spot Index, which is based on price levels of the contracts included in the S&P DFI.
2. The S&P DFI Excess Return Index (S&P DFI ER), which incorporates the returns of the S&P DFI Spot Index as well as the discount or premium obtained by “rolling” hypothetical positions in such contracts forward as they approach delivery.
3. The S&P DFI Total Return Index (S&P DFI TR), which incorporates the returns of the S&P DFI ER and interest earned on hypothetical fully collateralized contract positions on the commodities included in the S&P DFI.

Index Governance

Index Committee

S&P Dow Jones Indices has established an Index Committee to oversee the daily management and operations of the S&P DFI, and is responsible for all analytical methods and calculation of the indices. 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.

For information on Quality Assurance and Internal Reviews of Methodology, please refer to S&P Dow Jones Indices' Commodities Indices Policies & Practices document located under the Resource Center on our Web site, www.spdji.com.

Index Policy

Holiday Schedule

The S&P DFI is calculated daily based on the CME group holiday schedule. The Index is calculated when the majority of the S&P DFI contracts are open for official trading and official settlement prices are provided, excluding holidays and weekends.

For information on Calculations and Pricing Disruptions, Expert Judgment, Data Hierarchy and Unexpected Exchange Closures, please refer to S&P Dow Jones Indices' Commodities Indices Policies & Practices document located under the Resource Center on our Web site, www.spdji.com.

Contact Information

For questions regarding an index, please contact: index_services@spglobal.com.

Index Dissemination

Tickers

Index Name	Bloomberg Real Time	Bloomberg EOD
S&P DFI Index	SPDFI	SPDFII
S&P DFI Index ER	SPDFIP	SPDFIIP
S&P DFI Index TR	SPDFITR	SPDFIITR
S&P DCFI Index	SPDCFI	SPDFCI
S&P DCFI Index ER	SPDCFIP	SPDFCIP
S&P DCFI Index TR	SPDCFITR	SPDFCITR
S&P DFFI Index	SPDFFI	SPDFNI
S&P DFFI Index ER	SPDFFIP	SPDFFNP
S&P DFFI Index TR	SPDFFITR	SPDFFNTR

FTP

Daily constituent and index level data are available via FTP on subscription..

For further information, please refer to S&P Dow Jones Indices' Web site at *www.spdji.com* or contact an S&P Dow Jones Indices account manager.

Appendix

Component Futures Contracts

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

Futures Contract	Exchange	Symbol	Inclusion
Australian Dollar	CME	AD	February 1988
British Pound	CME	BP	January 1985
Canadian Dollar	CME	CD	January 1985
Euro (*replaced the German Mark*)	CME	EU	January 2000
German Mark	CME	DM	January 1985
Japanese Yen	CME	JY	January 1985
Swiss Franc	CME	SF	January 1985
US 10 Year Treasury Note	CBOT	TY	January 1985
US Treasury Bond	CBOT	US	January 1985

CBOT: Chicago Board of Trade
CME: Chicago Mercantile Exchange

Exponential Average Multiplier Schedule

To create an exponential average for comparison, price inputs (percentage change from current and previous six position determination dates, *PDDs*) are weighted using a multiplier per the schedule below, which is based on 1.6^0, 1.6^1, 1.6^2, 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 each month is based on its multiplier versus the accumulation of the multipliers. For example, the price seven months prior is 2.32% (1/43.072576), and so on. Therefore, 78.5% of the index's moving average is weighted to the price movements of the last three months, making current price movements more important than those of the more distant past.

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